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ORIGINAL PAPER

Pre-marital predictors of marital violence in the WHO World Mental Health (WMH) Surveys

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Abstract

Purpose Intimate partner violence (IPV) is a pervasive public health problem. Existing research has focused on reports from victims and few studies have considered pre-marital factors. The main objective of this study was to identify pre-marital predictors of IPV in the current marriage using information obtained from husbands and wives.

Methods Data from were obtained from married heterosexual couples in six countries. Potential predictors included demographic and relationship characteristics, adverse childhood experiences, dating violence, and psychiatric disorders. Reports of IPV and other characteristics from husbands and wives were considered independently and in relation to spousal reports.

Results Overall, 14.4% of women were victims of IPV in the current marriage. Analyses identified ten significant variables including age at first marriage (husband), education, relative number of previous marriages (wife), history of one or more categories of childhood adversity (husband or wife), history of dating violence (husband or wife), early initiation of sexual intercourse (husband or wife), and four combinations of internalizing and externalizing disorders. The final model was moderately predictive of marital violence, with the 5% of women accounting for 18.6% of all cases of marital IPV.

Conclusions Results from this study advance understanding of pre-marital predictors of IPV within current marriages, including the importance of considering differences in the experiences of partners prior to marriage and may provide a foundation for more targeted primary prevention efforts.

Keywords Intimate partner violence · Predictive modeling · Epidemiology · International · Mental health

Introduction

Violence against women (VAW) has been recognized as a global major public health problem since the 49th World Health Assembly in 1996 [1]. Since then, a multitude of efforts have been directed to understand the pervasiveness of the problem, particularly physical violence perpetrated by male intimate partners as this is the most common form of VAW [1–6]. Notable efforts include the first multi-country study on violence against women [7] and the first comprehensive review of data on the global prevalence of intimate partner violence (IPV) [6]. While these efforts were necessary and important steps towards awareness and an understanding of the extent of the problem, significant gaps in our understanding of how to prevent this phenomenon remain [8]. Current prevention programs typically focus on a single level of the three possible levels of action. These levels include primary, secondary, and tertiary strategies. Primary strategies aim to prevent IPV before it occurs. Secondary prevention focuses on the immediate response to IPV after it has occurred, while tertiary prevention focuses on long-term care in the wake of IPV such as rehabilitation and post-traumatic growth [9]. Over the past few decades, the majority of funding and resources have been directed towards secondary and tertiary efforts [9] resulting in a limited number of

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primary prevention programs with promising results [8, 10]. In response to this gap, the WHO and CDC have identified a need to scale-up evidence-based primary prevention programs [11, 12].

Primary prevention has historically been difficult as IPV is a complicated, multi-factorial phenomenon. Additionally, although IPV is inherently a dyadic experience [13], relatively few studies have examined pre-marital predictors from both members of the dyad [14, 15] which could partially explain our inability to prevent IPV before it occurs. Not surprisingly, the few promising primary prevention efforts utilize gender-synchronized approaches which engage both men and women yet, with the exception of a few studies, the majority have examined IPV solely using factors from female victims [6]. This raises questions about the relationship between IPV and factors from both members of the dyad. Few community epidemiological surveys have been able to address these questions. The World Health Organization World Mental Health Surveys (WMH) [16] provide a unique opportunity to do so by assessing pre-marital risk factors and the occurrence of marital violence perpetrated towards women from both members of currently married couples. The predictors considered are categorized into distinct groupings derived from existing evidence and use in prior studies [14, 15, 17] including demographics, childhood adversities, dating experiences, and pre-marital psychiatric disorders. Our study has two unique features: First, the sample consisted of married couples, of which both members answered the same questions regarding their own experience with physical violence perpetration and victimization within their current marriage. Additionally, both members of each dyad completed the same survey, which allowed assessment of a comprehensive list of pre-marital factors from both members. In doing so, we hope to aid in elucidating this complicated experience by increasing understanding pre-marital risk factors and using this information to develop a predictive model of marital violence using information from pre-marital factors. In doing so, we hope to inform public health practitioners as to when and where primary prevention may have the greatest impact with more targeted efforts.

Materials and methods

Samples

The WMH surveys are a coordinated set of community epidemiological surveys of the prevalence and correlates of common mental disorders carried out in nationally or regionally representative household samples in countries throughout the world [16]. Surveys took place in multistage clustered area probability household samples representative of specific metropolitan areas (Brazil and the People's Republic of China), large sections of the country (Nigeria) or the entire nation (the remaining countries). A more detailed description of WMH sampling procedures is available elsewhere [18].

The data reported here come from the subset of WMH countries that included a probability sub-sample of currently married couples whose survey instruments assessed physical violence in the current marriage, dating violence, and traumatic experiences. This resulted in six countries including Brazil, Bulgaria, The People's Republic of China, Lebanon, Nigeria, and the United States. The overall response rate across all countries was 74.7% ranging from 70.0% in Lebanon to 81.3% in Brazil for the couples sample resulting in a total sample of 1515 heterosexual couples (3030 individuals; or 1515 husbands and 1515 wives). Sample sizes ranged from 422 couples in Bulgaria to 104 couples in the People's Republic of China. Further sample characteristics are shown in Table 1.

Field procedures

Surveys were administered to all respondents by lay face-to-face interviewers who obtained informed consent before administering the interview. Interviewers explained the purpose of the survey and made it clear that participation was voluntary, that respondents could decide to not answer any questions, and that all responses would be treated as confidential. Recruitment and consent procedures were approved by Human Subjects and Ethics committees in each country. A more detailed description of the implementation procedures is available elsewhere [19].

Measures

Marital violence

Physical violence in the respondent's current marriage was assessed using questions based on a modified version of the Revised Conflict Tactics Scale (CTS2) [20]. Respondents were provided with a list of specific violent actions in a respondent booklet that they were given during the interview. In instances of illiteracy, the items were read to the respondents by research interviewers. They were asked if each of the described actions had ever occurred in their current marriage. Moderate physical violence was defined for respondents as "pushed, grabbed or shoved, threw something at, slapped or hit". The response categories were "never, rarely, sometimes, or often". The outcome was coded as "yes" if either the wife reported ever being a victim of moderate physical violence from her current husband and/or the husband reported ever perpetrating moderate physical violence towards his current wife (for simplicity, we hereinafter refer to the outcome measure as marital violence). As much

Table 1 Sample characteristics

Survey	Sample characteristics[a]	Field dates	Age years	Part II sample size (*n*)[b]	Response rate[c] (%)	Couples sample size (*n*)[d]
Brazil	Sample of household residents in the São Paulo metropolitan area	2005–2008	18+	(1848)	81.3	(133)
Bulgaria	Nationally representative sample of household residents	2002–2006	18+	(1152)	72.0	(422)
People's Republic of China	Sample of household residents in the Shanghai and Beijing metropolitan areas	2001–2003	18+	(5201)	74.7	(104)
Lebanon	Nationally representative sample of household residents	2002–2003	18+	(482)	70.0	(159)
Nigeria	Sample of households in 21 of the 36 states in the country, representing 57% of the national population	2002–2004	18+	(1076)	79.3	(305)
United States	Nationally representative sample of household residents	2001–2003	18+	(1607)	70.9	(392)
Total				(11,366)	74.7	(1515)

[a]Most World Mental Health (WMH) surveys are based on stratified multistage clustered area probability household samples in which samples of areas equivalent to counties or municipalities were selected in the first stage followed by one or more subsequent stages of geographic sampling (e.g. towns within counties, blocks within towns, households within blocks) to arrive at a sample of households, in each of which a listing of household members was created and one or two people were selected from this listing to be interviewed. No substitution was allowed when the originally sampled household resident could not be interviewed. These household samples were selected from census area data

[b]The interview was divided into two parts. Part I assessed core disorders and was completed by all respondents. Part II participants consisted of all those who met lifetime criteria for any core disorder plus a probability sub-sample of approximately 25% of other Part I respondents. The current sample comprised Part II respondents who were currently married, and answered the questions about violence in current marriages

[c]Response rate is calculated as the ratio of the number of households in which an interview was completed to the number of households originally sampled, excluding from the denominator households known not to be eligible either because of being vacant at the time of initial contact or because the residents were unable to speak the designated languages of the survey

[d]The number of heterosexual couples in each country sample

as practicable, couples were interviewed separately to ensure safety and confidentiality. Interviewers were trained to assess for emotional distress following completion of the survey and followed specific protocols for connecting participants to appropriate clinical services if necessary.

Demographics/relationship characteristics

Demographic characteristics considered as part of this project included the participant's education level, highest level of parent education, highest parent occupation, whether or not respondent was in their first marriage, number of previous marriages, age when first married, age at start of current marriage, and years married or living together in current marriage. Participating countries varied in the age at which schooling was commenced and the duration of each stage of education. To accommodate these differences, four milestones of education were defined by within country standards as completing primary education, completing secondary education, entry into tertiary education, and graduation from tertiary education (including university or other higher levels of education after secondary education) [21] and are referred to as low, low-average, high-average, and high, respectively. Parental occupation was first classified into 28 categories and 10 major groups defined by the International Standard Classification of Occupations of the International Labour Organization (ISCO-88) [22]. The ten groups were then further classified into skill-level categories defined by ISCO-88 as elementary (unskilled and semi-skilled labor), low-average prestige (clerks, service and sales, skilled workers, craft and related, and plant/machine operators), high-average prestige (technicians), and high prestige (professionals). Finally, respondents were asked the age they were when they were first married. Age of first marriage was then placed into discrete gender and country specific quartiles to reflect young, young-average, old-average, and old age.

Childhood adversities

Childhood adversities (CAs) were assessed using 12 dichotomously-scored measures about experiences occurring before age 18. These included physical abuse, sexual abuse and emotional/physical neglect, father's death, mother's death, other parental loss, parent with a mental disorder, parent with a substance disorder, parent criminality, witnessing family violence, having had a life-threatening illness, and experience of economic adversity in childhood. Physical abuse of the respondent by a parent or caregiver was assessed using the CTS2 [20, 23]. Consistent with prior WMH research on CAs [24, 25], we distinguished between CAs in a highly correlated set of seven that we labeled maladaptive family functioning CAs (physical and sexual abuse,

neglect, parent with a mental disorder, parent with a substance disorder, parental criminality and witnessing family violence).

Dating experiences

Dating experiences included exposure to any violence in dating relationships (reported perpetration or victimization of moderate physical violence), age of first sexual intercourse, and age respondent started dating. Exposure to violence in dating relationships was assessed using the CTS2 [20]. Age of first sexual intercourse was examined in roughly equal quartiles combining reports from wives and husbands allowing for consistent age cutoffs: young (less than 18 years old), young-average (18–19 years old), old-average (20–22 years old), and older than average (23 years or older).

Psychiatric disorders

Age of onset (AOO) of eight internalizing disorders (panic disorder, generalized anxiety disorder, post-traumatic stress disorder, separation anxiety disorder, social phobia, specific phobia, major depressive disorder, and broad bipolar disorder) and seven externalizing disorders (conduct disorder, oppositional defiant disorder, alcohol abuse with or without dependence, alcohol dependence with or without abuse, drug abuse with or without dependence, drug dependence with or without abuse, and intermittent explosive disorder) were collected. Diagnoses of mental disorders were based on Version 3.0 of the WMH-CIDI [16]. Pre-marital onset of mental disorders was defined as reporting a disorder with AOO less than that of marrying their current spouse (i.e. AOO was less than the age respondent was at current marriage).

Analysis methods

All data management and analyses were completed in SAS software, Version 9.4 (SAS Institute Inc., Cary, NC, USA). Analyses utilized a data set in which each couple was represented by a single observation allowing us to examine potential interactions between spouses [26]. All analyses were weighted to the sum of the weights for both spouses reflecting a couples' weight. The sum of the consolidated weights across couples was standardized in each survey for purposes of pooled cross-national analysis to equal the observed number of couples within the sample.

Weighted prevalence of marital violence was estimated using cross-tabulations for each country separately and then for all six countries together. Logistic regression was then used to examine predictors of marital violence pooled across surveys. This process was completed for husbands and wives separately and then together for each predictor group (i.e. we modeled wives predictors separate from husbands, husbands separate from wives, and then modeled the significant predictors from each together as well as examining joint effects of exposures between wives and husbands). All models included dummy control variables for WMH country, within country quartiles of the years each couple was married, and whether a person was present during the interview for the wife or not. For the fourth predictor block, psychiatric disorders, we included two additional controls; the current age of the husband and wife. The design-based Taylor series method [27, 28] was used to adjust for the weighting and clustering of observations. Regression coefficients were exponentiated and reported as odds-ratios with 95% confidence intervals. Design-based Wald Chi Square tests were used to test the mean difference in odds for parameter estimates and the potential joint significance for sets of parameters by adjusting the degrees of freedom within tests [29].

Significant predictors from each predictor group were used to construct a final predictive model. Once the final model was estimated, a predicted probability of marital violence for each couple was generated from the model coefficients. A receiver operating characteristic (ROC) curve was calculated from this summary predicted probability [30]. The Area Under the Curve (AUC) was then calculated to quantify overall prediction accuracy of the model [31]. Additionally, we evaluated concentration of risk of marital violence among the 5% of respondents with highest predicted risk of marital violence based on the final model, which we defined as the proportion of all observed cases of marital violence that was found among this 5% of respondents.

Given the possibility of overfitting our model due to the large number of predictors examined, we then used the method of replicated tenfold cross-validation with 20 replicates [32, 33] and generated a predicted probability of marital violence for each couple. A ROC and AUC were calculated to quantify overall prediction accuracy of the simulated data (20 times the original sample size, $n = 30{,}300$). As with the observed data, we evaluated concentration of risk of marital violence among the 5% of respondents with highest predicted risk of marital violence. Using tenfold cross-validation with 20 replicates corrects for the over-estimation of overall model prediction accuracy when estimating AUC and concentration of risk [32].

Results

Prevalence of marital violence

Comparative prevalence estimates of spousal report are shown in Table 2. Prevalence of husbands reporting

Table 2 Prevalence of marital violence ever in current marriage in the six World Mental Health Survey countries with couples samples, as reported by either spouse ($n = 1515$)

Violence report	% (se)	(*n*)
Husband reports perpetration[a]	9.10 (0.81)	(162)
Wife reports victimization[b]	9.10 (0.81)	(162)
Both report marital violence	3.80 (0.56)	(76)
Either spouse report marital violence	14.40 (0.98)	(248)

Based on weighted data

se standard error, *n* number of observed cases of the outcome in the sample

[a]Husband reports perpetration of marital violence towards his current wife (whether or not wife reports victimization)

[b]Wife reports victimization of marital violence from her current husband (whether or not husband reports perpetration)

Table 3 Prevalence of marital violence ever in current marriage in the six World Mental Health Survey countries with couples samples, as reported by either spouse

	Couples sample size[a]	% (se)	(*n*)
Brazil	133	21.80 (3.21)	(33)
Bulgaria	422	10.67 (1.59)	(52)
People's Republic of China	104	16.25 (3.20)	(21)
Lebanon	159	8.75 (3.23)	(14)
Nigeria	305	12.16 (2.65)	(50)
United States	392	22.22 (1.77)	(78)
Total	1515	14.40 (0.98)	(248)

Based on weighted data

se standard error, *n* number of observed cases of the outcome in the sample

[a]The number of heterosexual couples in each country sample

perpetration of violence towards their current wife across surveys was 9.1% (162 respondents). Prevalence of wives reporting victimization of violence from their current husbands was also 9.1% (162 respondents). Although prevalence estimates were the same for husbands and wives, concordant responses were low. When looking at concordant responses, the prevalence of both reporting violence (i.e. husband reported perpetration towards current wife and wife-reported victimization from current husband) was 3.8% (76 couples). Thus, the combined measure of female victimization of physical violence (via either husband or wife report) was 14.4% (248 couples) which was used as the outcome measure for this project. Prevalence estimates differed significantly across all surveys ($\chi^2_5 = 27.9$, $p < 0.001$) ranging from 8.8% in Lebanon to 22.2% in the United States (Table 3).

Predictors of marital violence

Due to the number of predictors examined, results are only presented for the final models in each predictor group (i.e. models presented are those combining factors identified in the spousal specific models as well as examination of joint effects of exposures between both members of the dyad for each predictor group).

Model 1

Preliminary analysis found that low education and younger age when first married were significant predictors for wives and husbands whereas highest parent education, highest parent occupation were not. Additionally, reporting that their current marriage was not their first marriage was also a significant predictor for the wife. However, after examining the joint effects of these exposures between the couple, the final model (Table 4, Model 1) resulted in the husband reporting young when first married (OR 1.5; 95% CI 1.1–2.2), the highest education level within the couple (OR 0.7; 95% CI 0.6–0.9), and the wife being in more marriages than her current husband (OR 2.4; 95% CI 1.3–4.4). The odds ratios for these parameter estimates were significant as a set (χ^2_3 36.7, $p < 0.001$).

Model 2

Preliminary analysis showed that reporting one or more maladaptive family functioning CA was the best predictor of marital violence for husbands and wives separately. Examination of the interaction between this variable for husbands and wives resulted in insignificant parameter estimates resulting in the final model for this predictor group (Table 4, Model 2), which included the gender specific variables reflecting personal experience with these adversities irrespective of their spouse. The odds for marital violence were significantly higher for wives experiencing one or more maladaptive family functioning CA (OR 2.2; 95% CI 1.5–3.7) as were the odds for husbands (OR 2.1; 95% CI 1.4–3.1).

Model 3

Preliminary analysis showed that ever experiencing dating violence, young age of first sexual intercourse and early initiation of sexual intercourse were significant predictors of marital violence for wives and husbands separately. However, after examining the joint effects of these exposures between the couple, only two interaction variables were retained in the final model (Table 4, Model 3). These included either spouse reporting any prior dating violence before the age of 21 (OR 2.6; 95% CI 1.7–3.8) and either

Table 4 Associations of demographics/relationship characteristics, childhood adversities, dating experiences, and psychiatric disorders with marital violence ($n=1515$)[a]

	Bivariate models OR (95% CI)	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)	Model 4[b] OR (95% CI)	Model 5[b] OR (95% CI)
I. Demographics/ relationship characteristics						
Husband's age when first married[c]						
Young	1.7 (1.1–2.7)*	1.5 (1.0–2.2)*	–	–	–	1.3 (0.8–1.9)
Young average	0.7 (0.4–1.3)		–	–	–	
Old average	1.2 (0.7–1.9)		–	–	–	
Old	1.0		–	–	–	
χ^2	$\chi^2_{(3)}$ 0.0, $p=0.92$					
Highest education level in couple	0.9 (0.6–0.8)	0.7 (0.6–0.9)*	–	–	–	0.8 (0.6–0.9)*
Couple marriage categories						
Wife more marriages than husband	2.7 (1.5–4.8)*	2.4 (1.3–4.4)*	–	–	–	1.8 (0.9–3.5)
Husband more marriages than wife	1.1 (0.7–1.8)		–	–	–	$\chi^2_{(3)}$ 18.6, $p<0.001$
Both previously married	1.0 (0.4–2.1)		–	–	–	
Both in first marriage	1.0		–	–	–	
χ^2	$\chi^2_{(3)}$ 11.5, $p=0.009$*					
II. Childhood adversities						
Wife—maladaptive family functioning CAs (vs. none)						
1 or more	2.3 (1.6–3.4)*	–	2.2 (1.5–3.2)*	–	–	1.8 (1.2–3.7)*
χ^2	$\chi^2_{(1)}$ 17.3, $p<0.001$					
Husband—maladaptive family functioning CAs (vs. none)						
1 or more	2.2 (1.5–3.2)*	–	2.1 (1.4–3.1)*	–	–	1.5 (1.0–2.3)
χ^2	$\chi^2_{(1)}$ 14.8, $p<0.001$					$\chi^2_{(2)}$ 13.60, $p<0.001$
III. Dating experiences						
Either husband and/or wife ever experienced any violence in any dating relationships[d]						
	2.7 (1.8–4.0)*	–	–	2.6 (1.7–3.8)*	–	1.7 (1.2–2.6)*

Table 4 (continued)

	Bivariate models OR (95% CI)	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)	Model 4[b] OR (95% CI)	Model 5[b] OR (95% CI)
	$\chi^2_{(1)}$ 24.6, $p<0.001$					
Early initiation of sexual intercourse for either spouse[e]						
	1.7 (1.1–2.6)*	–	–	1.6 (1.1–2.5)*	–	1.3 (0.8–2.0)
χ^2	$\chi^2_{(1)}$ 5.8, $p=0.02$					$\chi^2_{(2)}$ 9.40, $p=0.009$
IV. Psychiatric disorders						
Couple mental disorder combination category						
Wife internalizing[f]—husband externalizing[g]	9.2 (4.6–18.3)*	–	–	–	9.2 (4.6–18.3)*	5.0 (2.5–10.3)*
All other combinations where at least one or both spouses had both (at least one internalizing and at least one externalizing)	4.3 (2.0–9.2)*	–	–	–	4.3 (2.0–9.2)*	3.4 (1.5–7.6)*
All other combinations where at least one spouse had exactly one internalizing or externalizing disorder (but not both)	1.8 (1.1–2.9)*	–	–	–	1.8 (1.1–2.9)*	1.6 (1.0–2.6)
Neither spouse had either	1.0	–	–	–		1.0
χ^2	$\chi^2_{(3)}$ 43.0, $p<0.001$					$\chi^2_{(3)}$ 21.80, $p<0.001$
Model χ^2		$\chi^2_{(3)}$ 36.7, $p<0.001$	$\chi^2_{(2)}$ 32.5, $p<0.001$	$\chi^2_{(2)}$ 31.0, $p<0.001$	$\chi^2_{(3)}$ 43.0, $p<0.001$	$\chi^2_{(10)}$ 127.20, $p<0.001$

n number of observed cases of the outcome in the sample, *OR* odds ratio, *CA* childhood adversity

*Significant at the 0.05 level, two sided test

[a]Models were based on weighted data. Each model included dummy variable controls for WMH country, years the couple was married, and whether or not a person was present during the interview for the wife

[b]Models controlled for the wife's age and husband's age in addition to those in[a]

[c]Age when first married for the husband was categorized into country specific quartiles

[d]Any violence is defined as ever being a victim or perpetrator of moderate physical violence in any dating relationships, the reference includes those who did not date before 21

[e]Wife young (< 18) or husband young or young average (< 20) years old, compared to all other combinations

[f]Irrespective of comorbidity with any externalizing disorders

[g]Irrespective of comorbidity with any internalizing disorders

the wife was young and/or the husband was young or young average at age of first sexual intercourse (OR 1.6; 95% CI 1.1–2.5). As a set, these variables were significant (χ^2_3 31.0, $p < 0.001$).

Model 4

Preliminary analysis showed that each of the 15 pre-marital psychiatric disorders assessed had an elevated OR for husbands (seven were statistically significant at the 0.05 level) where 13 of the 15 were significant for wives (5 were statistically significant at the 0.05 level) when considered independently. However, few remained significant in multivariate models due to comorbidity among disorders. Therefore, the most robust predictor of marital violence for husbands and wives separately was one or more internalizing disorder or one or more externalizing disorder. Further analysis (Table 4, Model 4) then showed that the most parsimonious characterization reflected the interaction of these variables between the couple. The odds of marital violence were significantly higher among couples where the wife had any internalizing disorder and the husband had any externalizing disorder (OR 9.2; 95% CI 4.9–18.3), all other combinations where at least one or both spouses had at least one internalizing or externalizing disorder (OR 4.3; 95% CI 2.0–9.2), and all other combinations where at least one spouse had one internalizing or externalizing disorder (but not both) (OR 1.8; 95% CI 1.1–2.9) when compared to couples where neither spouse had an internalizing or externalizing disorder. These variables were significant as a set (χ^2_3 43.0, $p < 0.001$).

Model 5

Model 5 (Table 4) shows results from the final analytic model including all ten predictors identified in Models 1–4. Of the parameters included, only five were significant. The odds of marital violence were significantly higher among couples where the wife had experienced one or more maladaptive family functioning CAs (OR 1.8; 95% CI 1.2–3.7), either spouse experienced dating violence before the age of 21 years (OR 1.7; 95% CI 1.2–2.6), the wife reported any internalizing disorder (with or without externalizing) and the husband reported any externalizing disorder (with or without internalizing) (OR 5.0; 95% CI 2.5–10.3), or all other combinations where at least one or both spouses had at least one internalizing disorder or externalizing disorder (but not both) (OR 3.4; 95% CI 1.5–7.6). Additionally, the odds of marital violence decreased as the highest educational attainment level of the couple increased (OR 0.8; 95% CI 0.6–0.9). The odds of marital violence differed significantly for each aim's group of predictors as sets within the model. Within-group mean differences in odds were also tested for each aim's group of predictors, all of which were significant.

Strength and consistency of overall model predictions

The estimated AUC was 0.75 based on predicted probabilities in the observed data and 0.70 based on the simulated data of 20 replicates of tenfold cross validated predictions (Fig. 1). Based on the simulated data, the 5% of respondents with the highest predicted risk included 18.6% of all cases of

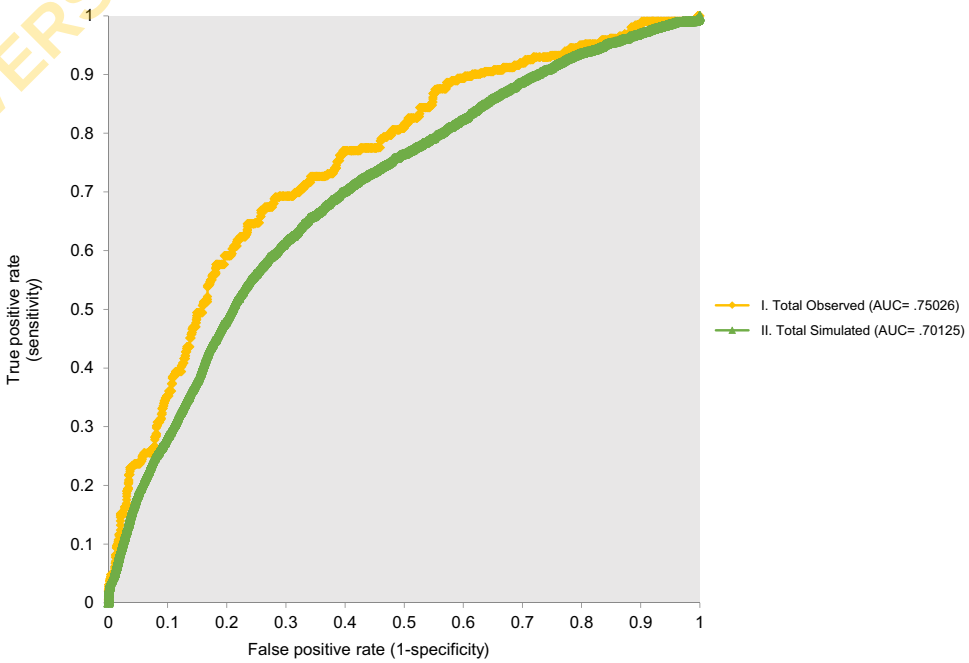

Fig. 1 AUC of marital violence final model, total sample weighted analysis. *AUC* area under the receiver operating characteristic curve

marital violence. This is just under four times the proportion expected by chance (Table 5). This is compared to 27.3% in the observed data which is five and a half times the proportion expected by chance.

Discussion

Overall, concordance of spousal reports of marital violence was low. Only in about 25% of couples where at least one member reported physical violence did their spouse also report violence. Though we could have used the conservative estimate where reports of physical violence were concordant, we decided to combine reports where either spouse reported violence, which raised our estimate from 3.8 to 14.4%. This decision is potentially justified as there are reasons to believe reports of violence are likely underestimates. Despite efforts for the safety and privacy of participants, there are reasons why spouses may avoid disclosure of violence particularly when there are potential cultural or legal consequences [34, 35]. Abused women may not feel comfortable revealing victimization as they may feel embarrassed or ashamed, fear reprisal by abusers, or the subject may be too personal to discuss with a stranger [36]. Reasons for non-disclosure of male perpetration, however, are less studied. Though, it is possible that males may not reveal perpetration because it may be viewed as a stigmatizing behavior with potential legal consequences [37] especially in countries where there is higher gender equality. Given the multitude of factors which influence reporting, we chose to use the combined report of physical violence. Additionally, the conservative estimate where reports of violence were concordant was dramatically lower than previously reported prevalence estimates giving us no reason to believe that this is closest to the truth [6, 17]. While victims of IPV can be of any gender or sexual orientation, previous research has established the overwhelming global burden is borne by women [1]. Though women can also perpetrate violence in relationships with men, this is often done in self-defense. Furthermore, it has been shown that female victims experience negative IPV-related health outcomes disproportionately higher than their male counterparts [12]. Violence can also occur in same-sex relationships however, the most common perpetrators of IPV towards women are male intimate partners [38].

The primary goal of this project was to identify pre-marital predictor variables associated with subsequent marital violence. Statistically significant predictors, and their optimal functional form, were then used to develop a model predicting risk for marital violence. Indicators of model fit suggest that models were largely successful in predicting risk of marital violence as the AUC was 0.75 in the model with the observed sample and 0.70 in the model using the simulated data. An important finding from our study was that just under 30% (28.43%) of couples who experienced marital violence were among the top 10% of respondents with highest predicted risk scores in our cross-validated predictive model (simulated sample). This is noteworthy because cross-validation is designed to limit the possibility of overfitting and suggests that our model's performance has external validity across other unknown samples [39]. Our model provides suggestive evidence that a predictive model could be used to support primary prevention of marital violence. In order for primary prevention to be successful, methods need to be developed to target high-risk couples for program intervention. Although relatively weak, the model from this project shows that it is possible to identify these couples better than by chance. However, in order to achieve the goal of targeted intervention provision, the predictive strength of our model would need to be validated and assessed in a prospective study with a sample of newly married couples. To date, few primary prevention efforts for IPV have shown promising results [8, 10]. The Creating Healthy Relationships program has shown results in reducing IPV among currently married couples [10]. This program was designed to reduce IPV in low-income, situationally violent couples

Table 5 Concentration of risk among the top three ventiles of couples with highest predicted risk of marital violence in the total sample

AUC	Simulated data[a] ($n = 30{,}300$)			AUC	Observed sample[b] ($n = 1515$)		
	Concentration of risk in ventiles predicted to have highest risk[c]				Concentration of risk in ventiles predicted to have highest risk[c]		
	Top 5%	Top 10%	Top 15%		Top 5%	Top 10%	Top 15%
0.70	18.6	28.43	38.0	0.75	23.7	35.2	49.4

Each ventile represents 5% of married couples in the sample ranked in terms of their predicted risk of marital violence

AUC area under the receiver operating characteristic curve

[a]Estimates calculated from 20 replicates of tenfold cross-validation of the final model

[b]Estimates calculated from the final model

[c]Concentration of risk refers to the percent of all observed occurrences of the outcome in a ventile or ventiles of the predicted risk distribution

(i.e. couples where violence tends to be more reciprocal, stay within the family, and not involve control or dominance) [40]. Though this program has been used to prevent IPV in this specific population, it is possible that it has utility in a broader target group. Other primary prevention programs initially started by targeting isolated risk factors [8]. However, these programs are predicated on the assumption that efforts designed to achieve a significant reduction in victimization are optimally supported by the identification and targeting of specific risk factors associated with the outcome. These types of programs were inevitably unsuccessful because they ignore the possibility that while single risk factors are associated with IPV, they are not well-suited for consideration of the complex synergy between multiple characteristics between both members of the couple. Such interventions originally focused on women and girls (i.e. victims) targeting underlying risk factors such as poverty, low education, and alcohol abuse [8, 41]. However, such interventions targeting single risk factors that were neither necessary nor sufficient for abuse to occur, were not well equipped to achieve change at a community level. Additionally, primary prevention interventions provided solely to female victims are inherently flawed as it takes a heterosexual couple for this type of IPV to occur. Hence consideration and involvement of both potential victims and perpetrators makes logical sense to reduce marital violence. The predictive modeling techniques used in this project provide evidence that it is possible to use a combination of factors to look beyond the individual characteristics, as is commonly done in public health practice, to stratify individuals based on their cumulative predicted risk.

Generally, individual coefficients in a predictive model should be interpreted with caution as there is a trade-off between prediction and interpretation when using these techniques [39]. However, a review of variables used in the final predictive model may provide some insight into their contribution to the larger context of risk. Seven of the ten variables included in the final predictive model represent characteristics of the couple rather than the experiences of either spouse alone. This indicates that the strongest predictors of marital violence are largely the function of characteristics between members of the dyad rather than the independent experience of either member of the couple. The three remaining factors were unique to either the husband or wife. Two of these measured exposure to any of the seven maladaptive family functioning CAs. This finding is contrary to the majority of previous studies exploring the associations between childhood adversities and IPV which consistently note that witnessing parental violence is the most important adversity in this relationship [14, 42, 43]. While maladaptive family functioning includes witnessing parental violence, our results suggest that exposure to any one of the seven CAs within this group increased risk for marital violence for each spouse. The remaining independent spousal variable measures the husband's report of young age at first marriage. This finding is plausible as young age has been identified as a risk factor for male perpetration of IPV [44] yet it is somewhat unexpected in that this relationship was not significant for wives.

This project has a number of potential limitations. Reliance on self-reported data could introduce recall bias [45]. It is possible that respondents have forgotten events or made errors in the timing of events. Inaccuracies are especially likely in reported AOO of psychiatric disorders [46]. The survey did not include length of time in the relationship prior to marriage which may have resulted in over counting premarital psychiatric disorders as some disorders may have actually presented after the start of the current relationship but prior to actual marriage. Additionally, the CIDI does not assess all psychiatric disorders. It is possible that inclusion of additional disorders may reveal different associations with marital violence. It is also possible that respondents provided answers based on what they thought was the right answer introducing social desirability bias. This is particularly relevant as the questions asked were highly sensitive. However, it was communicated to participants that a certificate of confidentiality was obtained to protect data from subpoena. Our sample only includes currently married couples which has the potential to introduce selection bias, specifically survivor bias [45]. Consequently, this could result in an underestimate of the outcome of interest as some marriages where abuse occurred may have already ended in divorce. As an indirect way to address this bias, we controlled for duration of marriage in all models. The assessment of violence in this study focuses solely on moderate physical violence using the CTS. As our assessment does not include severe physical, sexual, or emotional violence it may not provide a comprehensive assessment of all forms of violence within marriages. Additionally, despite its widespread use, the CTS2 has been criticized as questions of abuse are based in the context of disputes, disagreements, or differences. This does not allow for the possibility that abuse can occur with any other form of conflict, or no conflict at all [47].

Conclusion

Our results highlight the importance of considering both members of relationships when conducting research on IPV. We were able to identify important findings drawing on the strengths of our data as we had detailed information from both members of currently married couples. Implications of this finding suggests that traditional IPV research may not adequately describe the inherent dyadic nature of the occurrence.

Additionally, results demonstrate that it is possible to predict marital violence better than by chance (four times better within the top ventile) but the predictive power of the model we generated is not strong enough for offering specifically targeted primary prevention efforts. This may be attributed to the bias within our data as our sample only includes currently married couples. Despite this limitation, our results are promising enough for further exploration in a prospective study designed to assess its predictive power in an uncensored sample.

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Compliance with ethical standards

Conflict of interest In the past 3 years, Dr. Kessler received support for his epidemiological studies from Sanofi Aventis; was a consultant for Johnson & Johnson Wellness and Prevention, Sage Pharmaceuticals, Shire, Takeda; and served on an advisory board for the Johnson & Johnson Services Inc. Lake Nona Life Project. Kessler is a co-owner of DataStat, Inc., a market research firm that carries out healthcare research. The opinions and assertions expressed herein are those of the author(s) and do not necessarily reflect the official policy or position of the Uniformed Services University or the Department of Defense.

References

1. Krug E, Dahlberg LL, Mercy JA, Zwi AB, Lozano R (2002) World report on violence and health. World Health Organization, Geneva
2. Devries KM, Mak JY, Garcia-Moreno C, Petzold M, Child JC, Falder G, Lim S, Bacchus LJ, Engell RE, Rosenfeld L, Pallitto C, Vos T, Abrahams N, Watts CH (2013) Global health. The global prevalence of intimate partner violence against women. Science 340(6140):1527–1528. https://doi.org/10.1126/science.1240937
3. Watts C, Zimmerman C (2002) Violence against women: global scope and magnitude. Lancet 359(9313):1232–1237. https://doi.org/10.1016/s0140-6736(02)08221-1
4. Garcia-Moreno C, Jansen HA, Ellsberg M, Heise L, Watts CH (2006) Prevalence of intimate partner violence: findings from the WHO multi-country study on women's health and domestic violence. Lancet 368(9543):1260–1269. https://doi.org/10.1016/s0140-6736(06)69523-8
5. Ellsberg M, Jansen HA, Heise L, Watts CH, Garcia-Moreno C (2008) Intimate partner violence and women's physical and mental health in the WHO multi-country study on women's health and domestic violence: an observational study. Lancet 371(9619):1165–1172. https://doi.org/10.1016/s0140-6736(08)60522-x
6. WHO (2013) Global and regional estimates of violence against women: prevalence and health effects of intimate partner violence and nonpartner sexual violence. World Health Organization, Geneva
7. Garcia-Moreno C, Jansen H, Ellsberg M, Heise L, Watts C (2005) WHO multi-country study on women's health and domestic violence against women. World Health Organization, Geneva
8. Ellsberg M, Arango DJ, Morton M, Gennari F, Kiplesund S, Contreras M, Watts C (2015) Prevention of violence against women and girls: what does the evidence say? Lancet 385(9977):1555–1566. https://doi.org/10.1016/s0140-6736(14)61703-7
9. WHO (2010) Preventing intimate partner and sexual violence against women: taking action and generating evidence. World

Health Organization/London School of Hygiene and Tropical Medicine, Geneva
10. Cleary Bradley RP, Gottman JM (2012) Reducing situational violence in low-income couples by fostering healthy relationships. J Marital Fam Therapy 38(Suppl 1):187–198. https://doi.org/10.1111/j.1752-0606.2012.00288.x
11. WHO (2016) Global plan of action to strengthen the role of the health system within a national multisectoral response to address interpersonal violence, in particular against women and girls, and against children. World Health Organization Geneva, Switzerland
12. Black MC, Basile KC, Breiding MJ, Smith SG, Walters ML, Merrick MT, Chen J, Stevens MR (2010) The National Intimate Partner and Sexual Violence Survey (NISVS): 2010 Summary Report. Center for Disease Control and Prevention, Atlanta
13. Straus MA, Mickey EL (2012) Reliability, validity, and prevalence of partner violence measured by the conflict tactics scales in male-dominant nations. Aggress Violent Behav 17(5):463–474
14. Capaldi DM, Knoble NB, Shortt JW, Kim HK (2012) A systematic review of risk factors for intimate partner violence. Partn Abuse 3(2):231–280. https://doi.org/10.1891/1946-6560.3.2.231
15. Hindin MJ, Kishor S, Ansara DL (2008) Intimate partner violence among couples in 10 DHS Countries: Predictors and Health Outcomes. DHS Analytical Studies No. 18. Macro International Inc., Calverton, Maryland
16. Kessler RC, Üstün TB (2008) The WHO World Mental Health Surveys: global perspectives on the epidemiology of mental disorders, vol 6. Cambridge University Press, New York
17. Garcia-Moreno C, Jansen H, Ellsberg M, Heise L, Watts C (2005) WHO Multi-country study on women's health and domestic violence against women: Initial results on prevalence, health outcomes and women's responses. World Health Organization, Geneva
18. Heeringa S, Wells E, Hubbard F, Mneimneh Z, Chiu WT, Sampson N, Berglund P (2008) Sample designs and sampling procedures. In: RC K TÜ (ed) The WHO World Mental Health Surveys: Global perspectives on the epidemiology of mental disorders. Cambridge University Press, New York, pp 14–32
19. Pennell B-P, Mneimneh Z, Bowers A, Chardoul S, Well SJ, Viana M (2008) Implementation of the World Mental Health Surveys. In: Kessler RCÜT (ed) The WHO World Mental Health Surveys: global perspectives on the epidemiology of mental disorders. Cambridge University Press, New York, pp 33–57
20. Straus MA, Hamby SL, Boney-McCoy S, Sugarman DB (1996) The revised conflict tactics scales (CTS2) development and preliminary psychometric data. J Fam Issues 17(3):283–316
21. Lee S, Tsang A, Breslau J, Aguilar-Gaxiola S, Angermeyer M, Borges G, Bromet E, Bruffaerts R, de Girolamo G, Fayyad J, Gureje O, Haro JM, Kawakami N, Levinson D, Browne MAO, Ormel J, Posada-Villa J, Williams DR, Kessler RC (2009) Mental disorders and termination of education in high-income and low- and middle-income countries: epidemiological study. Br J Psychiatry 194(5):411–417. https://doi.org/10.1192/bjp.bp.108.054841
22. Hussmanns R, Mehran F, Verna V (1990) Surveys of economically active population, employment, unemployment and underemployment: An ILO manual on concepts and methods. International Labour Office, Geneva
23. Straus MA (1979) Measuring intrafamily conflict and violence: the conflict tactics (CT) scales. J Marriage Fam 41(1):75–88
24. Kessler RC, McLaughlin KA, Green JG, Gruber MJ, Sampson NA, Zaslavsky AM, Aguilar-Gaxiola S, Alhamzawi AO, Alonso J, Angermeyer M, Benjet C, Bromet E, Chatterji S, de Girolamo G, Demyttenaere K, Fayyad J, Florescu S, Gal G, Gureje O, Haro JM, Hu CY, Karam EG, Kawakami N, Lee S, Lepine JP, Ormel J, Posada-Villa J, Sagar R, Tsang A, Ustun TB, Vassilev S, Viana MC, Williams DR (2010) Childhood adversities and adult psychopathology in the WHO World Mental Health Surveys. Br J Psychiatry 197(5):378–385. https://doi.org/10.1192/bjp.bp.110.080499
25. McLaughlin KA, Greif Green J, Gruber MJ, Sampson NA, Zaslavsky AM, Kessler RC (2012) Childhood adversities and first onset of psychiatric disorders in a national sample of US adolescents. Arch Gen Psychiatry 69(11):1151–1160. https://doi.org/10.1001/archgenpsychiatry.2011.2277
26. Miller E, Breslau J, Petukhova M, Fayyad J, Green JG, Kola L, Seedat S, Stein DJ, Tsang A, Viana MC, Andrade LH, Demyttenaere K, de Girolamo G, Haro JM, Hu C, Karam EG, Kovess-Masfety V, Tomov T, Kessler RC (2011) Premarital mental disorders and physical violence in marriage: cross-national study of married couples. Br J Psychiatry 199(4):330–337. https://doi.org/10.1192/bjp.bp.110.084061
27. Wolter K (1985) Introduction to variance estimation. Springer, New York
28. Levy PS, Lemeshow S (2013) Sampling of populations: methods and applications. Wiley, New York
29. Agresti A (2002) Logistic regression. Wiley Online Library, Hoboken
30. Zou KH, O'Malley AJ, Mauri L (2007) Receiver-operating characteristic analysis for evaluating diagnostic tests and predictive models. Circulation 115(5):654–657
31. Hanley JA, McNeil BJ (1983) A method of comparing the areas under receiver operating characteristic curves derived from the same cases. Radiology 148(3):839–843
32. Smith GC, Seaman SR, Wood AM, Royston P, White IR (2014) Correcting for optimistic prediction in small data sets. Am J Epidemiol 180(3):318–324. https://doi.org/10.1093/aje/kwu140
33. Efron B (1983) Estimating the error rate of a prediction rule: improvement on cross-validation. J Am Stat Assoc 78(382):316–331
34. Ellsberg M, Heise L, Pena R, Agurto S, Winkvist A (2001) Researching domestic violence against women: methodological and ethical considerations. Stud Fam Plann 32(1):1–16
35. Kishor S (2005) Violence against women: a statistical overview, challenges and gaps in data collection and methodology and approaches for overcoming them—domestic violence measurement in the demographic and health surveys: the history and the challenges. Dvision for the Advancement of Women, Geneva
36. Smith MD (1994) Enhancing the quality of survey data on violence against women: a feminist approach. Gender Soc 8(1):109–127
37. Fulu E, Jewkes R, Roselli T, Garcia-Moreno C (2013) Prevalence of and factors associated with male perpetration of intimate partner violence: findings from the UN Multi-country cross-sectional Study on Men and Violence in Asia and the Pacific. Lancet Global Health 1(4):e187–e207. https://doi.org/10.1016/s2214-109x(13)70074-3
38. Heise L, Ellsberg M, Gottemoeller M (1999) Ending violence against women. Popul Rep 27(4):1
39. Kuhn M, Johnson K (2013) Applied predictive modeling, vol 810. Springer, New York
40. Cleary Bradley RP, Friend DJ, Gottman JM (2011) Supporting healthy relationships in low-income, violent couples: reducing conflict and strengthening relationship skills and satisfaction. J Couple Relatsh Therapy 10(2):97–116
41. Heise L (2011) What works to prevent partner violence? An evidence overview. STRIVE, London School ofHygiene and Tropical Medicine, London. https://www.oecd.org/derec/49872444.pdf
42. Gil-Gonzalez D, Vives-Cases C, Ruiz MT, Carrasco-Portino M, Alvarez-Dardet C (2008) Childhood experiences of violence in perpetrators as a risk factor of intimate partner violence: a systematic review. J Public Health 30(1):14–22. https://doi.org/10.1093/pubmed/fdm071

43. Roberts AL, Gilman SE, Fitzmaurice G, Decker MR, Koenen KC (2010) Witness of intimate partner violence in childhood and perpetration of intimate partner violence in adulthood. Epidemiology 21(6):809–818. https://doi.org/10.1097/EDE.0b013e3181f39f03
44. Kim HK, Laurent HK, Capaldi DM, Feingold A (2008) Men's aggression toward women: a 10-year panel study. J Marriage Fam 70(5):1169–1187. https://doi.org/10.1111/j.1741-3737.2008.00558.x
45. Szklo M, Nieto J (2014) Epidemiology beyond the basics, 3rd edn. Jones and Bartlett Learning, Burlington
46. Kazemian L, Farrington DP (2005) Comparing the validity of prospective, retrospective, and official onset for different offending categories. J Quant Criminol 21(2):127–147
47. DeKeseredy WS, Schwartz MD (1998) Measuring the extent of woman abuse in intimate heterosexual relationships: a critique of the conflict tactics scales. US Department of Justice Violence Against Women Grants Office Electronic Resources. http://www.vaw.umn.edu/research.asp

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