



Do laws promoting gender equity and freedom from violence benefit the most vulnerable? A multilevel analysis of women's and adolescent girls' experiences in 15 low- and middle-income countries

Lauren Maxwell^{1,2}, Zara Khan^{1,3} and Kathryn M Yount^{1,4,*}

¹Hubert Department of Global Health, Rollins School of Public Health, Emory University, 1518 Clifton Road NE, Atlanta, GA 30322, USA

²Heidelberg Institute for Global Health, Heidelberg University, Building 6130.3, Level 6, Im Neuenheimer Feld 130.3, Heidelberg 69120, Germany

³University of Texas Southwestern Medical School, 5323 Harry Hines Blvd., Dallas, TX 75390, USA

⁴Hubert Department of Global Health, Rollins School of Public Health, Emory University, 1518 Clifton Road, Atlanta, GA 30322, USA

*Corresponding author. Hubert Department of Global Health, Rollins School of Public Health, Emory University, 1518 Clifton Rd NE, Claudia Nance Rollins Building Room 7029, Atlanta, GA 30322, USA. E-mail: kyount@emory.edu

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Abstract

In this analysis, we assess whether laws that promote gender equity and freedom from violence are associated with a lower risk of prior-year physical and sexual intimate partner violence (IPV) among adolescent girls and adult women (AGW) and whether these laws protect more and less vulnerable AGW equally. We included all 15 countries that administered the Domestic Violence Module in a Demographic and Health Survey since 2015. The primary exposure was a validated, country-level index of laws on violence against women and girls (LoVI). A multilevel approach was used to model five forms of violence (prior-year partner physical, sexual, physical or sexual violence and prior-year non-partner physical violence or sexual violence) among ever-partnered, non-widowed adolescent girls 13–19 years ($n = 6691$) and women 20–49 years ($n = 119\,343$). Across countries, partner physical violence ranged from 0% to 33% and sexual violence from 0% to 23%. Laws on marital rape, child marriage and sexual harassment were negatively associated with prior-year physical and sexual IPV for women and girls. Comprehensive domestic violence legislation was unrelated to girls' experiences of prior-year physical or prior-year sexual IPV. No interaction was observed between LoVI component laws and a score meant to capture adolescent vulnerability. Three of the four LoVI component laws had consistent, negative associations with partner violence for girls and women, but negative associations were stronger for women than girls. Thus, while laws promoting gender equity and freedom from violence are generally protective, they may be more so for women than adolescent girls. Future research should explore the impact of gender equitable laws on women's and adolescent girls' experiences of violence, and countries may consider more comprehensive legal protections against violence for adolescent girls.

Keywords: Adolescence, girls, intimate partner violence, national legal environment, non-partner violence, vulnerability

Introduction

Globally, one in three adult women report lifetime experiences of physical and/or sexual intimate partner violence (IPV) (Devries *et al.*, 2013), and lifetime rates of IPV are comparable in adolescence and young adulthood. Across 30 low- and middle-income countries (LMICs), 28% of girls ages 15–19 and 29% of young women ages 20–24 report lifetime experiences of physical or sexual IPV (Decker *et al.*, 2015). Compared to adult women, adolescents report a comparable annual risk of physical and sexual IPV, and young women report a 20% higher risk (Decker *et al.*, 2015).

Adolescence is a period of rapid developmental change (Patton *et al.*, 2016) and of heightened vulnerability to multiple forms of violence (Finkelhor *et al.*, 2007). Before age 15, girls are not considered to be physically or cognitively ready to make safe, consensual and voluntary decisions about

marriage, sexual relations or reproduction (Dixon Mueller, 2008). In middle adolescence, from ages 15 to 17, physical and cognitive readiness for these events is thought to vary, depending on pubertal and cognitive maturation (Dixon Mueller, 2008). Experiences of IPV in adolescence are associated with various mental-health and behavioural challenges, which may be more severe for girls than boys (Barter and Stanley, 2016). We used the World Health Organization's definition of adolescence, which includes girls ages 10–19 (2021).

Following feminist social-ecological theory (Heise, 1998), unfavourable gender norms and power imbalances at multiple levels are important drivers of violence against women and girls (VAWG). Yet, multilevel research on VAWG has focused on community-level influences (Clark *et al.*, 2018; James-Hawkins *et al.*, 2017; James-Hawkins *et al.*, 2017;

Key messages

- Laws on violence against women and girls are meant to prevent experiences of partner and non-partner violence. Laws on gender equity in inheritance, hiring and pay also may affect women's and girls' experiences of partner and non-partner violence, but few analyses have explored these relationships.
- Because laws and policies often are related, an index capturing the national legal context may be useful to understand the relation between gender-equitable laws and women's and girls' experiences of partner and non-partner violence.
- Three of the four Laws on Violence against women and girls Index component laws had consistent, negative associations with partner violence for girls and women, but negative associations were stronger for women. Laws promoting gender equity and freedom from violence are generally protective, but possibly more so for women than girls.

Yount *et al.*, 2016; 2018, Semenza *et al.*, 2019; Yount *et al.*, 2018, Vanderende *et al.*, 2012) rather than on country-level legal and policy environments. Extant multilevel research has identified an association between inequitable community-level gender norms and higher risk of IPV. Macro-level factors associated with VAWG also may include systems that privilege men's entitlements, aggressive masculinities and the justification of VAWG (Heise, 1998). Using data from 44 countries, Heise and Kotsadam (2015) assessed the relation between national gender norms and inequalities, measured by the Cingranelli-Richards Human Rights Database and the Organization for Economic Cooperation and Development (OECD) Social Institutions and Gender Index, and women's risk of IPV. They found that unequal access to land and property for women and men was associated with a higher risk of experiencing prior-year physical and sexual IPV.

The Heise and Kotsadam (2015) study did not include measures for violence-related laws and policies, which capture legal norms for behaviour that may differ from societal norms (Bicchieri and Mercier, 2014; Klugman, 2017). VAWG-related legal reforms have accelerated since the 1990s (Pierotti, 2013). The number of countries with laws against IPV has risen from close to 0 (World Bank Group, 2016) to more than 144 (World Bank Group, 2018). This increase is attributed largely to international and regional human-rights conventions as well as to the campaigns of autonomous feminist movements (World Bank Group, 2016; Pierotti, 2013; Htun and Weldon, 2012). Legal reform may facilitate societal change on VAWG through multiple pathways (Klugman, 2017). Laws can enable citizens to hold states and perpetrators accountable (Jejeebhoy and Cook, 1997), attract resources for primary and secondary violence prevention (Ellsberg *et al.*, 2015), stimulate improvements in violence-response services (Aday, 2015) and change societal norms about the treatment of women and girls (Pierotti, 2013).

To quantify the relation between the legal context and women's and girls' experiences of partner and non-partner violence, this study (1) examines the influence of country-level laws on VAWG on the prior-year risk of sexual, physical or

sexual and physical IPV against adolescent girls; (2) assesses whether these laws offer similar protection against violence for less and more vulnerable adolescents, as defined by their social, economic and personal health status (Arora *et al.*, 2015) and (3) compares whether these laws offer similar protection against violence for adolescent girls and adult women. Because laws do not operate independently but rather as part of the legal system, this study considers both the legal context and the relation between individual laws and women's and girls' experiences of partner and non-partner violence. This work expands our understanding of whether and how policy and legal context relate to women's and girls' actual experiences of physical and sexual partner and non-partner violence to inform recommendations for research investment and interventions to support Sustainable Development Goal 5, the elimination of all forms of VAWG.

Methods

We included all 15 countries for which a Demographic and Health Survey (DHS) with a Domestic Violence Module (DVM) was administered since 2015 and was available at the time the dataset was created. Most included countries were in Sub-Saharan Africa ($n=9$) or South and Southeast Asia ($n=3$), while one each were in Central Asia (Afghanistan), Latin America and the Caribbean (Colombia), and North Africa, West Asia and Europe (Armenia). The percentage of women aged 20–24 years who were first married or in a union before age 18 ranged from 5% (Armenia) to 53% (Mozambique). The variance inflation factor (VIF) was used to assess multicollinearity, the correlation between model covariates (Everitt and Skrondal, 2002). The values associated with categorical variables are reported in Supplementary Appendix Table 1.

Outcome variables

Five primary outcomes were considered for this analysis. These included ever-partnered, non-widowed adolescent girls' and women's prior-year experiences of (1) physical violence, (2) sexual violence or (3) physical or sexual violence perpetrated by their current or most recent intimate partner and prior-year experiences of (4) being hit or (5) forced to have sex by someone other than an intimate partner.

Exposure variables

The primary exposure was an index representing country-level laws related to VAWG. The Laws on Violence against women and girls Index (LoVI) captured the presence of 'comprehensive' national legislation against child marriage, sexual harassment and assault, marital rape and domestic violence (DV), as measured by the World Bank Women, Business, and the Law (WB-WBL) and WORLD datasets (Yount *et al.*, 2018). Psychometric validation of the policy index is described elsewhere (Yount *et al.*, 2018). To estimate the LoVI for the present analysis, laws related to DV and sexual harassment were combined to create indicators for whether the country had comprehensive DV or sexual harassment legislation (Supplementary Appendix Text 1). Supplementary Appendix Table 2 presents the duration of time elapsed since the passage of any laws, while Supplementary Appendix Table 3 presents the cross-country distribution of LoVI scores and

of the laws and categories of laws that make up the LoVI. Given the small number of countries included in this analysis, the LoVI had a discrete distribution that naturally formed quartiles and was modelled as such (Supplementary Appendix Figure 1). In separate models, the LoVI was disaggregated into its component laws (or combined indicators for DV and sexual harassment-related legislation).

Individual-level vulnerability

Vulnerability was operationalized through a standardized score that included whether or not the respondent had any formal schooling; began living with her partner before age 15; was a member of an ethnic, linguistic or religious minority as defined by the World Directory of Minorities and Indigenous Peoples (Minority Rights Group International, 2019); was impoverished (lived in a household that was classified as being in lowest quintile of the DHS household wealth index, based on the score derived from the first component of a principal components analysis of household assets and amenities); lived in a rural area; had limited or no literacy or was blind (7 respondents reported being blind); or was severely stunted (height/weight Z-scores less than 2 standard deviations below the median reference height for girls 15–19 by year and month of age, according to the DHS methodology) (Richard *et al.*, 2012). Severe stunting is a well-known predictor of poor cognitive functioning, poor schooling performance, and chronic health conditions throughout adulthood (McGovern *et al.*, 2017).

A higher score represented a higher level of vulnerability. Ten country surveys did not measure one or more of the variables used to construct the vulnerability score (see Supplementary Appendix Table 4 for the distribution of vulnerability-related variables measured across countries). To account for cross-country differences in the availability or distribution of factors considered important for determining vulnerability, we estimated individual-level Z-scores within each country. The relation between individual components of the vulnerability score and adolescent girls' experiences of prior-year violence are reported in Supplementary Appendix Table 5.

Individual-level covariates

We adjusted for covariates that are known to be associated with women's or girls' experiences of IPV: respondent's age (Yount and Carrera, 2006), childhood exposure to father-on-mother physical IPV (Yount and Carrera, 2006), age at first cohabitation (Nasrullah *et al.*, 2014; Yount *et al.*, 2016), parity (Yount and Carrera, 2006), level of schooling completed (Vyas and Watts, 2009), partner's level of schooling completed (Ackerson *et al.*, 2008), and partner's frequency of drinking (Vizcarra *et al.*, 2004). Different functional forms of the continuous covariates were considered (see Supplementary Appendix Table 6 for model fits for age, age at first cohabitation and parity); however, non-linearities were not evident, so these covariates were modelled as linear.

Country-level covariates

National-level covariates included the natural log of per capita gross domestic product (GDP), in US dollars, (Heise and Kotsadam, 2015) and the Laws on Women's Economic

Equality Index (LoWEE), an index that captures information on the presence of national laws to ensure equality in women's access to (1) employment, (2) hiring, (3) remuneration for work ('equal pay'), (4) inheritance of assets as daughters and spouses ('equal inheritance') and (5) access to credit (Yount *et al.*, 2018; Supplementary Appendix Text 2). A LoWEE index for 2013 was created by applying standardized factor loadings for five binary items (estimated using the 2018 WB-WBL database) to WB-WBL data on the presence or absence of the same national laws in 2013 (Yount *et al.*, 2018). Supplementary Appendix Table 7 presents the cross-country distribution of laws that make up the LoWEE in 2013. Like the LoVI, the LoWEE followed a discrete distribution in this sample of countries (Supplementary Appendix Figure 2) and was modelled using quartiles and, separately, its five component laws.

We considered including the Human Development Index and societal norms about VAWG, operationalized as the percentages of women 20–34, women 35–49, men 20–34, and men 35–59 who believed that a husband was justified in beating his wife in at least one instance. Ultimately, these covariates were excluded because of high collinearity (inflated standard errors, VIF > 10) with other country-level variables.

Multilevel models

We included country-level random intercepts to account for unmeasured, country-level factors and applied an exchangeable correlation matrix to address the cluster sample design. We used the Akaike information criterion (AIC) to assess the importance of including random slopes to allow the relation between the LoVI and experiences of violence to vary across countries. The AIC considers both the fit and complexity of the model and is a widely used method for balancing model complexity and fit (Bozdogan, 1987). We assessed the potential for non-linear relationships between continuous covariates (standardized vulnerability score, age, number of children and age at first cohabitation) and the outcome by comparing restricted cubic splines with three knots to exponential, quadratic and linear terms using the AIC. We assumed that the random effects followed a normal distribution and assessed the sensitivity of the estimates to variations in the distribution of the random effects. The DFBETA is a measure of influence, specifically the measure between the difference in the parameter estimate with and without a given observation (Li and Valliant, 2011). Large values of DFBETA indicate potential outliers that could unduly influence model results. We used DFBETA to assess the effect of outliers on the overall estimates and estimated influence and leverage using Pearson residuals and predicted probabilities, respectively.

We used the likelihood ratio test to assess whether the inclusion of an interaction term between the LoVI (or LoWEE) and the standardized vulnerability score contributed to model fit. Models were weighted to account for the stratified, multi-stage, probabilistic sampling frame of the DHS (Corsi *et al.*, 2012). Given that odds ratios overestimate the risk of prevalent outcomes, like physical VAWG, we used log binomial regression models (generalized linear mixed models with a binomial distribution and a logit link) to estimate the relative risk of each binary outcome (Yelland *et al.*, 2011; Richardson *et al.*, 2015).

Missing data

The DHS imputes data for core variables (e.g. respondent's age and education) that are routinely measured. The measurement of other variables differs across countries. The Mozambique 2015 DHS did not measure partner's drinking frequency, and the Colombia 2015 DHS did not measure partner's education level and drinking frequency (see Supplementary Appendix Table 4 for a distribution of variables missing at the country level). We, therefore, estimated models that included (1) all covariates (dropping Colombia and Mozambique from the estimation) and (2) all 15 countries (excluding partner's education level and drinking frequency from the models). After restricting the sample to ever-partnered, non-widowed adolescent girls ages 13–19 who participated in the DVM and, excluding these two variables, only 9% ($n = 630$) of 7321 respondents were missing data on variables of interest and were excluded from the analysis. In models that excluded partner drinking and partner education, 6691 ever-partnered, non-widowed girls ages 13–19 and 148 915 women from 15 countries were included in the analysis.

Sensitivity analyses

We conducted a *post hoc* sensitivity analysis, where we modelled the direct associations of the LoVI's components—comprehensive laws on DV and sexual harassment, marital rape and child marriage—and their interactions with the individual-level vulnerability index. The original analysis plan and *post hoc* amendments are detailed in attachments to this manuscript. Results of all sensitivity analyses and comparisons of fully adjusted models and models that drop variables that were missing at the country level (i.e. partner education and partner drinking) are presented in Supplementary Appendix Tables 8–19.

Results

Table 1 shows the distributions and missingness of respondent- and household-level covariates for all girls in the sample. Variables that were not measured across countries are highlighted with footnotes. Most ever-partnered girls had at least one child, with some girls having as many as four children. More than 20% of girls had not received any formal schooling, while only 16% of their partners had no formal schooling. About one-third of girls (31%) had witnessed their father beat their mother. Very few girls answered questions about prior-year experiences of non-partner physical (8%) and sexual violence (16%), defined as being hit or being forced to have sex, respectively. Of the 16% of the sample who responded to the question about whether they were forced to have sex by someone other than their partner, none answered 'yes.'

Table 2 shows the distributions of country-level variables. Supplementary Appendix Table 20 provides national distributions of the percentage of ever-partnered adolescent girls who experienced prior-year partner and non-partner physical and sexual violence. Across countries, levels of physical IPV ranged from 0% in Armenia in 2015 to 33% in the Timor Leste in 2016. Levels of sexual IPV ranged from 0% in Armenia in 2015 to 23% in the Burundi in 2016. Non-partner physical and sexual violence had high levels of missingness.

The median level of non-response for the question about whether respondents had been hit or forced to have sex by someone other than their intimate partner in the last year was 91% and 98%, respectively.

Relationship between the LoVI and LoWEE component laws and adolescent girls' experiences of prior-year partner and non-partner physical and sexual violence

Table 3 shows the estimated relationship between component parts of the LoVI and the LoWEE and adolescent girls' and women's prior-year experiences of physical and sexual IPV. We present the component part of the LoVI and LoWEE to facilitate the discussion of the relationship between related legal domains and women's and girls' experiences of partner and non-partner violence. Results with the LoVI and LoWEE modelled as four-level categorical variables are summarized below and presented in Supplementary Appendix Table 21. There were too few observations to allow for the estimation of the relationship between the LoVI and adolescent girls' prior-year experiences of being hit or forced to have sex by someone other than their current or most recent intimate partner.

Living in a country with comprehensive DV legislation in 2013 was not related to girls' relative risk of prior-year physical IPV [RR: 0.98; 95% confidence interval (CI): 0.82, 1.18] but was related to their higher relative risk of prior-year sexual IPV (RR: 1.52; 95% CI: 1.39, 1.66). Living in a country with a marital rape law or with comprehensive sexual harassment legislation was related to a lower relative risk of physical IPV (RR: 0.54; 95% CI: 0.42, 0.71; RR: 0.59; 95% CI: 0.52, 0.68, respectively). Of the four LoVI components, which include two laws (marital rape law and legal age of marriage for girls 18 or above) and two groups of laws (comprehensive DV and sexual harassment legislation), only comprehensive DV legislation was not related to girls' experiences of prior-year physical or prior-year sexual IPV. Adolescent girls in countries that had enacted a marital rape law were 54% less likely to experience physical IPV (RR: 0.42, 0.71) and slightly less likely to have experienced prior-year sexual IPV (RR: 0.73; 95% CI: 0.51, 1.05) than girls in countries that had not enacted marital rape laws, although the CI included the null value. These results were consistent with the relationship between the LoVI component laws and prior-year experiences of physical and sexual IPV for women ages 20–49 (Table 3).

Considering the relationship between LoVI quartiles and girls' experiences of IPV (Supplementary Appendix Table 9), compared to girls in countries with the lowest levels of the LoVI, girls in countries with the highest levels of the LoVI were less likely to experience prior-year physical IPV (RR: 0.77; 95% CI: 0.54, 0.95) and as likely to experience prior-year sexual IPV (RR: 1.26; 95% CI: 0.62, 2.55). There was no evidence of a dose-response relationship between the LoVI quartiles and girls' experiences of prior-year physical or sexual IPV.

Individual-level covariates

The individual-level marker of vulnerability was not related to adolescent girls' experiences of prior-year physical or sexual IPV (Table 2). Compared to their counterparts, higher-parity girls were more likely to experience prior-year physical IPV (RR: 1.19; 95% CI: 1.01, 1.42) and slightly more likely

Table 1. Characteristics of analysis sample,^a stratified by LoVI Quartile (*n* = 7321 adolescent girls; 15 countries)

	LoVI Category									
	Overall		Lowest		Low		High		Highest	
	<i>n</i> = 7321		<i>n</i> = 1695		<i>n</i> = 2025		<i>n</i> = 1965		<i>n</i> = 1636	
	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)
Categorical participant-level variables										
Completed respondent schooling level										
Higher than secondary	184	(2)	16	(8)	12	(9)	110	(50)	46	(34)
Secondary	3129	(42)	324	(11)	378	(13)	1329	(37)	1098	(40)
Primary	2520	(35)	537	(25)	1302	(48)	473	(19)	208	(8)
No formal schooling	1488	(21)	818	(58)	333	(19)	53	(4)	284	(19)
Missing	0									
Marital status										
Currently married/cohabitating	6802	(92)	1638	(27)	1852	(25)	1706	(22)	1606	(26)
Divorced, separated	519	(8)	57	(12)	173	(40)	259	(42)	30	(6)
Completed partner's schooling level ^d										
Higher than secondary	335	(5)	84	(25)	70	(17)	44	(10)	137	(48)
Secondary	2417	(34)	479	(20)	600	(23)	326	(13)	1012	(45)
Primary	1684	(22)	505	(33)	852	(47)	99	(7)	228	(13)
No formal schooling	1082	(16)	566	(59)	256	(17)	14	(1)	246	(23)
Missing	1803	(22)	61	(4)	247	(26)	1482	(77)	13	(1)
Partner drinks alcohol ^e										
Often	206	(3)	30	(14)	82	(39)	34	(16)	60	(31)
Sometimes	1129	(16)	122	(12)	477	(42)	195	(17)	335	(29)
Never	4733	(68)	1539	(34)	1466	(27)	487	(11)	1241	(28)
Missing	1253	(13)	4	(0)	0	(0)	1249	(100)	0	(0)
Observed father beat mother										
Yes	2240	(31)	605	(31)	649	(27)	650	(26)	336	(17)
No	4478	(59)	825	(19)	1246	(27)	1185	(24)	1222	(30)
Missing	603	(10)	265	(49)	130	(17)	130	(20)	78	(14)
Experienced prior-year physical IPV										
Yes	1695	(23)	455	(32)	435	(26)	500	(25)	305	(18)
No	5625	(77)	1239	(24)	1590	(26)	1465	(24)	1331	(26)
Missing	1	(0)	1	(100)	0	(0)	0	(0)	0	(0)
Experienced prior-year sexual IPV										
Yes	602	(8)	130	(23)	255	(42)	115	(19)	102	(17)
No	6718	(92)	1564	(26)	1770	(25)	1850	(25)	1534	(25)
Missing	1	(0)	1	(100)	0	(0)	0	(0)	0	(0)
Experienced prior-year non-partner physical violence ^f										
Yes	215	(3)	51	(21)	74	(33)	18	(9)	72	(37)
No	416	(5)	70	(18)	232	(53)	42	(10)	72	(19)
Missing	6690	(92)	1574	(26)	1719	(24)	1905	(25)	1492	(24)
Experienced prior-year non-partner sexual violence ^g										
Yes	72	(0)	3	(3)	17	(16)	50	(55)	2	(26)
No	1406	(16)	56	(5)	113	(9)	1220	(84)	17	(1)
Missing	5843	(84)	1636	(30)	1895	(29)	695	(13)	1617	(29)
Household-level variables										
Household wealth quintile										
Highest	638	(10)	225	(36)	200	(28)	91	(13)	122	(23)
High	1000	(15)	343	(32)	231	(25)	221	(22)	205	(22)
Middle	1536	(22)	351	(22)	442	(28)	364	(25)	379	(26)
Low	2013	(27)	383	(23)	544	(25)	615	(26)	471	(26)
Lowest	2134	(27)	393	(24)	608	(25)	674	(26)	459	(25)
Rural residence										
Yes	5068	(72)	1317	(29)	1530	(27)	892	(17)	1329	(27)
No	2253	(28)	378	(18)	495	(23)	1073	(41)	307	(18)
Continuous participant-level variables										
	Mean ^b	(SD)	Mean ^b	(SD)	Mean ^b	(SD)	Mean ^b	(SD)	Mean ^b	(SD)
Age	18.0	(1.1)	17.9	(1.1)	17.9	(1.1)	17.9	(1.3)	18.2	(0.9)
Age at first cohabitation	16.1	(1.7)	15.9	(1.5)	16.0	(1.8)	15.8	(1.7)	16.5	(1.6)

(Continued)

Table 1. (Continued)

Continuous participant-level variables	Mean ^b	(SD)	Mean ^b	(SD)	Mean ^b	(SD)	Mean ^b	(SD)	Mean ^b	(SD)
Number of children	0.6	(0.7)	0.6	(0.7)	0.8	(0.7)	0.7	(0.7)	0.4	(0.6)
Vulnerability Z-score ^c	-0.0	(1.0)	0.0	(0.9)	-0.1	(1.0)	-0.0	(1.0)	-0.1	(0.9)

SD = standard deviation.

^aSample restricted to ever-partnered, non-widowed adolescent girls who responded to any question related to physical or sexual IPV.

^bMeans, standard deviation and proportions are weighted to account for multistage sampling frame.

^cStandardized score that includes whether the adolescent has no formal education vs any formal education; began cohabitation before age 15; belongs to an ethnic, linguistic or religious minority, lives in an impoverished (lowest quintile) household, lives in a rural area, is not literate or blind and is severely stunted.

^dPartner's schooling is not measured in the Colombia 2015 and Mozambique 2015 Demographic and Health Surveys.

^ePartner's drinking is not measured in the Colombia 2015 Demographic and Health Survey.

^fBeing hit by someone other than your intimate partner is not measured in the Colombia 2015 Demographic and Health Survey.

^gForced sex in the prior year by someone other than an intimate partner is not measured in the Afghanistan 2015 Demographic and Health Survey.

to experience prior-year sexual IPV (RR: 1.13, 95% CI: 0.91, 1.41). There was some evidence for a negative dose-response relationship between girls' schooling level and their partner's schooling level and girls' likelihood of experiencing prior-year physical IPV. The relationship between girls' and partner schooling and girl's experiences of sexual IPV followed a similar (albeit non-significant) pattern. More frequent partner drinking was strongly associated with girls' higher risk of prior-year physical and sexual IPV. Girls whose partners often drank were 2.8 times as likely to experience prior-year physical IPV and 2.11 times as likely to experience prior-year sexual IPV as girls whose partners never drank (95% CI: 2.40–3.26; 95% CI: 1.69, 2.65, respectively). Girls who were currently cohabitating were much more likely to experience prior-year sexual IPV than girls who were separated or divorced (RR: 4.16; 95% CI: 1.44, 12.05). Girls who had witnessed father-on-mother physical IPV in childhood were more likely to experience prior-year physical (RR: 1.71; 95% CI: 1.53, 1.92) and sexual (RR: 1.50; 95% CI: 1.20, 1.88) IPV. Household wealth quintile was not related to girls' experiences of prior-year physical or sexual IPV. The relationships between individual-level covariates and IPV outcomes were consistent for girls and women when comparing models that included the LoVI and LoWEE quartiles rather than component laws (Supplementary Appendix Table 9).

Country-level covariates

Several components of the LoWEE were related to girls' experiences of physical and sexual IPV. Compared to their counterparts, girls in countries with 'equal pay' (EP) laws and 'equal inheritance' (EI) laws were less likely to experience prior-year physical (RR_{EP}: 0.68; 95% CI: 0.56, 0.82; RR_{EI}: 0.80; 95% CI: 0.65, 1.00) and sexual IPV (RR_{EP}: 0.63; 95% CI: 0.42, 0.94; RR_{EI}: 0.79; 95% CI: 0.72, 0.86). However, girls in countries with 'anti-gender-discrimination in hiring' laws were more likely to experience sexual IPV (RR: 2.67; 95% CI: 1.80, 3.98), and girls in countries with 'equal access to credit' laws were more likely to experience prior-year physical IPV (RR: 1.72; 95% CI: 1.41, 2.09). The natural log of GDP per capita, measured in US dollars, was related to a lower likelihood of girls' experiencing prior-year sexual IPV (RR: 0.69; 95% CI: 0.65, 0.74) and a slightly higher likelihood of experiencing prior-year physical IPV (RR: 1.06; 95% CI: 1.01, 1.11). Findings for women ages 20–49 were consistent with those of adolescent girls.

Discussion

In this analysis, we applied a multilevel modelling approach to a previously validated law and policy index to explore its influence on VAWG on girls' experiences of partner and non-partner physical and sexual violence. We compared these associations for more and less vulnerable adolescents and for adolescents vs women ages 20–49 to see whether laws against VAWG operate similarly across these groups. We used all DHS datasets that included a DVM and were available when we created the analysis dataset in the Spring of 2019.

Contrary to findings from our prior country-level research where the LoVI was negatively associated with rates of lifetime and prior-year IPV (Yount *et al.*, 2018), here, we did not find a relationship between the LoVI quartiles and individual women's or girls' experiences of prior-year physical or sexual IPV. The difference in these findings may be related to differences in the levels of analysis and/or a difference in how the LoVI was modelled. While the LoWEE and LoVI become continuous indices when estimated over a large number of countries, in this analysis of 13–15 countries, both indices were discrete rather than continuous exposures.

With the exception of comprehensive DV legislation, LoVI component laws had consistent negative associations with prior-year experiences of physical and sexual partner violence for girls and women. We did not find evidence to support an interaction between LoVI component laws and the adolescent vulnerability index, suggesting that laws operated similarly for all adolescent girls or that the measures we identified were insufficient markers for adolescent vulnerability. Negative associations between LoVI component laws and experiences of physical or sexual violence tended to be stronger for ever-married or cohabitating women than girls. There are several potential explanations for this difference. First, ever-married or partnered girls aged 13–19 may represent a highly selected population that has a higher likelihood of experiencing IPV than other girls, while ever-married or partnered women aged 20–49 may be more representative of the general population. Second, the small sample-size of adolescents compared to and women ages 20–49 may influence this finding. Lastly, adolescent girls may experience less of a protective effect from VAWG-related laws than women of reproductive age. In keeping with this interpretation, we did not find a clear association between the presence of a country-level marital rape law and the risk of sexual IPV against adolescent girls. This finding is in keeping with prior research that found a high prevalence of forced first sex among child brides (Erulkar, 2013), for

Table 2. Country-level characteristics of analysis sample, ^a stratified by LoVI quartile

	LoVI quartile							
	Lowest		Low		High		Highest	
	Median (IQR)	Median (IQR)	Median (IQR)	Median (IQR)	Median (IQR)	Median (IQR)	Median (IQR)	
GDP per capita, 2013	1268.1 (647.9–5258.4)	647.9 (647.9–903.4)	655.0 (332.4–5258.4)	8066.0 (1268.1–8066.0)	1452.2 (1452.2–1452.2)			
Human Development Index, 2013	0.527 (0.476–0.607)	0.476 (0.476–0.512)	0.483 (0.466–0.527)	0.72 (0.498–0.72)	0.607 (0.607–0.607)			
Percentage of older respondents who believe that husbands are justified in beating their wives in at least one instance, 2015–16	0.411 (0.412–0.563)	0.810 (0.565–0.810)	0.281 (0.281–0.474)	0.033 (0.033–0.273)	0.411 (0.411–0.411)			
20–34-year-old women	0.435 (0.211–0.571)	0.794 (0.571–0.795)	0.299 (0.299–0.486)	0.040 (0.040–0.265)	0.435 (0.435–0.435)			
35–49-year-old women	0.304 (0.225–0.358)	0.748 (0.358–0.747)	0.246 (0.225–0.384)	0.050 (0.050–0.234)	0.305 (0.305–0.305)			
20–34-year-old men	0.288 (0.185–0.302)	0.731 (0.302–0.731)	0.217 (0.185–0.330)	0.055 (0.055–0.200)	0.288 (0.288–0.288)			
35–59-year-old men								
LoWEE index^b, 2013	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	
Highest	1304 (18)	0 (0)	995 (76)	309 (24)	0 (0)			
High	3484 (48)	90 (3)	325 (9)	1433 (41)	1636 (47)			
Low	1254 (17)	549 (44)	705 (56)	0 (0)	0 (0)			
Lowest	1279 (18)	1056 (83)	0 (0)	223 (17)	0 (0)			

IQR = interquartile range. The LoWEE index was created from a confirmatory factor analysis (CFA) of five binary items from the 2018 WB-WBL database. Standardized loadings from the CFA were applied to WB-WBL database on the presence of laws at the national level in 2013. Items captured the presence (1 = yes, 0 = no) of national laws to ensure equality in women's access to employment and hiring, remuneration for work, inheritance of assets and access to credit.

Table 3. Relation between the LoVi's component parts and prior-year physical and sexual IPV (ever-partnered, non-widowed girls aged 13–19 nd women aged 20–49 interviewed for the DVM from DHS conducted between 2014 and 2015 in 13 countries). All models are adjusted to account for the DHS multistage sampling design and include country-level random intercepts.

	Ever-partnered, non-widowed girls aged 13–19 (<i>n</i> = 5012)				Ever-partnered, non-widowed women aged 20–49 (<i>n</i> = 119 343)							
	Prior-year physical IPV		Prior-year physical or sexual IPV ^a		Prior-year physical IPV		Prior-year physical or sexual IPV					
	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)				
LoVi components (exposure)												
Comprehensive DV legislation	0.98	(0.82, 1.18)	1.52	(1.39, 1.66)	1.11	(0.98, 1.26)	1.72	(0.90, 3.31)	2.56	(1.16, 5.60)	1.96	(1.03, 3.70)
Marital rape law	0.54	(0.42, 0.71)	0.73	(0.51, 1.05)	0.57	(0.45, 0.74)	0.14	(0.07, 0.27)	0.22	(0.60, 0.76)	0.14	(0.07, 0.28)
Comprehensive sexual harassment legislation	0.59	(0.52, 0.68)	0.55	(0.37, 0.80)	0.48	(0.41, 0.56)	0.59	(0.38, 0.90)	0.59	(0.37, 0.94)	0.45	(0.29, 0.68)
Legal age of marriage for girls is 18 or over	1.09	(0.87, 1.36)	0.83	(0.70, 0.98)	1.09	(0.93, 1.27)	0.79	(0.39, 1.62)	0.50	(0.97, 0.98)	0.76	(0.37, 1.53)
Participant-level variables												
Age	1.03	(0.97, 1.10)	0.98	(0.85, 1.13)	1.02	(0.97, 1.07)	0.99	(0.98, 0.99)	0.98	(0.97, 0.98)	0.99	(0.98, 0.99)
Age at first cohabitation	0.95	(0.94, 0.97)	0.97	(0.89, 1.07)	0.97	(0.95, 0.99)	1.00	(0.99, 1.00)	1.01	(0.99, 1.02)	1.00	(0.99, 1.00)
Parity	1.19	(1.01, 1.42)	1.13	(0.91, 1.41)	1.19	(1.03, 1.39)	1.02	(1.01, 1.04)	1.04	(1.03, 1.05)	1.03	(1.01, 1.04)
Vulnerability Z-score ^{b,c}	0.92	(0.74, 1.13)	0.98	(0.78, 1.22)	0.95	(0.77, 1.18)	0.97	(0.95, 0.99)	0.98	(0.93, 1.04)	0.97	(0.95, 0.98)
Respondent education level												
Higher	0.66	(0.48, 0.91)	0.88	(0.34, 2.26)	0.68	(0.49, 0.94)	0.63	(0.59, 0.69)	0.59	(0.47, 0.76)	0.64	(0.89, 0.97)
Some secondary	0.70	(0.52, 0.94)	0.77	(0.46, 1.30)	0.79	(0.59, 1.06)	0.81	(0.78, 0.85)	0.85	(0.76, 0.96)	0.83	(0.80, 0.86)
Primary	0.75	(0.57, 0.98)	0.84	(0.50, 1.38)	0.83	(0.63, 1.09)	0.92	(0.88, 0.96)	0.97	(0.89, 1.06)	0.93	(0.60, 0.68)
No formal schooling	ref		ref		ref		ref		ref		ref	
Currently married/cohabitating vs divorced/separated	1.06	(0.65, 1.73)	4.16	(1.44, 12.05)	1.10	(0.69, 1.75)	1.62	(1.54, 1.70)	1.18	(0.80, 1.75)	1.68	(1.65, 1.72)
Partner's education level												
Higher than secondary	0.50	(0.35, 0.71)	0.20	(0.06, 0.62)	0.46	(0.34, 0.60)	0.81	(0.75, 0.88)	0.84	(0.54, 1.31)	0.81	(0.75, 0.87)
Secondary	0.76	(0.69, 0.82)	0.80	(0.52, 1.25)	0.71	(0.63, 0.80)	0.91	(0.88, 0.95)	0.99	(0.85, 1.16)	0.92	(0.88, 0.95)
Primary	0.83	(0.75, 0.92)	1.05	(0.69, 1.59)	0.83	(0.74, 0.92)	0.96	(0.93, 0.99)	0.99	(0.94, 1.04)	0.97	(0.94, 1.00)
No formal schooling	ref		ref		ref		ref		ref		ref	
Partner drinks alcohol												
Often	2.80	(2.40, 3.26)	2.11	(1.69, 2.65)	2.43	(2.10, 2.80)	3.05	(2.75, 3.39)	3.67	(2.91, 4.63)	2.76	(2.52, 3.02)
Sometimes	2.02	(1.70, 2.40)	1.60	(1.22, 2.10)	1.78	(1.52, 2.09)	1.77	(1.69, 1.85)	1.75	(1.56, 1.96)	1.71	(1.63, 1.80)
Never	ref		ref		ref		ref		ref		ref	
Observed father beat mother	1.71	(1.53, 1.92)	1.50	(1.20, 1.88)	1.64	(1.44, 1.87)	1.86	(1.73, 1.99)	1.81	(1.60, 2.05)	1.81	(1.68, 1.96)
Household-level variables												
Household wealth quintile												
Highest	0.79	(0.59, 1.05)	0.71	(0.31, 1.65)	0.88	(0.61, 1.26)	0.68	(0.60, 0.77)	0.70	(0.58, 0.85)	0.71	(0.64, 0.79)
High	0.81	(0.64, 1.01)	0.71	(0.42, 1.17)	0.82	(0.65, 1.03)	0.85	(0.77, 0.94)	0.82	(0.64, 1.05)	0.88	(0.82, 0.94)
Middle	1.04	(0.85, 1.27)	0.93	(0.74, 1.18)	1.06	(0.89, 1.26)	0.93	(0.85, 1.03)	0.86	(0.69, 1.09)	0.95	(0.88, 1.03)
Low	1.04	(0.90, 1.21)	0.97	(0.72, 1.30)	1.04	(0.89, 1.20)	0.96	(0.94, 0.98)	0.90	(0.78, 1.03)	0.97	(0.95, 0.99)
Lowest	ref		ref		ref		ref		ref		ref	
Rural vs urban residence	1.04	(0.76, 1.44)	1.01	(0.86, 1.17)	1.08	(0.81, 1.44)	0.95	(0.88, 1.03)	0.98	(0.88, 1.08)	0.98	(0.92, 1.04)

(continued)

Table 3. (Continued)

	Ever-partnered, non-widowed girls aged 13–19 (<i>n</i> = 5012)				Ever-partnered, non-widowed women aged 20–49 (<i>n</i> = 119 343)							
	Prior-year physical IPV		Prior-year sexual IPV		Prior-year physical IPV		Prior-year sexual IPV					
	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)				
Country-level variables												
Natural log of per capita GDP	1.06	(1.01, 1.11)	0.69	(0.65, 0.74)	0.93	(0.90, 0.97)	1.07	(0.89, 1.30)	0.61	(0.48, 0.79)	0.91	(0.74, 1.11)
LoWEE components												
Non-discrimination based on gender in hiring	1.10	(0.89, 1.37)	2.67	(1.80, 3.98)	1.31	(1.08, 1.59)	2.05	(1.02, 4.13)	3.84	(2.07, 7.12)	2.67	(1.38, 5.17)
Equal remuneration for men and women for work of equal value	0.68	(0.56, 0.82)	0.63	(0.42, 0.94)	0.65	(0.55, 0.77)	0.27	(0.13, 0.54)	0.32	(0.12, 0.84)	0.23	(0.11, 0.47)
Equal inheritance rights for sons and daughters	0.80	(0.65, 1.00)	0.79	(0.72, 0.86)	0.87	(0.76, 1.00)	0.37	(0.19, 0.71)	0.47	(0.25, 0.88)	0.40	(0.22, 0.73)
Equal access to credit for men and women	1.72	(1.41, 2.09)	1.22	(0.96, 1.54)	1.45	(1.22, 1.72)	2.17	(1.46, 3.23)	1.88	(1.01, 3.49)	1.98	(1.33, 2.95)

^aSample restricted to ever-partnered, non-widowed adolescent girls who responded to any question related to physical or sexual IPV.

^bMale/female spouses who have equal inheritance rights is dropped from the model because of collinearity.

^cStandardized score that includes whether the adolescent has no formal education vs any formal education; began cohabitation before age 15; belongs to an ethnic, linguistic or religious minority, lives in an impoverished (lowest quintile) household, lives in a rural area, is not literate or blind and is severely stunted.

whom marital rape laws may not be protective. These findings highlight the need to continue to assess the impact of VAWG laws and programs for adolescent girls and women separately (Yount *et al.*, 2017).

A positive association was observed between comprehensive DV legislation and women's and girls' experiences of prior-year sexual partner violence. This variation may be related to differences between the effects of different component laws that are masked in the creation of a binary marker for comprehensive DV legislation. As stated earlier, we were not able to model the individual laws used to estimate the LoVI, so cannot quantitatively assess this hypothesis. Ideally, we would have had longitudinal data for this analysis, which would have allowed us to assess whether the relationship between the policy index and women's and girls' experiences of IPV violence differed with different policy lags. We did an extensive search to identify all available sources of policy data related to VAWG. To allow researchers to explore the causal effect of VAWG-related laws on adolescent girls' and women's experiences of GBV, funders should invest in the development of longitudinal data on marital rape and DV-related laws.

With respect to other national laws in the models, the LoWEE component laws on women's economic rights were inconsistently related to the risk of violence against girls and women. Specifically, laws on equal pay and equal inheritance tended to be negatively associated with the experiences of prior-year physical and sexual IPV for women and girls, whereas laws on non-discrimination in hiring and equal access to credit tended to be positively associated. Women and girls whose rights to equal pay and equal inheritance are protected by law may be less vulnerable to violence (Vyas and Watts, 2009). However, many women and girls are employed informally (Bonnet *et al.*, 2019) and few have access to credit (Morton *et al.*, 2014), and as such, laws on non-discrimination in hiring and equal access to credit may not offer protection against violence. Furthermore, increased female economic empowerment has been associated with increased risk of violence because of male backlash (Bhalotra *et al.*, 2020). Thus, the findings of Heise and Kotsadam (2015)—that laws and practices disadvantaging women's access to land, property and productive resources are positively associated with prior-year physical and sexual IPV—should be interpreted with caution, as the many legal protections and economic rights of women and girls related to employment, pay, property and inheritance may be correlated over time. Our findings should be tested more thoroughly across more countries and more constellations of legal protections for gender equitable economic rights.

This analysis has some important limitations. First, the DHS restricts IPV-related questions to women and girls who have ever married or lived with a partner. Thus, we were unable to estimate the effects of the LoVI and its component laws on the experiences of adolescent girls who never married or lived with a partner. Given the high prevalence of marriage before age 18 in the Sub-Saharan African and South and Southeast Asian countries that made up the majority of our sample (15–53%), it may be reasonable to anticipate similar effects of the LoVI on the experiences of adolescent girls regardless of marital status (Petroni *et al.*, 2017). This suggestion may be supported by our finding that LoVI component laws did not differentially protect adolescents by vulnerability. Alternatively, if the adolescents in our sample

are not representative of adolescents in the general population, this selection bias may explain the observed weaker negative associations for adolescents than women, for whom our sample more closely represented the general population. Second, the validity of the LoVI is predicated on the accuracy of the documentation about component laws in the WB-WBL and WORLD datasets and on the process used to construct the index. Third, while we considered including the Human Development Index and societal norms about VAWG as country-level covariates, we were unable to do so given their high collinearity with other national-level variables. Future analyses performed with more countries should include these measures, if correlations between related national-level policies and laws be lower than they were in our analysis sample. Fourth, the small sample of countries included in this analysis limits inference to countries with similar distributions of the laws included in the LoVI. Given the small number of countries included here, the lack of a relationship between the LoVI and women's and girl's experiences of violence could also be related to the lack of variation in the distribution of laws. For example, codifying 18 as the legal age of marriage was only reported in India and comprehensive sexual harassment legislation was only present in India and Ethiopia (Supplementary Appendix Table 2). Finally, the LoVI measures the presence of laws on VAWG, not their implementation. Understanding the implementation of laws in a given country is central to measuring the relationship between national laws and girls' experiences of violence. While the availability of comprehensive policy data prior to 2012 precluded our ability to perform an implementation-related sensitivity analysis, future analyses could include a quantitative evaluation of the potential role of implementation in moderating the relationship between laws and experiences of violence.

Conclusion

In spite of these limitations, our findings, based on a robust analysis, suggest that laws promoting gender equity and freedom from violence are generally protective against the risk of partner violence for adolescent girls and women; however, the protective effects of laws may be stronger for women. Future research should continue to assess the impacts of VAWG legislation separately on women's and adolescent girls' experiences of violence. Given the high risk of exposure to violence in adolescence and the lesser protections that standard VAWG laws may provide, states should consider additional legal and programmatic efforts to protect adolescent girls from the risk of violence. Such efforts could yield considerable benefit by mitigating early exposure to violence and its long-term effects.

Supplementary data

Supplementary data are available at *Health Policy and Planning* online.

Data availability

The datasets generated during and/or analysed during the current study are available on the Demographic and Health Surveys website, <https://www.dhsprogram.com/data/new-user-registration.cfm>.

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Authors' contributions

K.M.Y. conceived of the study. K.M.Y. and L.M. designed the study and created the analysis plan. L.M. created the dataset and conducted the analysis. K.M.Y., Z.K. and L.M. drafted the paper. All authors provided critical comments on the paper and approved the final version for submission.

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Conflict of interest statement. The authors declare that they have no competing interests.

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