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Psychometric evidence of the Woman Abuse Screening Tool in Peruvian women victims and non-victims of intimate partner violence

Evidencias psicométricas del Woman Abuse Screening Tool en mujeres víctimas y no víctimas de violencia de pareja

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Abstract

Objective: the present study evaluated the factorial validity, measurement invariance, reliability and graded response model of the WAST in a sample of female victims and non-victims of intimate partner violence. **Method:** A total of 285 Peruvian women participated (59.6% were victims of intimate partner violence and 40.4% were not victims of intimate partner violence), with ages ranging from 18 to 64 years and an average age of 31.73 years for victims of intimate partner violence and 26.54 years for non-victims. The confirmatory factor analysis (CFA) suggested a two-factor model that was significantly adjusted for the group of female victims of IPV and non-victims of IPV. **Results:** The multigroup CFA supported factorial invariance according to female IPV and non-IPV victims of the WAST. Reliability was adequate and was calculated using the omega coefficient. Finally, the WAST items showed adequate discrimination indexes and a correct ordering of the difficulty thresholds. **Conclusion:** The results showed that the WAST possesses good evidence of validity, reliability, invariance and graded response model in women victims and non-victims of IPV.

Keywords: partner violence; women; reliability and validity; psychometrics

Resumen:

Objetivo: la escala Woman Abuse Screening Tool (WAST), es una medida desarrollada para la detección de la violencia en la pareja. El presente estudio evaluó la validez factorial, invarianza de medida, confiabilidad y modelo de respuesta graduada del WAST en una muestra de mujeres víctimas y no víctimas de violencia de pareja. **Método:** Participaron un total de 285 mujeres (59.6% fueron víctimas de VP y 40.4% no fueron víctimas de VP) con una edad promedio de 31.73 para las víctimas de VP y 26.54 para las no víctimas de VP. **Resultados:** El análisis factorial confirmatorio (AFC) sugirió un modelo de dos factores para el grupo de mujeres víctimas de VP y no víctimas de VP. El AFC multigrupo apoyó la invarianza factorial según mujeres víctimas de VP y no víctimas de VP del WAST. La confiabilidad fue adecuada y se calculó mediante el coeficiente de omega. Finalmente, los ítems mostraron índices de discriminación adecuados y un orden correcto de los umbrales de dificultad. **Conclusión:** Los resultados muestran que el WAST posee buenas evidencias de validez, confiabilidad, invarianza y modelo de respuesta graduada en mujeres víctimas de VP y no víctimas de VP.

Palabras claves: violencia de pareja; mujeres; confiabilidad y validez; psicometría

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Introduction

Intimate partner violence (IPV) has become a serious public health problem that is highlighted worldwide and affects women's fundamental rights (Miller & McCaw, 2019), generating serious consequences at the physical, psychological, sexual, and economic levels (Vilariño et al., 2018; McCauley et al., 2018; Savage, 2021). Most reported cases of intimate partner violence are through male perpetration towards women (World Health Organization [WHO], 2002; Benebo et al., 2018). The WHO (2021) reports that at least 30% of women have experienced physical and sexual violence by their partners. Additionally, between 20% and 75% of women have been victims of psychological and/or verbal violence by their partners at some point in their lives. In Latin America, intimate partner violence (IPV) rates reported high levels in countries such as Bolivia (60.3%), Argentina (29.4%), Colombia (32%), Nicaragua (20%), the Dominican Republic (19%), Mexico (19%), Brazil (19.6%), and Chile (19.2%) (Bot et al., 2021).

In Peru, the National Institute of Statistics and Informatics [INEI] (2019) reports that 63.2% of women have suffered some type of violence by their partner. For example, 30.7% physical violence, 58.9% verbal-psychological violence and 6.8% sexual violence. According to various studies, IPV stressors such as financial problems and social disconnection minimize the ability of victims to seek support (Finkel & Hall, 2018). Also, the psychological effects of the victim can lead to problems with anxiety, depression, alcohol abuse, and drug use (Bacchus et al., 2018; Chandan et al., 2019). According to the Ombudsman's Office (2022), another of the most devastating consequences of the IPV was that there had been 146 feminicides, of which 52% of the perpetrators were the victims' partners or ex-partners and 13% of the cases were reported as missing persons. On the other hand, Agüero (2021) indicates that COVID-19 and the lockdown measures increased the risk of violence against women, with a 48% rise in calls to “Linea 100” for cases of violence between April and July 2020. However, Román-Lazarte et al. (2023) report a trend towards a decrease in violence after the COVID-19 lockdown, although this is subject to various factors, such as the risk of the victim remaining at home with their aggressor due to strict confinement rules, fear of contagion preventing the reporting of violent incidents, and differences in cases of violence between urban and rural areas.

Research on IPV has been conducted through sociodemographic variables such as gender, age, residence area, poverty, economic dependence, and alcohol consumption (Trinh et al., 2016; Martín-Fernández et al., 2018; Savage, 2021). However, there are also integrative conceptual models that involve perceptions,

attitudes, habits and beliefs (Zark & Satyen, 2021). In this way, IPV is promoted through social acceptance and cultural normalization, where perpetrators justify their actions through their beliefs and experiences at home (Tiruye et al., 2020; Flood & Pease, 2009); and victims generate feelings of guilt for the events of violence and for not reporting in a timely manner (Neville et al., 2004). Therefore, intimate partner violence has different levels in society modulating prevalence, detection and intervention.

The COVID-19 pandemic through state containment measures such as social isolation, business closures, restrictions on non-essential public services, travel bans, and distancing has had a profound impact on families and victims of intimate partner violence (Holmes et al., 2020). Studies report that unemployment, housing insecurity and financial problems can generate relational conflicts leading to increased intimate partner violence (Peitzmeier et al.,2021). On the other hand, the pandemic has forced women to stay at home with their abuser; as well as, the psychological problems of victims have been exacerbated by exposure to violence (Vigo et al., 2020; Pfefferbaum & North, 2020). In addition, social isolation has generated a higher risk of intimate partner violence, preventing women from being able to seek support from their social network (Van Gelder et al., 2020) and victims from having timely attention for complaints and intervention when faced with IPV facts (Cheng & Lo, 2019).

The need to detect victims experiencing violence has led to the development of measurement tools, allowing risk assessment and victim safety planning to become integral actions that care professionals take into account (Messing, 2019). In this sense, having measures with evidence of validity and reliability on intimate partner violence is essential for research, care, and intervention processes (Powell & Webster, 2018). Previous psychometric research has addressed the measurement of intimate partner violence, but some limitations have been identified. Some tools, like the Coercion in Intimate Partner Relationships Scale (CIPR), have been developed in the United States. This scale assesses subscales such as demand, threat, surveillance, and response to demand. Although it is an instrument with strong theoretical backing, its considerable length (202 items) makes it difficult to use, and the validity and reliability findings are not generalizable to other Latin American contexts (Wilson & Timmons Fritz., 2021). Another tool with adequate psychometric properties is the Intimate Partner Violence Against Women Acceptability Scale (A-IPVAW). However, its application has been limited to samples from the general population (Villagrán et al., 2022) and university students (García-Carpintero et al., 2018), which complicates the generalization of results. Additionally, other tools, such as the Multiple Intimate Partner Violence

Questionnaire and the Revised Dating Violence Questionnaire (CUVINO-R), have used exploratory and confirmatory factor analysis, but have not considered processes like item response theory to assess item difficulty and discrimination (Fernández et al., 2022; Alfaro, 2020). Therefore, it is essential to develop robust psychometric measures to assess intimate partner violence in victims, both in research settings and in the general population.

The Woman Abuse Screening Tool (WAST), a measure developed in the United States by Brown et al. (1996), is a screening tool to assess intimate partner violence and is used by family physicians during routine office visits or well-being examinations of women. This tool has been validated in mothers during the postpartum period (Vivilaki et al., 2010), abused and non-abused women (Guiguet-Auclair et al., 2021), university students (Wong et al., 2017), pregnant women (Zapata-Calvente et al., 2022; Kita et al., 2016) and women with mental disorders (Salahi et al., 2018). Likewise, WAST has been translated into languages such as Spanish (Fogarty & Brown, 2002), Portuguese (Matavel et al., 2021), Greek (Vivilaki et al., 2010), French (Guiguet-Auclair et al., 2021), Indonesian (Iskandar et al., 2014) and Japanese (Kita et al., 2016).

The intimate partner violence screening tool (WAST) has generated great interest in evaluating its psychometric properties. Plazaola-Castaño et al. (2008) found a sensitivity of 91.4% and specificity of 76.2%. Also, a positive predictive value of 40.2% and a negative value ohf 98.1%. Likewise, another study reported sensitivity values of 97.7% and specificity of 97.1%. In addition, a positive predictive value of 97.2% and a negative predictive value of 97.7% (Guiguet-Auclair et al., 2021). Another research recorded that WAST has good accuracy values (sensitivity 66.7-71.4% and specificity of 89.7%) (Kita et al., 2016).

Other validity evidence procedures based on internal structure were conducted by Wong et al. (2017); through an exploratory factor analysis they found a bifactorial structure, one factor related to distress and the second factor to physical, psychological and sexual violent acts in the relationship. In addition, through a confirmatory factor analysis, satisfactory goodness of fit indexes were obtained (RMSEA = .05, CFI = .99, TLI = .98 and WRMR = .69). Likewise, Vivilaki et al. (2010) examined the psychometric evidence of the WAST, where through an exploratory factor analysis they found a bifactorial model considering a first factor of "emotional and physical abuse" and the second factor " strain in the relationship". The factor structure was tested through a confirmatory factor analysis, finding good fit indexes (CFI = 0.95, NFI = 0.92, SRMR = 0.051). Thus, through the psychometric review of the WAST studies, there is limited evidence of validity and reliability

through item response theory procedures in female victims and non-victims of IPV. In Latin America, Chile culturally adapted the WAST through focus groups that changed some items to facilitate its understanding; likewise, the accuracy values of the WAST were adequate, with a sensitivity of 100% and a specificity of 96% (Binfa et al., 2018)

For that reason, the main objective of the present study is to analyze the psychometric evidence of the WAST in a sample of women who have and have not suffered IPV in the Peruvian context. The exploration of the psychometric properties of the WAST through its evidence of validity, invariance, reliability, and discrimination and difficulty parameters will be important for the detection, care and intervention of intimate partner violence.

Methods

Design

The present research is instrumental (Montero & León, 2005); since it uses knowledge acquired under a rigorous, organized and systematic approach to know the reality.

Participants

A purposive non-probabilistic sampling method was used with a sample of 285 Peruvian women. For sample size calculation, the recommendations of Svetina (2024) were considered, highlighting a minimum of 250 participants when using polytomous models of Item Response Theory (IRT), such as the Graded Response Model (GRM), and taking into account the length of the instrument. The sample was divided into two subsamples: victims and non-victims of intimate partner violence (59.6% women victims of IPV and 40.4% women non-victims of IPV). The sample of women victims of IPV (n = 115) belonged to an integral care program for family violence that belongs to the government and provides psychological, social and legal care services; among the inclusion criteria: a) having filed a complaint for IPV, b) being over 18 years of age, and c) signing informed consent. For the sample of women who had not been victims of IPV (n = 170), it was taken into account, to be older than 18 years and to sign the informed consent. Table 1 describes the sociodemographic characteristics of the sample.

Table 1. *Sociodemographic data of the sample*

Characteristics	Women victims of IPV (n=115)	Women non-victims of IPV (n=170)
Level of education (%)		
Without studies	2 (1.9%)	0 (0%)
Elementary School	11 (10.5%)	1 (0.6%)
Secondary School	65 (61.9%)	27 (15.9%)
Tecnician	20 (19%)	17 (10%)
Higher Education	17 (16.2%)	125 (73.5)
Age (M ± DE)	31.73 ± 10.83	26.54 ± 9.11
Marital status (%)		
Single	50 (43.5%)	110 (64.7%)
Married	13 (11.3%)	26 (15.3%)
Live-in partner	44 (38.3%)	29 (17.1%)
Divorced	8 (7.0%)	5 (2.9%)
Employment status (%)		
Employee	68 (59.1%)	46 (27.1%)
Unemployed	17 (14.8%)	22 (12.9%)
Housekeeper	22 (19.1%)	13 (7.6%)
Student	8 (7.0%)	89 (52.4%)
Monthly family income (M ± SD)	835.65 ± 819.86	1 884.46 ± 2 298.63
N° of children	2.10 ± 1.58	0.64 ± 1.06
Pregnant?		
Yes	12 (10.4%)	7 (4.1%)
No	103 (89.6%)	163 (95.9)
Relational bond of the couple		
Husband	14 (12.2%)	25 (14.7%)
Former husband	5 (4.3%)	4 (2.4%)
Live-in partner	44 (38.3%)	29 (17.1%)
Former live-in partner	39 (33.9%)	6 (3.5%)
Boyfriend	4 (3.5%)	62 (36.5%)
Former boyfriend	9 (7.8%)	44 (25.9%)

Instrument

Sociodemographic data file. The sociodemographic file collected data about the participants, such as age, education level, marital status, number of children, employment status, monthly family income, pregnancy, and the couple's relationship.

Woman Abuse Screening Tool (WAST). The instrument was created in the United States with the intention of assessing dating violence in women who were users of primary care services (Brown et al., 1996). The instrument is composed of 8 items and evaluates the degree of tension, couple´s dynamics, episodes of physical, psychological and sexual cruelty. The woman rates each of the items using a Likert-type response scale with 3 response options (1 = Many times; 2 = Sometimes and 3 = Never). Total scores range from 8 to 24, where a high score indicates a more severe level of violence. The questionnaire was translated into Spanish by Fogarty and

Brown (2002) in Spanish-speaking patients. Likewise, the Spanish version showed favorable evidence of validity and reliability.

Mental Health Inventory-5 (MHI-5). The Brief Mental Health Scale is composed of 5 items (MHI-5, from its initials in English) and adapted to Spanish by Rivera-Riquelme et al. (2019). The scale was designed to be used among the population in general, including items of psychological well-being (Berwick, et al., 1991). The scale is composed of 5 items and assesses psychological well-being (items 2 and 4) and psychological distress (items 1, 3 and 5). The scale uses 4 response categories (from never to always) and a higher score is evidence of a better state of mental health. The psychometric properties demonstrate an acceptable two-dimensional structure (CFI = .99; TLI = .99; RMSEA = .071) and with a reliability calculated by omega for the dimensions of psychological well-being (ω =0.75) and psychological distress (ω = 0.79) acceptable. of 0.83. Thus, the MHI-5 is an instrument with strong psychometric evidence (Vilca et al., 2022).

Generalized Anxiety Disorder 2-item Scale, GAD-2. It is an instrument designed to measure GAD and the intensity of anxious symptoms. The full 7-item version is used to assess anxious symptoms during the last 2 weeks, using a 4-point Likert scale. The instrument is available on the Patient Health Questionnaire website (http://www.phqscreeners.com) in its Spanish adaptation 5. The psychometric evidence of the GAD-7 has an internal consistency of Cronbach's alpha of 0.826. The abbreviated version consists of the first two items of the GAD-2; the internal consistency of both items shows a reliability of 0.879 and an adequate correlation with the GAD-7 (Pearson's r = 0.940; p<0.01). Therefore, the GAD-2 questionnaire shows adequate evidence of validity and reliability.

Patient Health Questionnaire-2 (PHQ-2). The patient health questionnaire is composed of the first two items of the PHQ-9 and evaluates cognitive and emotional aspects associated with depression. It is an ultra-brief measure in which it showed a sensitivity of 86% and 61%7. For the present study we used the version adapted to Spanish taken from the Pfizer website (https://www.phqscreeners.com), which has adequate evidence of reliability of Cronbach's alpha 0.738 [95% CI, 0.699, 0.773].

Procedure

For the development of the research, approval was obtained from the Ethics Committee with registration number 020-2022-CEI-UTP. The sample was divided into female victims and non-victims of IPV.

The group of women victims of IPV belonged to a Peruvian state program for integral attention to family violence. Initially, the women victims of IPV received psychological, social and legal counseling services. Afterwards, the evaluation of the instruments was carried out individually and in the company of a psychologist. The time of data collection was between the months of January to September 2022. For the group of women not victimized by IPV, recruitment was done through social media advertisements (Facebook, twitter, Instagram and WhatsApp) and a snowball approach was used. The advertisement specified assessment through IPV measurement instruments. The data collection time for women who were not victimized by IPV was between the months of July to September 2022.

The participants were informed about the nature of the questionnaires before the start of the study, informing them that they could omit any question or interrupt the evaluation if they felt uncomfortable. The objective of the study was specified and voluntary participation was informed. The informed consent form was presented to them and after signing it, they were provided with the questionnaires for their development. The study followed the ethical guidelines of the American Psychological Association (APA).

Data analysis method

Data analysis was performed in four stages. The first stage calculated descriptive measures such as mean, standard deviation, asymmetry (g1) and kurtosis (g2) per item of the total sample, victims and non-victims of IPV. Subsequently, univariate normality was assessed through asymmetry and kurtosis scores, where values should be kept between +/- 1.5 (Ferrando & Anguiano-Carrasco, 2010). Multivariate normality was obtained through the Mardy coefficient for asymmetry and kurtosis (Cain et al., 2017).

In the second stage, the confirmatory factor analysis (CFA) was performed, where two factor structures of the WAST were tested (Model 1 = one-dimensional, Model 2 = two-dimensional). The CFA used a maximum likelihood estimator with robust corrections (MLR, Yuan & Bentler, 2000; Chin, 1998), given the ordinal nature of the items (three categories) and multivariate non-normality (Finney & DiStefano, 2013). Fit indexes for factor models such as Chi-square test ($\chi 2$), degrees of freedom (df), comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized root mean square residuals (SRMR) were assessed. For model fit, the SRMR and RMSEA indexes were assessed to obtain values lower than .08 and the CFI higher than .90 (DiStefano et al., 2018; Schumacker & Lomax, 2015; Fornell & Larcker, 1981). Factor loadings (λ) greater than .50 to be considered acceptable

(Dominguez-Lara, 2018). For the analysis of factorial invariance between female victims and non-victims of IPV, the multigroup CFA was performed by evaluating progressive restrictions (configurational invariance model, metric and scalar model) and analyzing the changes in the values of $\Delta\chi 2$, IFC and RMSEA (Brown, 2015; Cheung & Rensvold, 2002).

The third stage consisted of reliability analysis through internal consistency by McDonald's Omega coefficient (ω) and its 95% confidence intervals.

In the fourth stage, the Item Response Theory model (IRT) was used using the graded response model (GRM) for categorical polytomous items (Samejima, 2007). Discrimination (a) and difficulty (b) parameters were calculated for each item. For discrimination (a) to be adequate, it must be higher than 1, demonstrating the individual's level of ability. On the other hand, the difficulty parameter determines the amount of latent trait required as a response to the item. The WAST has three response options, and obtained two difficulty estimates per threshold. In addition, the Test Information Curve (TIC) and the Test Information by Item (TIIC) were used to analyze item performance.

Data analysis was performed using the Rstudio statistical program (version 4.0.3) together with the lavaan, psych, MVN, ltm and MBESS libraries.

Results

Table 2 shows the descriptive measures of the WAST where it is observed that item 3 ("At the end of arguments, do you feel down or bad about yourself?") has the highest mean (M = 2.10; SD = 0.77); while item 8 ("Has your partner abused you sexually?") obtained the lowest value (M = 1.27; SD = 0.50). Univariate normality through the evaluation of asymmetry and kurtosis, where most of the items show adequate values lower than +/- 1.5 (Finney & DiStefano, 2006). However, items 5, 7 and 8 present an asymmetric response behavior with a high concentration of scores in the first response options. In this way, the univariate and multivariate measures reveal an asymmetric distribution. The WAST items, being ordinal in nature, require non-parametric analysis.

Table 2. *Descriptive statistics of the WAST*

Items WAST	Total sample (n = 285)				Victims of IPV (n = 115)				Non-victims of IPV (n = 170)			
	M	SD	g1	g2	M	SD	g1	g2	M	SD	g1	g2
W1	2.03	0.81	-0.05	-1.49	2.74	0.46	-1.34	0.46	1.55	0.63	0.69	-0.53
W2	2.03	0.79	-0.06	-1.41	2.72	0.45	-0.98	-1.05	1.56	0.61	0.59	-0.61
W3	2.1	0.77	-0.17	-1.29	2.76	0.43	-1.18	-0.61	1.65	0.61	0.35	-0.69
W4	1.57	0.69	0.8	-0.58	2.19	0.58	-0.02	-0.32	1.15	0.37	2.31	4.42
W5	2.01	0.83	-0.01	-1.56	2.77	0.47	-1.74	2.12	1.49	0.6	0.76	-0.42
W6	1.59	0.73	0.79	-0.73	2.27	0.58	-0.11	-0.56	1.14	0.38	2.75	7.26
W7	1.99	0.81	0.01	-1.49	2.7	0.5	-1.25	0.45	1.52	0.62	0.76	-0.44
W8	1.27	0.5	1.69	1.99	1.57	0.61	0.56	-0.64	1.06	0.27	4.37	20.27
Mardía			597.9**	9.25**			311.7**	6.18**			1432.1**	38.72**

Note: M = mean, SD = standard deviation, g1 = asymmetry, g2 = kurtosis.

Evidence based on internal structure. A confirmatory factor analysis was performed testing 2 models of the WAST. The unidimensional model (model 1) showed a mediocre fit for the total sample (CFI = .90, RMSEA = .17), victims of IPV (CFI = .64, RMSEA = .18) and non-victims of IPV (CFI = .79, RMSEA = .20). On the other hand, the 2-factor model (model 2) of psychological (items 1, 2, 3, 5 and 7) and physical-sexual violence (items 4, 6 and 8) obtained an acceptable fit in the total sample (CFI = .99, RMSEA = .04), victims of IPV (CFI = .99, RMSEA = .01) and non-victims of IPV (CFI = .97, RMSEA = .07). Given these results, the two-factor model (model 2) was chosen as the baseline for the invariance tests.

Table 3. *Goodness-of-fit indexes of the WAST*

Sample	Models	χ^2	*gl*	CFI	RMSEA	RMSEA [CI 90%]	SRMR
Total sample (n=285)	Model 1	194.3	20	0.90	0.17	[0.15-0.20]	0.05
	Model 2	26.62	19	0.99	0.04	[0.00-0.07]	0.01
Víctims of IPV (n=115)	Model 1	90.71	20	0.64	0.18	[0.13-0.22]	0.09
	Model 2	10.35	19	0.99	0.01	[0.00-0.02]	0.03
Non-víctims of IPV (n=170)	Model 1	151.06	20	0.79	0.20	[0.18-0.22]	0.09
	Model 2	34.93	19	0.97	0.07	[0.03-0.11]	0.05

Note: Model 1 = one-dimensional; Model 2 = two-dimensional; $\chi 2$ = Chi-square; gl = degrees of freedom; CFI = comparative fit index; RMSEA = root mean square error of approximation; CI = confidence intervals; SRMR = standardized root mean square residual.

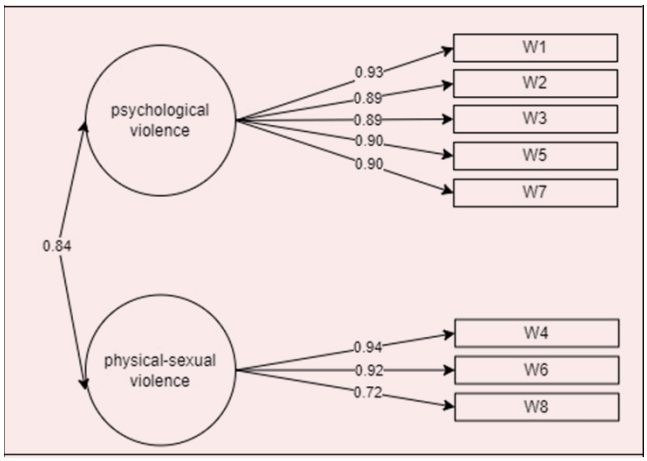

Figure 1. *Two-dimensional structure of the WAST*

The factor loadings for the two-dimensional model, which demonstrated a better fit, vary according to the sample analyzed. In the total sample, the psychological violence factor has loadings between 0.89 and 0.93, while the physical-sexual violence factor ranges from 0.72 to 0.94 (Figure 1). On the other hand, in the sample of intimate partner violence (IPV) victims, the psychological violence factor has factor loadings between 0.41 and 0.68, and the physical-sexual violence factor ranges from 0.66 to 0.83. Finally, in the sample of non-victims of intimate partner violence (IPV), the psychological violence factor shows factor loadings between 0.80 and 0.94, and the physical-sexual violence factor ranges from 0.62 to 0.93

Table 4. *Factorial loadings of the WAST items*

Sample	Models	*Factors*	Items							
			W1	W2	W3	W4	W5	W6	W7	W8
Total sample (n=285)	Model 1	FU	0.92	0.89	0.89	0.82	0.91	0.82	0.90	0.61
	Model 2	F1	0.93	0.89	0.89	-	0.90	-	0.90	-
		F2	-	-	-	0.94	-	0.92	-	0.72
Víctims of IPV (n=115)	Model 1	FU	0.55	0.39	0.63	0.61	0.58	0.51	0.58	0.53
	Model 2	F1	0.60	0.51	0.68	-	0.65	-	0.66	-
		F2	-	-	-	0.83	-	0.66	-	0.68
Non-víctims of IPV	Model 1	FU	0.92	0.86	0.79	0.65	0.81	0.68	0.85	0.56
	Model 2	F1	0.94	0.87	0.8	-	0.8	-	0.85	-
		F2	-	-	-	0.93	-	0.90	-	0.62

Note: Model 1 = one-dimensional; Model 2 = two-dimensional; FU = single factor; F1 = psychological violence factor; F2 = physical-sexual violence factor.

The goodness-of-fit indexes for the factorial invariance test of the two-dimensional model (psychological and physical-sexual violence) were calculated through the inclusion of restrictions (configural, metric and scalar invariance). The invariance between victims of IPV and non-victims of IPV was tested, finding evidence of scalar invariance. The proposed sequence: metric invariance (ΔCFI = -.003; ΔRMSEA = -.001) and scalar invariance (ΔCFI = -.014; ΔRMSEA = .004).

Table 5. *Structural invariance of the WAST*

Models	χ2	gl	*p*	SRMR	TLI	CFI	RMSEA	Δχ2	Δgl	ΔCFI	ΔRMSEA
Configural	39.906	38	0.385	0.039	0.998	0.998	0.018	-	-	-	-
Metric	63.968	44	0.026	0.062	0.981	0.985	0.056	22.083	6	-0.013	0.038
Scalar	74.404	50	0.014	0.071	0.979	0.981	0.058	6.006	6	-0.004	0.002

Note: χ2=Chi-square; gl = degrees of freedom; SRMR = root mean square standardized residual root; TLI = Tucker Lewis Index; CFI = comparative fit index; RMSEA = root mean square error of approximation; Δχ2 = change in chi-square; Δgl = change in degrees of freedom; ΔCFI = change in comparative fit index; ΔRMSEA = change in root mean square error of approximation.

Reliability. The reliability of the two-dimensional WAST model was determined through internal consistency using the omega coefficient (ω) and Cronbach's alpha (α). Acceptable values were found for the psychological violence factor (ω = 0.95; 95% CI, 0.94; 0.96; α = 0.95) and the physical-sexual violence factor (ω = 0.92; 95% CI, 0.89; 0.93; α = 0.91).

Convergent and discriminant analyses. The correlations between the dimensions of intimate partner violence in the WAST and other constructs showed theoretically congruent relationships. Evidence of discriminant validity was found in the negative correlations between mental health and the dimensions of psychological violence (r = -0.86, p<0.01) and physical-sexual violence (r = -0.75, p<0.01). On the other hand, evidence of convergent validity showed that psychological violence was positively correlated with depression (r = 0.83, p<0.01) and anxiety (r = 0.85, p<0.01). Similarly, physical-sexual violence was positively correlated with depression (r = 0.73, p<0.01) and anxiety (r = 0.74, p<0.01).

Item response theory model. According to the results of the confirmatory factor analysis (CFA), the two-dimensional model considering the psychological violence and physical-sexual violence factor of the WAST was taken into account through Graded Response Models, using the 2-parameter logistic model for each dimension. Table 6 shows the discrimination column (a) per item of each dimension, obtaining values higher than 1, demonstrating an acceptable discrimination among subjects. The difficulty columns (b1) to (b2) show monotonically ordered estimates for the difficulty of the WAST.

Table 6. *Discrimination and item difficulty parameters by dimension of the WAST*

Dimensions	Item	*a*	b_1	b_2
Psychological violence	W1	4.542	-0.732	0.238
	W2	3.332	-0.657	0.517
	W3	2.255	-1.421	0.637
	W5	3.763	-0.197	0.667
	W7	3.723	-0.317	0.686
Physical-sexual violence	W4	5.895	-1.564	-1.145
	W6	4.960	-1.800	-1.290
	W8	1.131	0.133	1.502

Note: a = Discrimination parameter; b = Difficulty parameters

Figure 2 shows the test information curves for each dimension. It can be seen that the reliability (accuracy) of the psychological violence dimension is in a range of -1.8 and 1.5; and the physical-sexual violence dimension shows a range of -2 and -1.

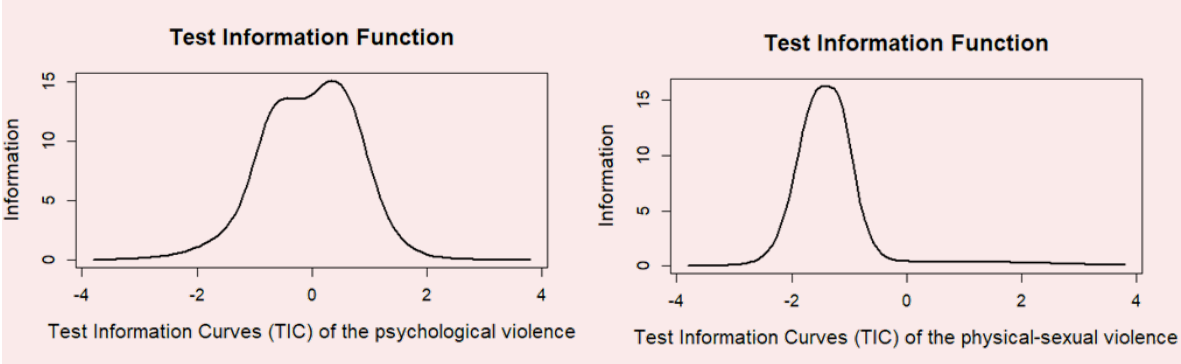

Figure 2. *Information curves by dimensions of the WAST*

Figure 3 shows the information curves by item for each dimension. In the psychological violence dimension, item 1 is the most accurate for the evaluation of the latent trait. In the physical-sexual violence dimension, item 4 is the one that shows the highest discriminatory capacity for the measurement of the variable.

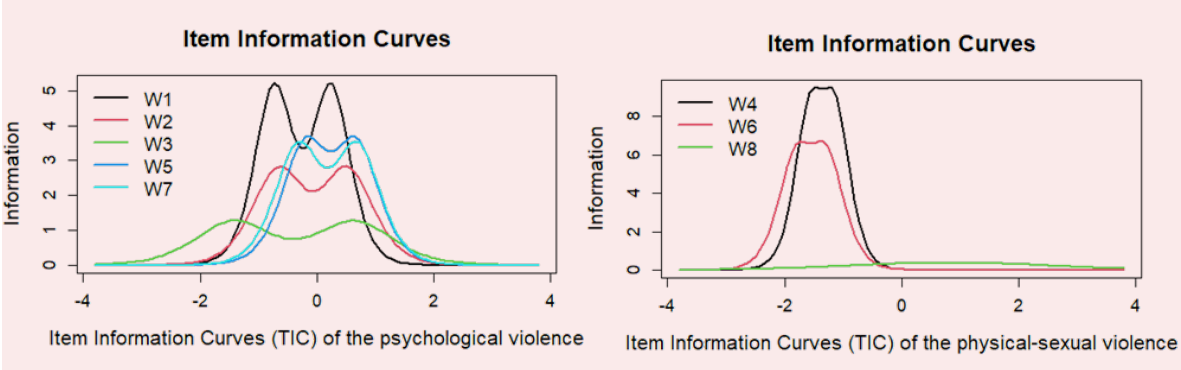

Figure 3. *Information curves by items According to the WAST Dimension*

Discussion

Intimate partner violence is a complex phenomenon influenced by the sociocultural context, which includes psychological, physical and sexual violence as an expression of harm (El Morr & Layal, 2020). Thus, proper assessment of intimate partner violence provides guidelines for timely referral, care and intervention processes. The WAST is a rapid clinical diagnostic measure for the detection of intimate partner violence. Therefore, the present study evaluated the internal structure, analysis of invariance between victims and non-victims of IPV, internal consistency reliability, and discrimination and difficulty parameters through the item response theory model of the WAST.

The factor structure confirmed the two-dimensionality across psychological and physical-sexual violence of the WAST in the total sample and the subsamples of IPV victims and non-victims of IPV -supporting the multidimensionality of the construct (Wong et al., 2017; Vivilaki et al., 2010). These findings resemble the study of a systematic review establishing the tools used to measure the perpetration of intimate partner violence; they are established through psychological, physical and sexual abuse, where through AFE and CFA procedures the internal structure of the instruments is tested (Tarriño-Concejero et al., 2022), such as the multidimensional dating violence scale (EMVN, García-Carpintero et al., 2018) and the dating violence questionnaire (CUVINO, López-Cepero et al., 2016). The WAST suggests a two-dimensional structure, where the psychological violence factor is comprised of items related to partner tension (items 1-3) such as coercion, rigidity and arguments; likewise, emotional abuse (items 5 and 7) such as insults, manipulations, intimidation and humiliation (Dokkedahl et al., 2019).

In addition, measurement invariance between female victims and non-victims of IPV was reported to verify that the theoretical structure was similar (Dimitrov, 2010). The results of the multigroup analysis determined that configurational, metric, and scalar invariance supported the two-dimensional model for both victims and non-victims of IPV. This suggests that the 8 items conceptually fit the hypothesized configuration for both female victims and non-victims of IPV. Metric invariance through constraining factor loadings showed that the items load adequately on their latent factors for both female victims and non-victims of IPV. Scalar invariance suggests that the relationship between observed and latent WAST scores is invariant across female victims and non-victims of IPV.

On the other hand, the WAST demonstrated acceptable internal consistency in the total sample and subsamples. These results allow inferring that the WAST is a

consistent instrument for measuring intimate partner violence in female victims and non-victims of IPV. The reliability findings are similar to the original study (Fogarty & Brown, 2002). Likewise, other studies obtained acceptable reliability in validations of the WAST (Iskandar et al., 2014; Plazaola-Castaño et al., 2008; Vivilaki et al., 2010; Wong et al., 2017).

The relationship between WAST scores with MHI-5, GAD-2 and PHQ-2 scores suggested the existence of positive correlations between intimate partner violence, anxiety and depression. A meta-analytic study suggests that relationship tension increases when there is betrayal, insecurity, and impulsive language, which contributes to a negative interaction cycle that includes anxiety (Spencer et al., 2020). Thus, repeated exposure to violence in the battered woman produces learned helplessness that restricts responsiveness to external demands, resulting in submission and anxiety in the abusive relationship (Choi et al., 2019). Moreover, the results are consistent, relating intimate partner violence to depressive symptoms. Research reports strong associations of emotional, physical, and sexual forms of violence with depressive symptomatology; in this way, the continuity of violent events, hopelessness, isolation, and low self-esteem may promote possible depression (Okafor et al., 2018). In a mediational study, it was found that the bidirectional role of violence may lead to higher levels of depression in women (Han et al., 2019). Thus, empirical results suggest that both anxiety and depression are strongly linked to victimization and perpetration of intimate partner violence (Hegarty et al., 2013). A meta-analytic study indicates that the most common mental problems in female victims of intimate partner violence are the use of negative emotions, depression, and body image-related problems (Spencer et al., 2019).

The use of IRT in the study of the psychometric evidence of the WAST constitutes an important strength of this article, since no psychometric validation research of the WAST has applied this theoretical model through the parameters of difficulty and discrimination. WAST item discrimination was found to be higher than 1 and therefore adequate. On the other hand, the estimates of the difficulty parameters increased monotonically; therefore, it is acceptable. The measurement information curves study the degree of accuracy of the instrument, being the WAST accurate in its low, moderate and high levels of intimate partner violence. In the psychological violence factor, item 1 has better discrimination for the assessment of the latent trait. This item is related to general tension in the couple's relationship. In the physical-sexual violence factor, item 4 has better discrimination for the evaluation of the latent trait. The item explores physical aggression as a result of continuous arguments within a couple; being useful to identify if a woman is a victim

of physical violence. Thus, the discrimination and difficulty values are within the appropriate parameters (Hambleton et al., 2010).

The results should be interpreted taking into account the following limitations. First, the scale was developed in a Peruvian sociocultural context. Therefore, cross-cultural research is required for the generalization of the results to other settings. The second limitation is the type of sampling, where the recruitment process was by convenience. Although these types of processes have proven to be effective, they have advantages and disadvantages that limit the generalization of the results (Stratton, 2021). Third, the cross-sectional nature of the study limits the results of invariance and relationship with other WAST variables, since longitudinal studies are required for their verification. Fourth, the study was composed entirely of women. In the future it would be important to have a more diverse sample, including men. Finally, for IRT models with polytomous data it is suggested to have a sample larger than 500 participants (de Ayala, 2013).

Conclusions and contributions of the study

Despite the limitations of the study, there are important practical contributions, because the existence of a brief and quickly applicable measure would help professionals working in the forensic and clinical context, especially professionals working with victims of intimate partner violence. Women victims of intimate partner violence often undergo lengthy evaluations that impair outcomes. Therefore, the existence of a brief questionnaire could improve the assessment processes. On the other hand, the WAST, being a tool with good evidence of validity and reliability for the assessment of intimate partner violence, will allow professionals to make more appropriate decisions for referral, intervention and treatment procedures. Another important contribution is that intimate partner violence, being a public health problem that directly affects women, can be examined through measures with good psychometric evidence that evaluate variables related to intimate partner violence, promoting the development of prevention and intervention programs. On the other hand, measuring intimate partner violence allows scholars to investigate the relationship with other aspects related to the construct. Also, this study contributes at the methodological level by applying IRT (Toland, 2014) and TCT for the analysis of the psychometric properties of the WAST.

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