Confirmatory Factor Analysis and Measurement Invariance of the Perception of Partner Psychological Abuse (PPPA) in Nigeria and South Africa

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Abstract

Purpose: Examining the psychometric properties of a research scale is a critical step in ensuring its reliability and validity. This study evaluates the psychometric properties of the **Perception of Partner Psychological Abuse (PPPA)** scale, developed to assess individuals' perceptions of psychologically abusive behaviors in intimate relationships, in Nigeria and South Africa. **Methods:** The study involved participants (N = 823) who were predominantly Black (African) (98.5%), with females (n = 452, 54.9%) and males (n = 371, 45.1%) from Nigeria (n = 291) and South Africa (n = 532). Various confirmatory factor analysis (CFA) models were used to assess the scale's factor structure and dimensionality. Measurement invariance procedures were employed to evaluate the equivalence of the factor structure across gender and country. Construct validity, including both convergent and discriminant validity, was also examined. **Results:** Findings indicated that the PPPA scale is appropriate for measuring perceptions of partner psychological abuse. The scale demonstrated adequate convergent and discriminant validity, and composite reliability showed good internal consistency. The hypothesized four-factor structure aligned well with the data, with observed variables collectively and individually contributing to the overall construct and subconstructs. The factor structure was consistent across genders and countries, confirming the scale's multidimensionality. Differences in the perception of partner psychological abuse were observed between the two countries. **Conclusions:** This study validates the psychometric properties of the PPPA scale, emphasizing the relevance of power dynamics and economic disparities in shaping perceptions of partner psychological abuse. It reinforces the scale's value as a tool for recognizing and addressing psychological abuse in intimate relationships.

Keywords: Psychological Abuse; Partner Violence; Verbal Aggression; Isolation; Control; Neglect; Economic Abuse; Financial Abuse

Introduction

Psychological abuse within intimate relationships remains a pervasive problem that requires a comprehensive understanding of its frequencies, dimensions, and correlates (Follingstad & Rogers, 2014; Godfrey et al., 2021), including victimization, perpetration, and perception. Unfortunately, many scales have focused primarily on measuring victimization and perpetration (Dokkedahl et al., 2019, 2022; Thompson et al., 2006), neglecting the crucial aspect of perception. Perception in this context refers to what individuals perceive or consider to be psychological abuse, the individual's subjective interpretation and understanding of behaviors and actions that constitute psychological abuse within intimate relationships. Typically, perception has been assessed using vignettes, hypothetical scenarios, focus groups, and interviews (Beccaria et al., 2013; Fincham et al., 2008; Maquibar et al., 2017; Sylaska & Walters, 2014). Recognizing that perception shapes how individuals interpret actions and influences their responses and disclosures of victimization and perpetration behaviors, the Perception of Partner Psychological Abuse (PPPA) was developed to fill this gap and gain an understanding of what people perceive as partner psychological abuse beyond what they experience or perpetrate within intimate relationships (Fakunmoju & Bammeke, 2024). Different strands of power and conflict theory (Stark, 2007) and feminist theory (Hunnicutt, 2009) informed its development.

In establishing convergent validity in the preliminary study (Fakunmoju & Bammeke, 2024), PPPA was positively associated with perceptions of psychological abuse of child scale (Fakunmoju & Bammeke, 2013) and partner violence (using a subscale of the intimate partner violence attitude scales – IPVAS, Smith et al., 2005). In establishing discriminant validity in the preliminary study, PPPA was negatively associated with perceptions of psychological manipulation and control of women (Fakunmoju et al., 2016, a, b). However, beyond identifying a scale's factor structure, determining the construct and factorial validity and measurement invariance of research scales across different groups or cultures is crucial (Brown, 2015; Milfont & Fischer, 2010). A validated and invariant scale allows researchers to examine differences in perceptions of psychological abuse across diverse cultural contexts, aiding in understanding how cultural factors shape the interpretation and effects of psychological abuse (Cheung & Rensvold, 2002; Putnick & Bornstein, 2016).

Defining, Conceptualizing, and Operationalizing Partner Psychological Abuse

In the study describing the development and exploratory factor analysis of the perception of partner psychological abuse (Fakunmoju & Bammeke, 2024), four-factor structure of the scale emerged from the consideration of six factors, namely verbal aggression/abuse, isolation/control, ignoring/neglecting, and economical/financial abuse. Verbal aggression or abuse involves the use of harmful words to cause psychological distress to a partner. Research consistently identifies verbal aggression as a critical aspect of partner violence and psychological abuse (Halpern et al., 2013; Romito et al., 2009). Isolation and control, another behavioral component, are widely recognized as abusive tactics in intimate relationships (Stark, 2007). These behaviors reinforce psychological abuse by restricting a partner's autonomy and freedom.

Ignoring or neglect represents non-verbal psychological abuse, where emotional needs, attention, and attachment are deliberately withheld. Psychological abuse does not always require verbalization, as inactions often serve as tools to manipulate and harm within relationships. While many studies focus on emotional neglect in childhood, the impact of neglect within adult relationships has also been explored (Park, 2023). Economic or financial abuse involves using money, assets, and financial control as tools for domination in intimate relationships. Its significant impact on survival makes it a potent form of psychological abuse. A comprehensive review by Postmus et al. (2020) highlighted the prevalence of economic abuse across various countries, advocating for its recognition as a distinct category of psychological abuse. Although numerous studies and scales have examined economic abuse in intimate

relationships (Adams et al., 2008; Adams & Beeble, 2019; Postmus et al., 2016, 2020; Renzetti, 2009; Stylianou et al., 2013; Stylianou, 2018), further research into its perceptions is critical to increasing knowledge about its effects on victimization and perpetration.

Confirmatory Factor Analysis and Measurement Invariance on Measures of Partner Psychological Abuse

Research on the psychometric properties of partner psychological abuse measures is limited, as studies focus more on psychometric properties of other forms of partner violence (e.g., physical and sexual violence) and on victimization and perpetration than on perception. Nevertheless, the Multidimensional Measure of Emotional Abuse (MMEA), developed by Murphy and Hoover (1999), has undergone multiple validations and measurement invariance testing across gender, ethnicity, and relationship types (Godfrey et al., 2021; Maldonado et al., 2022). Studies examining the Revised Conflict Tactics Scales (CTS2) (Straus et al., 1996) often assessed the entire scale without detailing the psychological aggression subscale (Calvete et al., 2007; Connelly et al., 2005). Evaluations of the MMEA and CTS2 typically focused on reliability and construct validity (e.g., convergent and discriminant validity) without performing confirmatory factor analysis or measurement invariance testing (Ro & Lawrence, 2007). Although Momtaz et al. (2022) and Porrúa-García et al. (2016) conducted confirmatory factor analysis for their Emotional Abuse Questionnaire (EAQ) and Psychological Abuse in Intimate Partner Violence scale, respectively, they did not test for measurement invariance across groups. Tolman (1999) validated the factor structure of the Psychological Maltreatment of Women Inventory (PMWI) using CFA but with limited measurement invariance testing. Cheung et al. (2020) identified significant score differences among women with varying relationship histories in their validity analyses.

Cultural adaptation is crucial in psychometric research due to variations in societal norms and cultural values. Differences in item interpretation based on gender and country are significant. Existing CFA studies have focused on the victimization and perpetration of partner psychological abuse, with few studies on the perception of partner psychological abuse, especially within African contexts. These limitations highlight the need for empirically validated, psychometrically sound, and cross-culturally relevant measures of partner psychological abuse perception, as intended in the current Nigerian and South African samples.

The Rationale for Cross-Cultural Validation in Nigeria and South Africa

Cross-cultural validation captures perceptions of partner psychological abuse within diverse social and cultural contexts, facilitating the development of effective interventions and policies (Follingstad & Rogers, 2013). Toma and Lederman (2022) recently highlighted the benefits of cross-cultural validation of scales, emphasizing its enhancement of the validity, applicability, and reliability of scales. Despite developmental (low income vs. middle income), infrastructural (poor vs. stable infrastructure), and regional (West Africa vs. South Africa) differences between Nigeria and South Africa (Human Rights Watch, 2018; United Nations Development Program, 2020), both countries share similarities in familial bonds, emotional support, cultural diversity, traditional gender roles and responsibilities, hospitality and generosity, culturally significant traditional marriages that involve families, and the strong influence of religious practices on family dynamics and social values. These commonalities and differences have significant implications for the manifestation, perception, and interpretation of psychologically abusive behaviors. Societal norms and cultural values significantly influence how psychological abuse is perceived and interpreted (Maquibar et al., 2017). Therefore, examining cross-cultural validation, similar to the initial cross-cultural development in the two countries, will help determine the validity and reliability of the PPPA across cultural contexts.

The Present Study

The present study describes the confirmatory factor analysis (CFA) of the four-factor structure of the PPPA to provide support for its comprehensive coverage. In addition to the first-order CFA model, additional CFA models (i.e., second-order and bifactor models) will be utilized to assess whether the scale possesses a hierarchical structure with a single underlying factor and whether it is unidimensional or multidimensional. Additionally, gender and country invariance will be examined to determine the equivalence of the factor structure across genders and countries (i.e., potential variations in scale ratings between males and females, and between respondents in Nigeria and South Africa). Understanding the psychometric properties of the scale can provide critical insights into the complex dynamics of psychologically abusive behaviors in intimate relationships, particularly regarding their prevalence and association with victimization, perpetration, and the propensity to perpetrate partner violence. In validating the factor structure and determining the measurement invariance of the scale, the following research questions will be examined:

1: How adequate is the validated four-factor structure of PPPA in Nigeria and South Africa?
2: Is the available evidence conclusive regarding the unidimensionality versus multidimensionality of PPPA?
3: Is the factor structure of PPPA consistent across gender and country?

Materials and Methods

Participants

The study, conducted in 2023, included a total of 823 adult participants, predominantly black people (African) (98.5%), with 291 (35.4%) participants from Nigeria and 532 (64.6%) participants from South Africa. The average age of the participants was 32.18 years (SD = 9.0). There were more female (n = 452, 54.9%) than male (n = 371, 45.1%) participants. The majority of participants (475, 57.7%) reported having an education level below a bachelor's degree. This was followed by those with a bachelor's degree (250, 30.4%) and those with a master's degree or higher (98, 11.9%). Most participants identified as single (527, 64%), while the remaining (296, 36%) indicated various marital statuses, including married or separated, cohabiting in a committed relationship, divorced, separated, or widowed.

Nearly one-third of participants (224, 27.2%) reported being unemployed. Among those employed, occupational statuses varied, including working in private organizations (16, 20.5%), government positions (143, 17.4%), and self-employment (102, 12.4%). Additionally, some participants reported being students who were not working (120, 14.6%), while others were students who also worked (65, 7.9%). The majority indicated being in a relationship (516, 62.7%), with many living with their partner (302, 36.7%). A smaller proportion (155, 18.8%) reported not being in a relationship.

Procedure

The study obtained approval from the Institutional Review Board of the University of Johannesburg, South Africa and Westfield State University, Massachusetts, USA. In South Africa, the assistance of four social media influencers was enlisted to share the survey link on their X (Twitter) feed. The link was also disseminated on various social media platforms, including Facebook, and participants were encouraged to share it with others. In Nigeria, the survey link was shared with students from three universities and various social media groups (such as Whatsapp and Facebook), with participants being encouraged to share it within their respective groups and contact lists. The online survey included a consent form that respondents were required to assent to before proceeding to complete the survey. The

inclusion/exclusion criteria and related measures helped ensure that only participants in the examined countries participated in the survey. Participants in Nigeria received data/airtime reimbursement equivalent to \$1.08 (N500), while those in South Africa received data/airtime reimbursement equivalent to \$1.62 (R30). The social media influencers received \$16.21 (R300) each for sharing the link on their X (Twitter) feed.

Measure

In addition to collecting demographic characteristics and related variables, respondents completed questions pertaining to the four-factor, 17-item PPPA scale.

Perception of Partner Psychological Abuse (PPPA): The 17-item four-factor structure consists of verbal aggression/abuse, ignoring/neglect, isolation/control, and economic/financial abuse. Response options are as follows: 1 = definitely not psychological abuse, 2 = most likely not psychological abuse, 3 = not sure if it's psychological abuse or not, 4 = most likely psychological abuse, and 5 = definitely psychological abuse. The Cronbach's alpha values in the present study for each factor are as follows: Verbal aggression/abuse (.86), Isolation/control (.84), Ignoring/neglect (.71), and Economic/financial abuse (.79). The overall Cronbach's alpha is (.89).

Data Analysis

Data analysis was conducted using two software programs: SPSS 28™ (IBM Corporation, 2021) and Stata 17 (StataCorp, 2021). Analysis was based on respondents that completed the questions pertaining to the perception of partner psychological abuse. After cleaning the data and removing respondents with incomplete or failed responses, as well as those who did not pass the survey engagement tests, 823 cases (South Africa: 532; Nigeria: 291) remained for analysis. To address missing data, the ipsative mean imputation method, as outlined by Schafer and Graham (2002), was applied to cases with less than 25% missing responses. After applying this method, the final dataset comprised 823 participants (532 from South Africa and 291 from Nigeria). Following the general guideline of 10 respondents per scale item or the conservative requirements of 200-400 participants, the sample size of 823 exceeded the requirements for factor analysis of 17 observed items (Boateng et al., 2018; Comrey & Lee, 1992; Kline, 2023; Kyriazos, 2018, MacCallum et al., 1999).

Socio-demographic variables were categorized and summarized for descriptive analysis to examine the demographic profiles of the participants, using SPSS version 28™ (IBM Corporation, 2021). Independent sample t-test was used to examine differences in perceptions of partner psychological abuse by country and gender, following the examination of country and gender invariance. Exploratory factor analysis (EFA) was conducted to determine the loadings of the underlying latent constructs. Convergent validity of PPPA was conducted by examining the factor loadings, composite reliability (CR), and average variance extracted (AVE) (Fornell and Larcker, 1981; Hair et al., 2011, 2019). These criteria include factor loadings (> .70), CR (.70 and above), and AVE (.50 and above) (Fornell and Larcker, 1981; Hair et al., 2011, 2019). Meeting these thresholds ensures that the indicators are appropriately related to their corresponding latent constructs, the latent constructs exhibit internal consistency, and they explain a satisfactory amount of variance in their indicators. For discriminant validity, Fornell and Larcker (1981) focused on cross-loadings and AVE. Firstly, each indicator should load (factor loading) significantly higher on their respective latent constructs than they do on other latent constructs (Fornell and Larcker, 1981). Secondly, each construct's Average Variance Extracted (AVE) should exceed the shared variance, which is equivalent to the squared correlation between constructs (Hair et al., 2019).

Stata 17 was utilized for Confirmatory Factor Analysis (CFA) to establish the factorial validity of the constructs and to assess measurement invariance. Maximum likelihood with missing values estimation

method was used. Relative indexes or baseline comparison include Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI). Absolute index or index for comparing non-nested models/population error include Root Mean Square Error of Approximation (RMSEA). Recommendations for acceptable model fit include RMSEA $\leq$ .05 = "close approximate fit"; RMSEA .05 to.08 = "reasonable error of approximation," CFI > .90 = "reasonable good fit", TLI > .90 = "favorable" (Hu & Bentler, 1998, 1999; Kline, 2023; MacCallum et al., 1996; Schumacker & Lomax, 2004; Steiger, 2007; Tucker & Lewis, 1973).

Different sets of multigroup models of measurement invariance were tested to assess the equivalence of the factor structure for country (Nigeria & South Africa) and gender (males & females) (van de Schoot et al., 2012). For country and gender, Model 1, known as configural/pattern invariance, was run without imposing any equality constraints. Recommendations for acceptable model fit was used as the criteria for acceptance of this model, whereas the confidence interval for the root mean square error of approximation (RMSEA), along with the changes in RMSEA (ΔRMSEA) and comparative fit index (ΔCFI), were evaluated to determine whether to accept or reject the null hypothesis of measurement invariance for metric/weak, strong/scalar, and strict/residual invariance. Specifically, "a value of ΔCFI smaller than or equal to –0.01 indicates that the null hypothesis of invariance should not be rejected" (Cheung & Rensvold, 2002, p. 251) as well as ΔRMSEA $\leq$ 0.015 (Chen, 2007; Rutkowski & Svetina, 2014; Timmons, 2010). These were the criteria considered for ΔCFI and ΔRMSEA. Similarly, ΔCFI that is less than .002 (Meade et al., 2008) was also considered. These criteria were utilized to make a decision regarding measurement invariance.

Model 2, metric/weak factorial invariance, included equality constraints on the measurement coefficients (i.e., factor loadings). Model 3, strong/scalar invariance, involved equality constraints on both the factor loadings and intercepts. Model 4, strict invariance, entails constraining the covariances of measurement errors. When full measurement invariance was not established for country and gender, taking into account the changes in CFI and RMSEA, partial scalar invariance was investigated to assess potential improvements (Gregorich, 2006; Widaman et al., 2010). This involved comparing changes in the comparative fit index (CFI) and root mean square error of approximation (RMSEA) with the values obtained from the metric/weak invariance model.

In addition to first-order confirmatory factor analysis, alternative models or competing CFA models were further tested to evaluate the multidimensionality of PPPA. These include single/one-factor and bifactor CFA model. Single factor CFA model was used to evaluate the extent to which the observed variables are indicators of a single underlying construct or dimension. It helps to examine the unidimensionality of the 17-item observed variables of PPPA and whether they are measuring the same latent trait or concept. are comparable to the first-order structure (Byrne, 2005).

Bifactor model was equally examined to determine if the total construct (PPPA) is measured and the constructs are not merely remeasuring the total construct. Theoretically, bifactor model "allows one to directly explore the extent to which items reflect a common target trait and the extent to which they reflect a primary or subtrait" (Reise et al., 2010, p. 546). Bifactor model helps assess the credibility of subscales and for determining the degree to which scores reflect a single variable, even in cases where the data exhibit multidimensionality (Reise et al., 2010). A bifactor model enables one to determine the unique contributions of each construct/factor to the measurement model, evaluate the dimensionality of the scale under consideration, and interpret the scores of the general factor and specific factors to gain a deeper understanding of the scale under consideration (Rodriguez et al., 2016a, b). In the bifactor model, each item is associated with a general factor, indicating a latent structure. This general factor captures the shared characteristics among the items and represents the individual variations on the primary dimension of interest (Reise et al., 2010). The bifactor model offers a valuable advantage as it enables researchers to

focus on measuring a single common latent attribute while also accounting for and controlling the variance caused by additional shared factors (Reise et al., 2010). Fitting the data better than the second-order model, the bifactor model facilitates a clearer understanding of how domain-specific factors relate to external variables independently of the influence of the general factor (Chen et al., 2006). In general, "the bifactor model, in theory, allows one to directly explore the extent to which items reflect a common target trait and the extent to which they reflect a primary or subtrait (Reise et al., 2010, p. 546).

After evaluating the model fits for the bifactor model of PPPA, Dueber's (2017) bifactor indices calculator was used to compute the model-based reliability indices outlined by Rodriguez et al. (2016a, 2016b). The examination of model fit indices was conducted to assess the presence of unidimensionality versus multidimensionality in the PPPA. The evaluated indices encompassed Explained Common Variance (ECV), Coefficient Omega (ω), Omega hierarchical or OmegaH (ωH, hierarchical factor saturation coefficient), Percent Uncontaminated Correlations (PUC), and Construct Reliability (H) (McDonald, 1999; Reise et al., 2010; Reise et al., 2012; Reise et al., 2013; Rodriguez et al., 2016a). Other coefficients used to quantify the amount of reliable variance attributed to the general factor, specific factors, and their combination in the bifactor model include OmegaS (ωS, specific factor saturation coefficient), OmegaHS (ωHS, hierarchical subscale saturation coefficient), and Relative Omega (ωR, OmegaH divided by Omega) (Dueber, 2017). Common method bias was examined using the Harman's Single-Factor Test (Harman, 1967).

Results

Preliminary Exploratory Factor Analysis

An initial exploratory factor analysis (EFA) was conducted to determine the loadings of the underlying latent constructs of PPPA. The EFA utilized varimax rotation and principal axis factoring with a coefficient value cut-off set at .30. Similar to study 3, this analysis revealed four factors based on eigenvalues. As anticipated, all the 17 items aligned with their hypothesized four-factor structure and loaded under their respective construct (i.e., verbal, isolation/control, ignoring/neglect, and economic/financial). Only three items cross-loaded at between .30 and .40. Specifically, "3. Mocking or making fun of a partner, including inappropriate jokes" and "2. Making negative comments about a partner's appearance or body" cross-loaded with isolation/control, whereas "9. Gaining access to a partner's phone, email, or social media accounts without permission" cross-loaded with "economical/financial." The four-factor solution accounted for 61.17% of the variance in the overall PPPA. Interrelationships among the items were observed, and Bartlett's test of sphericity yielded significant results (χ^2 (136, N = 727) = 5402.48, p < .0005), indicating that the correlation matrix differed from an identity matrix. Moreover, the measure of sampling adequacy (Kaiser-Meyer-Olkin = .895) exceeded the recommended threshold of .6, confirming that the sample size was sufficient for the analysis.

Means and Correlations of PPPA

The correlations in the first-order CFA model among the latent factors within the PPPA are of moderate magnitude (Figure 1a): verbal abuse correlated with isolation/control (.64), ignoring/neglect (.59), and economic/financial abuse (.47). Likewise, isolation/control correlated with ignoring/neglect (.48) and economic/financial abuse (.50). Furthermore, ignoring/neglect correlated with economic/financial abuse (.52).

Convergent and Discriminant Validity, Average Variance Extracted, Composite Reliability of PPPA, and Controlling for Common Method Bias

Composite reliability (CR) for the constructs is above the recommended value .60 (Fornell & Larcker, 1981) and .70 (Hair,1997). Specifically, CR of the factors are follows: verbal aggression/abuse (.87), isolation/control (.86), ignoring/neglect (.72), and economic/financial (.80). The average variance extracted (AVE) is above the recommended value of .50 for convergent validity (Fornell & Larcker, 1981): verbal aggression/abuse (.63), isolation/control (.54), economic/financial (.51), except for "ignoring/neglect" (approximately .40) that is below the recommended value of .50. The shared variance (i.e., squared correlation) between the factors are as follows: verbal aggression/abuse and isolation/control (.41), verbal aggression/abuse and ignoring/neglect (.35), verbal aggression/abuse and economic/financial (.22), isolation/control and ignoring/neglect (.23), isolation/control and economic/financial (.25), and ignoring/neglect and economic/financial abuse (.27). Most factor loadings of the indicators of the constructs were reasonably above .70 (Table 1). Meeting these criteria help establish that the measurement model (PPPA) has adequate convergent validity between the constructs.

Discriminant validity was also established. First, the factor loadings of indicators on their own latent construct were higher than their loadings on other constructs. Second, when the AVE of each latent construct is compared with the shared variance (i.e., squared correlation) of each latent construct, it is clear that the AVE of each latent construct is higher than the shared variance between that construct and other constructs. "Verbal" and "Isolation/control" share the highest variance: 41% of variance is shared between the two constructs. Meeting these criteria helps establish that the measurement model (PPPA) has adequate discriminant validity between the constructs. Results of Harman's Single-Factor Test indicate that a single factor did not account for a large proportion or more than 50% of the variance (the highest variance is 37.77%), suggesting the absence of common method bias.

Factor Structure of PPPA (First-order CFA)

The findings for the adequacy of the hypothesized four-factor structure of the scale are summarized in Table 1 (and Figure 1a). The complete model, consisting of a 17-item four-factor first-order CFA model (verbal, isolation/control, ignoring/neglect, and economic/financial), demonstrated satisfactory approximation errors based on goodness-of-fit indices (Research question 1). Notably, all factor loadings were statistically significant, ranging from 0.43 to 0.89. The factor loadings greater than or equal to .50 (except item 13) suggest that robust factors are formed (Costello & Osborne, 2005).

Unidimensionality vs Multidimensionality of PPPA (Bifactor CFA)

As shown in Table 2 (and Figure 1b), the results of the single-factor CFA model for the PPPA indicated an inadequate fit, indicating that the observed variables or items are not sufficiently associated with a single underlying construct or factor. However, bifactor model indicate a proper fit to the model, as demonstrated by goodness-of-fit indices (χ2 (df = 102, N = 823) = 440.70, p < 0.0005; RMSEA = 0.064 [C.058, .070]; CFI = .941; TLI = .922). The findings from the bifactor model fit statistics and reliability indices provide a mixed interpretation regarding the unidimensionality versus multidimensionality of PPPA (Table 3).

The Average Relative Parameter Bias (ARPB) value is relatively low (.077), indicating good model fit and reliable parameter estimates (Table 3). The value is below the recommended threshold of 10-15% (Muthén et al., 1987; Rodriguez et al., 2016a as cited in Dueber, 2017), suggesting a relatively low level of average factor loadings bias between the general and specific factors.

Table 1: Items, means, standard deviations, and factor loadings of PPPA.

Item wording and constructs	Mean	SD	PPPA Factor loading	Factor loading			
				Country[a]		Gender[b]	
				Nigeria	South Africa	Male	Female
VERBAL AGGRESSION/ABUSE							
1. Insulting a partner and using hurtful words.	4.71	.79	.89	.92	.88	.93	.84
2. Making negative comments about a partner's appearance or body.	4.57	.94	.80	.71	.85	.86	.73
3. Mocking or making fun of a partner, including inappropriate jokes.	4.51	.91	.80	.76	.81	.81	.78
4. Threatening physical harm to a partner.	4.62	.96	.66	.71	.64	.70	.61
ISOLATION/CONTROL							
5. Monitoring a partner's every move or action.	4.27	1.07	.75	.74	.74	.76	.74
6. Dictating how a partner should dress or what they should wear.	3.97	1.18	.76	.69	.78	.78	.74
7. Controlling a partner's actions and movements.	4.12	1.12	.77	.75	.76	.81	.72
8. Dictating whom a partner can or cannot be friends with.	4.02	1.18	.74	.72	.73	.76	.72
9. Gaining access to a partner's phone, email, or social media accounts without permission.	4.13	1.16	.60	.60	.62	.66	.56
IGNORING/NEGLECT							
10. Refusing to spend quality time with a partner or depriving them of necessary attention.	3.98	1.17	.70	.71	.70	.72	.68
11. Excluding a partner from important events, occasions, or activities.	3.88	1.24	.73	.75	.72	.72	.73
12. Refusing to accept or consider a partner's valid advice.	3.71	1.23	.62	.61	.62	.67	.58
13. Failing to appreciate or acknowledge a partner's positive actions.	3.68	1.22	.43	.42	.44	.45	.41

ECONOMIC/FINANCIAL ABUSE

14. Spending money on unnecessary things for self or the household.	4.02	1.16	.83	.84	.81	.82	.83
15. Refusing to contribute financially to household expenses or refusing to earn an income.	3.90	1.17	.73	.77	.72	.71	.75
16. Wasting the partner's money or hiding purchases that are not needed from the partner.	4.08	1.14	.74	.78	.72	.76	.73
17. Hiding personal income or sources of income from a partner.	3.33	1.32	.52	.55	.51	.50	.53

Note: Standardized estimates of the CFA model reported. All loadings are statistically significant (*p* < .01).

[a]Factor loading of partial scalar invariance reported.

[b]Factor loading of scalar invariance reported.

PPPA (M = 4.09, SD = .67); verbal aggression/abuse (*M* = 4.11, *SD* = .68); isolation/control (*M* = 4.10, *SD* = .89); ignoring/neglect (*M* = 3.82, *SD* = .89); economic/financial abuse (*M* = 3.83, *SD* = .94).
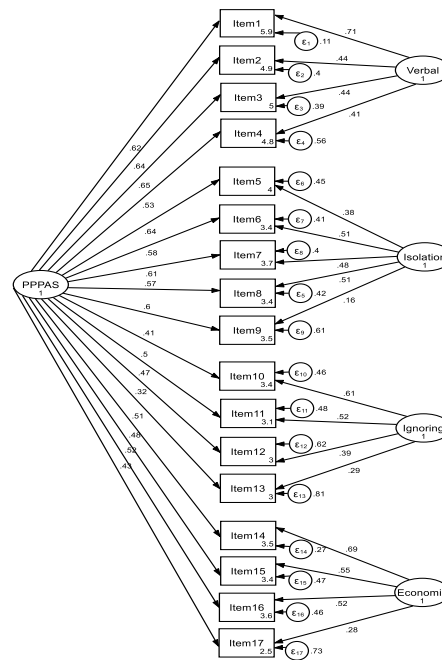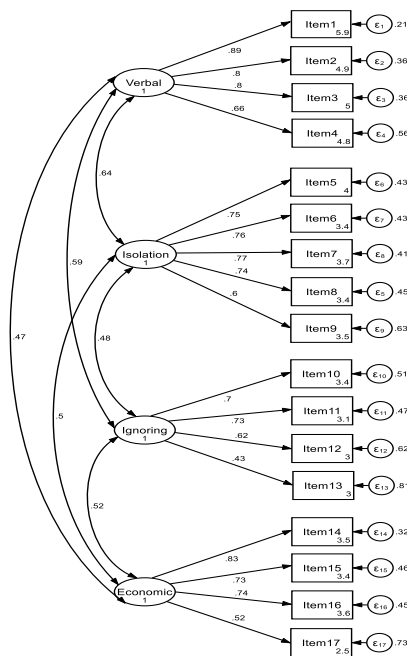

Figure 1a. First-order Confirmatory factor analysis of the Perception of Partner Psychological Abuse (PPPA)

Figure 1b. Bifactor confirmatory factor analysis of the Perception of Partner Psychological Abuse (PPPA)

Note: Standardized estimates reported. All loadings are statistically significant (*p* < .01). e = ε = error.

Table 2: CFA models, goodness-of-fit indices, and measurement invariance tests across country and gender for PPPA

Model/Error Correlation	χ^2	df	RMSEA (90% CI)	ΔRMSEA	CFI	ΔCFI	TLI
GOODNESS-OF-FIT INDICES							
First-order 17-item (no error correlation)	500.50	113	.065[.059, .070]	N/A	.933	N/A	.919
Single/one-factor model	2024.99	119	.140[.134, .145]	N/A	.669	N/A	.622
Bi-factor model[a]	440.70	102	.064[.058, .070]	N/A	.941	N/A	.922
COUNTRY INVARIANCE							
Model 1 (Configural/pattern invariance)	680.17	226	.070[.064, .076]	N/A	.922	N/A	.907
Model 2 (Metric/weak factorial invariance)	707.29	239	.069[.063, .075]	.001	.920	.002	.909
Model 3 (Strong/scalar invariance)	840.30	256	.075[.069, .080]	-.006	.900	.020	.894
Model 4 (Strict/residual invariance/invariant uniqueness)	929.31	243	.083[.077, .089]	-.014	.883	.037	.869
GENDER INVARIANCE							
Model 1 (Configural/pattern invariance)	704.43	226	.072[.066, .078]	N/A	.917	N/A	.900
Model 2 (Metric/weak factorial invariance)	737.99	239	.071[.065, .077]	.001	.913	.004	.901
Model 3 (Strong/scalar invariance)	789.37	256	.071[.066, .077]	.000	.907	.006	.902
Model 4 (Strict/residual invariance/invariant uniqueness)	768.27	243	.073[.067, .078]	-.002	.909	.004	.898

Note: PPPA (Perception of Partner Psychological Abuse). N/A (Not applicable). Loadings (measurement coefficients) and intercepts (measurement intercepts). Model 1 (Configural/pattern invariance = all parameters, factor loadings and intercepts, are free/not equal/vary among groups). Model 2 (Metric/weak factorial invariance = measurement coefficients are equal across groups). Model 3 (Strong/scalar invariance = measurement coefficients and intercepts are equal across groups). Model 4 (Strict invariance = covariances of measurement errors are equal across groups).
[a]Dueber's (2017) calculator was used to calculate model-based reliability indices/coefficients.

Several outputs in Table 3 support the unidimensionality of the scale. The Percent of Uncontaminated Correlations (PUC) value of 0.794 is close to the threshold of 0.80, indicating that the general factor accounts for a large proportion of the correlations. Although the Explained Common Variance (ECV) value for the general factor (.560) fell below the recommended threshold for confirming

the scale's unidimensionality, the Omega Hierarchical (ωH) value of 0.780 suggests that 78% of the reliable variance in the total scores is attributable to the general factor, further supporting the idea that the PPPA scale can be considered unidimensional. According to Rodriguez et al. (2016a), "ECV should be > .70 and PUC > .70" (p. 232) and "when PUC values are below .80, general ECV values exceed .60, and OmegaH for the general factor is greater than .70, the presence of some multidimensionality is not severe enough to invalidate the interpretation of the instrument as primarily unidimensional" (Reise et al., 2013, as cited in Dueber, 2017, p. 22).

The Relative Omega (ωR) value of 0.843, surpassing the cut-off of ≥ .8 recommended by Rodriguez et al. (2016a), reinforces that most of the scale's reliability is driven by the general factor, strengthening the argument for unidimensionality. In fact, the relatively stronger influence of the general factor compared to the specific factors is established by similar results: ω (.926), which suggests that the general factor explains a substantial portion of the total variance (92.6%), beyond what is explained by the specific factors (7.4%). Similar results also support the strong influence of the general factor: ωH (.780). Altogether, these results suggest that the general factor explains a larger proportion of the total variance compared to the specific factors, suggesting some degree of unidimensionality.

However, despite the evidence supporting unidimensionality, other results point toward multidimensionality. The results of the Item-Exclusivity Corrected Variance (IECV) values of all of the observed variables (items) were below the threshold of .80 (Stucky & Edelen, 2015), except item 9 (.944), indicating that not all items are primarily explained by the general factor. For example, Item 10 (IECV = 0.311) and Item 13 (IECV = 0.549) suggest that specific factors also influence these items' variance. These items are influenced by both the general and specific factors, suggesting potential multidimensionality of PPPA. Similarly, the Explained Common Variance (ECV) for specific factors (0.560), which measures the relative strength of each specific factor in relation to the explained variance attributed solely to the items loading on that factor (Dueber, 2017), suggests that the common variance is not unidimensional. The ECV values for specific factors range from .329 to .544, while the value for general factor (.560) did not meet or exceed the threshold of .7 (≥ .7). These results further indicate that the common variance is not unidimensional (Rodriguez et al., 2016a).

Additional bifactor reliability index helps point to the multidimensionality of PPPA. For example, despite the significant proportion of the variance being explained by the general factor, as evidenced by the ω (.926) and ωH (.780), the substantial contributions from the specific factors (ωS, ranging from .722 to .873) suggest a multidimensional structure of the PPPA. That is, the specific factor (ignoring/neglect) accounts for approximately 72.2% of the reliable variance that is specific to the observed variables. Similarly, approximately 87.3% of the reliable variance in the observed variables is attributed to the specific factor (i.e., verbal abuse). Overall, these sets of indices suggest that the unidimensionality versus multidimensionality of the scale/measure is inconclusive, as both the general factor and specific factors contributed meaningfully to the observed variance (Research question 2).

Overall, the PPPA scale displays both unidimensional and multidimensional characteristics. The high PUC, ECV, and ωH values suggest that the scale can primarily be treated as unidimensional, with the general factor explaining most of the variance. However, the significant contributions of the specific factors (as shown by the ωS and IECV values) indicate that multidimensionality cannot be entirely ruled out.

Table 3: Standardized factor loadings of CFA models of PPPA and reliability indices of bifactor CFA model

Item/ factor	Factor loading		Bifactor factor loading and reliability indices							
			Factor loading		Reliability indices					
	First-order	Single-factor	General factor loading	Specific factors loading	ECV	ω/ωS	ωH/ωHS	Relative Omega (ωR)	H	IECV
General factor					.560	.926	.780	.843	.885	
Specific factors										
Verbal aggression/abuse					.414	.873	.351	.402	.629	
Item 1	.89	.75	.62	.71						.433
Item 2	.80	.73	.64	.44						.679
Item 3	.80	.73	.65	.44						.686
Item 4	.66	.61	.53	.41						.626
Isolation/control					.329	.860	.265	.308	.545	
Item 5	.75	.64	.64	.38						.739
Item 6	.76	.63	.58	.51						.564
Item 7	.77	.65	.61	.48						.618
Item 8	.74	.63	.57	.51						.555
Item 9	.66	.59	.66	.16						*.944*
Ignoring/neglect					.542	.722	.383	.531	.552	
Item 10	.70	.45	.41	.61						.311
Item 11	.73	.52	.50	.52						.480
Item 12	.62	.46	.47	.39						.592
Item 13	.43	.33	.32	.29						.549
Economic/financial					.544	.804	.422	.525	.643	
Item 14	.83	.53	.51	.69						.353
Item 15	.73	.48	.48	.55						.432
Item 16	.74	.54	.52	.52						.500
Item 17	.52	.41	.43	.28						.702

Note. Percent of Uncontaminated Correlations (PUC) = 0.794; Explained common variance (ECV, of General Factor) = 0.560; Average Relative Parameter Bias (ARPB) = 0.077. Standardized estimates reported. All loadings are statistically significant (p < .01). e = ε = error.
Coefficient Omega/Omega (ω); OmegaS (ωS, specific factor saturation coefficient); Omega hierarchical or OmegaH (ωH, hierarchical factor saturation coefficient); OmegaHS (ωHS, hierarchical subscale saturation coefficient); Relative Omega (ωR, OmegaH divided by Omega); H (Construct Replicability);

and IECV (Item-Exclusivity Corrected Variance). Review Dueber (2017) and Rodriguez et al. (2016a, 2016b) for full definitions and details of bifactor model terms and reliability indices.

Country and Gender Invariance of PPPA

The results regarding measurement invariance of the PPPA factor structure across country and gender are presented in Table 2. With respect to country and gender invariance, configural/pattern and metric/weak factorial invariance were successfully established. This implies that the model with equal factor loadings across countries and genders was just as fitting as the model with freely varying parameters. Configural invariance suggests that the structure or pattern of the latent variables is the same across country and gender, a validation that the questions consistently represent the concept of perception of partner psychological abuse in each country and across gender, regardless of differences in average scores. Similarly, metric/weak factorial invariance suggests that the strength and direction of the associations between the observed variables and the latent variables (factors) remain consistent across the countries and genders.

Furthermore, strong/scalar invariance was achieved for country and gender regarding changing in RMSEA, indicating that the latent means of the PPPA could be compared across countries (Research question 3). Similarly, when changes in RMSEA is considered, an examination of the strict/residual invariance/invariant uniqueness suggests that the measurement errors the same across the countries and genders. This implies that any variability or error in the responses is uniform across countries and genders, suggesting that the instrument did measure the construct with consistent precision for both countries and genders.

Country and Gender Differences in Perception of Partner Psychological Abuse

Independent sample t-tests suggest that South African respondents (M = 4.10, SD = .64) hold higher perception of partner psychological abuse than Nigerian respondents (M = 3.99, SD = .74), t(779) = 2.06, p = .040. Similarly, females (M = 4.14, SD = .62) hold higher perception of partner psychological abuse than males (M = 3.97, SD = .73), t(779) = 3.62, p < .001.

Discussion

The present analysis examined the factor structure of PPPA, utilizing different CFA models to ascertain whether the hypothesized four-factor structure adequately matches the data, whether the scale exhibits a hierarchical structure with a single underlying factor, whether the factor structure remains consistent across genders and countries, whether it is possible to compare the latent means for genders and countries, and whether the scale is unidimensional or multidimensional. The CFA results confirmed the four-factor structure of PPPA and suggests that the observed variables (items) in the scale collectively capture the underlying constructs reasonably well. The results also suggest that each factor relates to PPPA the same way, and PPPA is suitable for measuring what people perceive as partner psychological abuse.

Country and Gender Invariance

A successful test of country and gender configural/pattern invariance indicates that respondents from Nigeria and South Africa, as well as males and females, attribute the same items to the same constructs (verbal abuse, isolation/control, ignoring/neglect, and economic/financial abuse). They perceive the items in the PPPA similarly or the scale maintains the same underlying factor structure across country and gender. Likewise, a successful test of country and gender metric/weak factorial invariance suggests that the constructs manifest in the same way among respondents from Nigeria and

South Africa, as well as between males and females. The relationship strength between each item in the PPPA and its underlying constructs remains consistent across both country and gender groups (Cheung & Rensvold, 2002). The identification of scalar invariance for country and gender implies the absence of systematic bias in how each country and how male and female participants responded to the items, and any differences in means of the latent constructs comprising the PPPA account for all the mean differences within the shared variance of the items (Putnick & Bornstein, 2016). This suggests that mean differences in the latent constructs of the 17-item PPPA can be compared across country and gender. Comparisons reveal that South African respondents have a stronger perception of partner psychological abuse compared to Nigerian respondents, and females perceive partner psychological abuse more strongly than males.

Unlike gender, scalar invariance was not established for country comparisons. Instead, partial scale invariance indicated differences in response patterns for items 2 and 6 between Nigeria and South Africa, suggesting these items were interpreted differently in each country. Item 2, focused on negative comments about a partner's appearance or body, and item 6, on dictating a partner's dressing, highlight issues related to physical appearance, body image, and attire. Cultural specificity, contextual factors, and differences in item functioning may explain these variations (Fakunmoju & Bammeke, 2017).

Cultural and religious influences significantly shape how individuals value appearance and body image and process sensitive or negative comments. For instance, cultural norms impact tolerance for remarks about physical shape and size, with emotional responses varying across societies (Abdullahi et al., 2017; Balogun et al., 2015; Fakunmoju, 2022; Fakunmoju & Bammeke, 2017). In South Africa, heightened awareness of the psychological impact of such comments, including potential links to depression and suicide, underscores a sensitivity to these issues (Kafka et al., 2022).

Religious and cultural traditions regarding dress also influence how partners perceive and react to dressing-related control in relationships. South Africans, influenced by westernization and multiculturalism, may exhibit greater flexibility regarding partners' dressing choices, whereas Nigerians, guided by religious prescriptions and concerns about societal perceptions, often hold stricter expectations. Dressing norms in Nigeria are more likely to involve power dynamics, with religion frequently used to justify controlling behaviors (Antai, 2011; Fakunmoju & Rasool, 2018). Notably, participants in South Africa may be more attuned to perceiving such behaviors as psychologically abusive due to heightened sensitivity to control-related issues.

Despite exposure to western values, religious and cultural traditions continue to strongly influence dressing norms in Nigeria, contributing to substantial differences in item functioning between the two countries. Mean differences between the two items indicate that South African participants are more likely to view these behaviors as psychologically abusive compared to Nigerian participants. However, it is important to note that most respondents in both countries identified both items (2 and 6) as abusive within intimate relationships.

While strict invariance was achieved for gender, suggesting consistent measurement parameters across genders (van de Schoot et al., 2012), the same could not be established for country comparisons. Unequal residual variances across countries imply differences in unexplained variances, potentially due to systematic variations in how constructs are interpreted (Vandenberg & Lance, 2000; Wu et al., 2007). Strict invariance allows meaningful comparisons across gender by ensuring equivalence in factor loadings, intercepts, and residual variances (Wu et al., 2007, p. 15).

Consistent with prior studies, South African respondents and females displayed higher perceptions of partner psychological abuse compared to Nigerian respondents and males, respectively (Álvarez et al., 2015; Fakunmoju et al., 2021; Wilson & Smirles, 2022; Yamawaki et al., 2023).

Differences in education, awareness of gender-based violence, legal protections for women, and advocacy for gender equality likely contribute to these findings. South Africa's proactive measures to address these issues stand in contrast to Nigeria's limited implementation of protective initiatives. Socialization and exposure to partner violence further influence how males and females perceive and interpret abusive behaviors, highlighting the complexity of these differences.

Hierarchical Structure and Unidimensionality Versus Multidimensionality

The initial analysis of the hierarchical structure of the scale using a higher-order single-factor solution (second-order CFA model) did not reach convergence, indicating that the first-order model is more acceptable than the second-order model. This suggests that the scale possesses multiple dimensions. These findings potentially indicate that perception of partner psychological abuse can be explained or encompassed by psychological manipulation and control tactics, as well as economic/financial abuse. The findings from the bifactor model provide further insights into the measurement and structure of the scale. They suggest that both the general factor (representing the overall construct of PPPA) and the specific factors (representing the four sub-constructs) contribute to the measurement of the scale.

The correlations among the factors are moderate and the size supports the multidimensionality of PPPA or supports the realization that the items are not indicators of a single construct. Both the first-order CFA and the bifactor model adequately capture the measurement properties of the PPPA and suggest that the observed variables (items) in the scale collectively and individually contribute to measuring the overall construct and the sub-constructs effectively.

Despite the identified support for Reise et al.'s (2013) assertion that a satisfactory fit for correlated first-order and second-order models often indicates the potential for an even better fit with a bifactor model, it is important to consider the implications of multidimensionality on the interpretation of total and subscale scores. By examining the bifactor model and reporting the corresponding ωH and ωS values, a better understanding of the impact of multidimensionality on the findings is gained without drawing definitive conclusions about the unidimensionality versus multidimensionality of PPPA. The relatively low ECV, the fact that specific factors contributed unique variance that is not accounted for by the general factor alone, and the fact that observed variables are influenced by both a general factor and specific factors suggests that the measurement model has a tendency towards being multidimensional rather than strictly unidimensional. Nevertheless, it is appropriate to treat PPPA at the subscale or general/overall scale level, depending on the purpose of the research, practice issues to evaluate, and research questions, hypotheses, or theory to be tested. Future comprehensive assessment and analyses, model fit indices, and theoretical considerations will provide the needed clarity for the unidimensionality versus multidimensionality validation of the scale.

Strengths and Limitations

A key strength of the study is its evaluation of the construct and factorial validity of a novel measure for assessing perceptions of partner psychological abuse within African settings. This contributes significantly to the psychometric field and has important implications for developing culturally appropriate interventions and policies to address partner violence. By validating the measure in Nigeria and South Africa, the study supports both research and practical applications. The importance of validating measurement tools across different cultures has been highlighted in recent literature (Toma & Lederman, 2022). Thus, assessing the measure's factor structure offers valuable insights and paves the way for future research that could provide further evidence supporting the validity of the measure.

Nevertheless, the study has limitations. While the online survey method increased the geographical coverage within the countries, the possibility of differences in perception between

individuals with and without internet access cannot be ignored. Socio-demographic differences among those who did not participate could also affect the identified factor structure. We used Harman's Single-Factor Test to evaluate common method bias, recognizing that this technique has its limitations. Other methods for addressing common method variance have their own advantages and drawbacks (Podsakoff et al., 2003; Tehseen et al., 2017). Although common method bias might impact the findings, a review of research indicates that significant distortion due to such bias is unlikely (Bozionelos & Simmering, 2022). Additionally, common method variance does not necessarily undermine results obtained from the same group of respondents.

Implications for Theory, Research, and Practice

The intercorrelated structure of PPPA highlights its multidimensional nature and provides empirical support for the applicability of various theories, emphasizing the influence of power dynamics and economic disparities in shaping perceptions of partner psychological abuse (Dobash & Dobash, 1979; Hunnicutt, 2009). The scale extends the understanding of these theories beyond victimization and perpetration experiences, offering researchers a tool to assess risks stemming from norms, beliefs, viewpoints, and biases.

Recognizing that knowledge about psychological abuse encompasses more than just victimization and perpetration but also perceptions and subjective interpretations, the scale deepens our understanding of partner psychological abuse. The scale allows for cross-national comparisons, facilitating reflections on how varying norms, beliefs, and cultural factors influence perceptions of partner psychological abuse. It also offers insight into how individuals internalize, interpret, and potentially normalize abusive behaviors. Additionally, it helps in understanding factors contributing to perceptions and tracking changes over time.

Understanding perceptions can inform preventive measures and educate individuals about recognizing psychological abuse while addressing attitudes and beliefs supportive of abusive behaviors. The structure of the scale enables the formulation of specific research questions and predictions that can examine the impacts of perceptions on victimization, perpetration, and the likelihood of engaging in partner psychological abuse. The use of the scale allows researchers to identify attitudes and beliefs that influence perceptions and contribute to victimization and perpetration, facilitating targeted interventions to change these attitudes and beliefs. Overall, measuring perception enhances knowledge of partner psychological abuse and generates insights that can help combat underlying stereotypes and beliefs.

Recommendations for Future Research

Future studies can validate the factor structure of PPPA in diverse cultural contexts to enhance its cross-cultural validity. It would be valuable to investigate associated factors, such as gender roles, beliefs, and hostility toward partners, and explore influences on changes in perceptions and their effects on victimization, perpetration, and the propensity for abusive behaviors. The insights gained from future studies will improve our understanding of the core beliefs, values, and experiences that shape individuals' perceptions of partner psychological abuse. Further research can also examine the differential effects of each PPPA subscale on victimization and perpetration, along with influencing factors.

Conclusion

The psychometric analyses provided empirical support for the validity of the four-factor structure of the PPPA, emphasizing the psychological and economic tactics underlying psychologically abusive behaviors. The findings confirm the multidimensionality of the PPPA and its measurement equivalence across genders and countries (Nigeria and South Africa), allowing for latent mean comparisons between the two. The results also demonstrate adequate convergent and discriminant validity between the

constructs. By validating the scale's psychometric properties, this research enhances the tools available for studying perceptions of partner psychological abuse in intimate relationships. As a cross-culturally validated instrument, the PPPA expands partner violence research beyond traditional measures of victimization, perpetration, and physical and sexual violence. It offers valuable insights into what individuals perceive as psychological abuse, providing a foundation for understanding how these perceptions shape the dynamics of psychological violence.

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