A Latent Class Analysis of Attitudes Concerning the Acceptability of Intimate Partner Violence in Rural Senegal

Authors:

John Sandberg (corresponding author)
Milken Institute School of Public Health
Department of Global Health
The George Washington University
950 New Hampshire Ave., NW
Washington, DC 20052
240 413-4571

John Sandberg (corresponding author)
Rosalind Fennell, The George Washington University
Yacine Boujija, Université de Montréal
Laetitia Douillot, Université de Montréal
Valerie Delaunay, Laboratoire Population Environment Developpement
Simona Bignami, Université de Montréal
Wubin Xie, The George Washington University
Cheikh Sokhna, Institut de Recherche pour le Developpement
Steven Rytina, Harvard University
Abstract

Background
Research concerning the causes and consequences of intimate partner violence (IPV), particularly in less developed areas of the world, has become prominent in the last two decades. Although a number of potential causal factors have been investigated, the current consensus is that attitudes toward IPV on the individual level, likely representing perceptions of normative behavior, and the normative acceptability of IPV on the aggregate level, likely play a key role. Measurement of both is generally approached through either binary indicators of acceptability of any type of IPV or additive composite indexes of multiple indicators. Both strategies imply untested assumptions, which potentially have important implications for both research into the causes and consequences of IPV as well as interventions aimed to reduce its prevalence.

Methods
Using survey data from rural Senegal collected in 2014, this analysis estimates latent class measurement models of attitudes concerning the acceptability of IPV. We investigate the dimensional structure of IPV ideation and test the parallel indicator assumption implicit in common measurement strategies, as well as structural and measurement invariance between men and women.

Results
We find that a two-class model of the acceptability of IPV in which the conditional probability of class membership is allowed to vary between the sexes is preferred for both men and women. Though the assumption of structural invariance between men and women is supported, measurement invariance and the assumption of parallel indicators (or equivalence of indicators used) are not.
Conclusions
Measurement strategies conventionally used to operationalize the acceptability of IPV, key to modeling perceptions of norms around IPV, are a poor fit to the data used here. Research concerning the measurement characteristics of IPV acceptability is a precondition for adequate investigation of its causes and consequences, as well as for intervention efforts aimed at reducing or eliminating IPV.

Keywords
Intimate Partner Violence, measurement models, latent class analysis, attitudes, norms

Background
In recent decades, there has been a growing call for the international community to address violence against women, and its elimination has been incorporated into the United Nations’ recent Sustainable Development Goals [6]. A robust research literature has developed concerning the causes and consequences of violence against women, particularly intimate partner violence (IPV), the physical, sexual or emotional abuse of a woman by her spouse or partner [7]. It has been estimated that close to 1/3 of women around the world have experienced IPV, with a much higher prevalence in many less developed societies, particularly in sub-Saharan Africa [5, 25]. From a public health perspective, IPV has been linked to a variety of reproductive, physical and mental health outcomes adversely affecting the well-being of women, their children, and their communities [1–4].

Though the research and intervention literatures concerning the causes of intimate partner violence has explored a number of potential structural, individual and social causal factors associated with IPV [9], a recent focus of this work has been on the influence of social norms concerning gender roles and the acceptability of spousal abuse [1, 2, 3, 9, 12, 13, 16, 17, 20].
Despite this current emphasis, relatively little work has addressed the measurement of such normative influence. Current operationalizations of norms associated with IPV are for the most part accomplished through aggregation of simple binary indicators or composite (generally additive) indexes of the experience of violence or beliefs and attitudes supporting it [12–16]. This latter category, including beliefs or attitudes concerning the circumstances in which it is seen as acceptable for a male to physically abuse his partner, are likely not simply personally held, but perceptions of the prevailing normative context around IPV [21]. As such, at the aggregate level, such attitudes are potentially critical to understanding the normative contexts in which violence is (or is not) perpetrated [15, 17, 18].

While possibly useful in some contexts, binary indicators and composite additive indexes are prone to error, and discard information on variability that may be potentially vital to explaining both the causes and consequences of IPV. There is substantial variation in the specific circumstances under which individuals believe intimate partner violence is acceptable [6, 18]. A simple binary variable indicating acceptability violence in one scenario does not indicate acceptability in all, or indeed, any, others. An additive index, while utilizing more information, ignores variation in the degree to which different circumstances are seen as acceptable and potentially important information concerning the distribution of different combinations of these. Both types of measures give equal weight in indicating the underlying latent construct to all indicators, implicitly employing an assumption of parallel indicators. Both types of measures erase exactly the nuances in normative cultural models of IPV that may make explanation more precise and which may be exploited by interventions aimed at reducing its prevalence.

The present analysis, using data from a rural population in Senegal, estimates a series of latent class measurement models of the acceptability of physical violence against wives. These models
use five indicators of acceptability under different, hypothetical scenarios, widely available in the Demographic and Health Surveys (DHS). These indicators are commonly used to measure attitudes on individual level, and, on the aggregate level, the normative context of IPV.

If ideation concerning violence against wives is unidimensional, we would expect only two classes of individuals, those supportive of spousal violence for any reason, and those not. A multidimensional result, in contrast, would be revealed by different classes of individuals supportive of different combinations of situations in which spousal violence is deemed acceptable, and where different justifications receive differential support. Following the literature having identified gendered differences in beliefs supportive of IPV in which women are often seen to be more accepting of it than men [6, 14, 16, 18], we also test structural equivalence between men and women in a multi-group analysis. Finally, we test the parallel indicator assumption that the weight attributed to each scenario in indicating the underlying latent construct of approval of IPV is equal, implicit in binary or composite index measures.

Methods

The present analysis, using data from a rural population in Senegal, estimates a series of latent class measurement models of the acceptability of physical violence against wives. These models use five indicators of acceptability under different, hypothetical scenarios, widely available in the Demographic and Health Surveys (DHS). These indicators are commonly used to measure attitudes on individual level, and, on the aggregate level, the normative context of IPV.

If ideation concerning violence against wives is unidimensional, we would expect only two classes of individuals, those supportive of spousal violence for any reason, and those not. A multidimensional result, in contrast, would be revealed by different classes of individuals supportive of different combinations of situations in which spousal violence is deemed
acceptable, and where different justifications receive differential support. Following the literature having identified gendered differences in beliefs supportive of IPV in which women are often seen to be more accepting of it than men [6, 14, 16, 18], we also test structural equivalence between men and women in a multi-group analysis. Finally, we test the parallel indicator assumption that the weight attributed to each scenario in indicating the underlying latent construct of approval of IPV is equal, implicit in binary or composite index measures.

Data
The data used for this analysis come from the first panel of the Niakhar Social Networks and Health Project (NSNHP), a large scale longitudinal social network survey collected in 2014 in collaboration with the Niakhar Demographic and Health Surveillance System (NDHSS). The NDHSS, maintained by the French national development research agency l’Institute de Recherché pour le Développment (IRD) and located approximately 150 km south east of Dakar in Senegal’s Siin region has prospectively monitored demographic and health events for the entire populations of 30 contiguous villages since 1982. The majority of the study area’s current population of 44,000 identifies as ethnically Sereer (94%) and Muslim (78%). However, a significant proportion of the study zone population is Christian (approximately 20.8%). The region’s economy is largely rooted in small livestock and agricultural production of millet and peanuts [19].

The NSNHP main survey panel includes a large, representative sample of the population age 16 and older of the NDHSS catchment area (n=882), as well as a census of the entire population of one town in the area, Yandé (N=1310). The response rate for the survey was above 95%. The survey contained a large module concerning a number of health and demographic
topics including, importantly for this research, acceptability of intimate partner violence under different scenarios.

Respondents were asked five questions derived from the 2013 Senegal DHS concerning the acceptability of a husband beating his wife under different scenarios. These included (1) if she goes out without telling him, (2) if she neglects the children, (3) if she disagrees with him, (4) if she refuses to have sex with him, and (5) if she burns the food. Respondents were asked to respond “yes” or “no,” indicating if they found it acceptable for a husband to beat his wife in the presented scenario. For each of these situations, a dichotomous variable was created with responses categories as 0- “No” or 1- “Yes.” For the purposes of this analysis all unknown and nonresponses were coded as missing.

Latent class analysis

Using responses to the five indicators of the acceptability of IPV under the scenarios described above, we first estimate models for 2, 3, and 4 classes for the population as a whole using robust maximum likelihood estimation and population weights to ensure representativeness. Our final analytic weighted sample size is 945 (399 men and 546 women) including 879 respondents from the population outside of Yandé and the weighted census equal to 66 respondents from Yandé. To test structural invariance between men and women (that men and women have the same preferred number of latent classes), we estimate these same solutions for men and women separately. Finally, we test measurement invariance to examine whether the item thresholds and latent class probabilities are equal between men and women in the preferred solution. All models were estimated with 1200 random starts to avoid local maxima and ensure replication of the best loglikelihood in MPLUS v7.3 [20].

Results
Figure one presents the estimated percentages of men and women in the sample finding spousal violence acceptable for each of the five indicators in the present analysis, and for at least one. Overall, the level of acceptability of spousal violence in this population is high. As expected, women indicate acceptability of spousal violence at higher rates than men across all scenarios. The scenario that both men and women find most acceptable is refusal of sex, with almost 60% of men and 75% of women answering yes to this question. The least acceptable scenario is that for when the wife burns food, with only about 20% of men and women finding this an acceptable reason for a husband to beat his wife. The difference between acceptability in these two scenarios underscores the wider variance within the population across all scenarios presented. All rationales for spousal abuse do not appear to have equal support. This is to be expected, but has potentially important implications for empirical analyses that measure approval of violence where different measures are assumed to be have equal weight in indicating underlying support, as in the construction of indexes, or as a binary construct where individuals approve of spousal violence for at least one of these reasons. This latter operationalization is shown in the first set of bars in figure 1. Almost 80% of men and 90% of women find at least one of these rationales for spousal violence acceptable.

Table 1 presents fit statistics for the latent class models of the acceptability of spousal abuse estimated. Traditional conditional measures of model fit here are the AIC and BIC, with lower values indicating better fit. The Vuong-Lo-Mendell Rubin (VLMR-LR) test is a likelihood ratio test appropriate for testing the relative fit of latent class models of k-1 vs. k classes [21]. Models 1, 2 and 3 are the 2, 3, and 4 class models, respectively. Though by the unconditional criteria the three class model would be preferred, by the VLMR test, the two class model is clearly preferred here. Under this model, 64% of the population is classified as more supportive
of spousal violence, 36% as (relatively) unsupportive. Neither class is estimated to find beating wives for burning food acceptable, however, and there is a not insubstantial likelihood of supporting the other rationales for violence among the unsupportive class. This suggests a more nuanced picture of ideation concerning spousal violence than is often acknowledged. An identical set of models estimated for Senegal as a whole with 2014 DHS data also results in a preferred two class model with similar relative distributions of conditional probability of class membership across the five indicators (analysis not shown) indicating that such a pattern is representative of the country as a whole.

Models 4, 5, 6 and 7, 8, 9 estimate the same models for women and men separately, testing the assumption of structural invariance. In both sets of models we see the same result as in those for the population as a whole. A two class model is preferred by the VLMR test.

Having established structural invariance between men and women, we proceed to test measurement invariance; the assumption that the conditional probabilities of class membership for the indicators are equal for men and women. Model 10 presents fit statistics for a multi-group model in which the probabilities of class membership conditional on observed responses are allowed to be different for men and women. Model 11 constrains them to be equal across the two groups. In this case, the information criteria are unequivocal. Model 10, where men and women have different probabilities of their respective class membership across the indicators is preferred.

Finally, the fit statistics in models 1a, 4a, 7a and 10a refer to models in which the indicators in the preferred model from each panel are constrained such that each indicator has the same estimated conditional probability of class membership. Comparison of these models to their unconstrained analogues provides a test of the parallel indicator assumption. In each case
the constrained models fit demonstrably worse than the unconstrained models, providing strong evidence against this assumption.

In sum, the preferred measurement model in this analysis is model 10, where both men and women are grouped in two classes of acceptability of spousal violence, the conditional probability of membership in each class allowed to be different across the indicators and the two groups. The estimated probabilities of class memberships under this model, quite similar to those derived from model 1, the two-class solution for the population as a whole (not shown) are presented in figure 2. Class 1, comprised of 53% of men and a stunning 71% of women is generally supportive of spousal violence, most prominently for refusal of sex and neglect of children. Women in this class are slightly more likely to find spousal violence for going out without permission and refusal of sex acceptable, men slightly more likely than women to find violence justified by neglect of children acceptable. The second class, with the remaining 46% of men and 29% of women is generally unsupportive of spousal violence, but still somewhat so, especially in the cases of going out without permission and refusal of sex. Women classified as unsupportive are much more likely to say they find these justifications acceptable than men.

**Discussion**

Causal factors currently believed to be associated with intimate partner violence include, prominently, individual attitudes and social norms concerning its acceptability. Prior substantive research concerning both has largely employed simple operationalizations, including binary indicators of any acceptability and additive composite indexes of this complex latent construct with untested measurement properties and assumptions. In this paper, we have tested a series of measurement models of attitudes concerning the acceptability of intimate partner violence under five scenarios, indicators that are widely available through the Demographic and Health Surveys
(DHS) and other sources and commonly used in the literature. In the rural Senegalese population from which our sample was drawn, we find support for a two-class model, where one class of respondents was generally supportive of intimate partner violence, the other less so. In this model the estimated degree of support for IPV in each class varied across the indicators, however, and was found to be different for men and women.

What this analysis has demonstrated is that in this population, common measurement strategies fit the data poorly relative to our preferred model. Both simple binary indicators of acceptability under any scenario and additive indexes assume each indicator carries equal weight in the underlying latent construct of IPV, which our results definitively indicate is untenable in this context. Both measurement strategies ignore variation in acceptability under different circumstances, which we have shown to be substantial here.

Our results should be qualified in least two important ways. First, we have modeled only a limited set of indicators here. Analyses incorporating different indicators, such as those related to the experience of IPV, or, when investigating norms, perceptions of the acceptability of IPV among others, may, and quite likely would, yield different preferred measurement models. Second, generalizations drawn from this analysis are limited to this particular, rural, population. Though as we have noted above, we have estimated the same models for Senegal as a whole and find an identical preferred structural model, we have no reason to believe a priori that this model would be appropriate for other populations, even within sub-Saharan Africa. We believe the first limitation is justifiable in that the indicators we have chosen here are commonly used to operationalize both attitudes and, on the aggregate level, norms, concerning IPV in the current research literature and that investigation of their measurement properties as part of a unique latent construct is warranted for this reason. We also believe that the lack of a priori
generalizability to other populations is a desirable feature of this analytic approach. Given our knowledge of variation in attitudes concerning the acceptability of intimate partner violence both within and between populations, we should not expect one structural and measurement model to fit them all, an assumption made with the use of conventional measures.

**Conclusion**

Investigation of variation in the measurement of IPV acceptability, from population to population, between subgroups within populations (defined by, for example, ethnicity and religion among others), is necessary to both the understanding of cultural constructions of the acceptability of IPV, and accurate representations of the causal structure behind both attitudes and norms related to it, as well as their consequences. Though, as noted above, the research literature has suggested a number of possible associations between IPV and critical public health outcomes, this evidence generally tends to be tentative. Definitive results will depend on, among other things, more accurate measurement strategies than have previously been employed. Current intervention work would also undoubtedly benefit from more accurate measurement, potentially allowing them to develop and tailor more efficient programming and achieve improved results. Researchers and practitioners in Public Health would do well to address the latent structure and measurement characteristics of these types of indicators (as well as others they employ) in each specific case if we are to, as a discipline, efficiently achieve the goal of reducing the prevalence of such attitudes and associated norms, and through them, intimate partner violence.
Endnotes

1. Three respondents in the population sample and one in Yandé did not complete the intimate partner violence module.

References


Table 1. Latent Class Model Fit, Acceptability of Spousal Violence Among Adults Age 16+, NDHSS Study Area (n=945)

<table>
<thead>
<tr>
<th>Model</th>
<th>Number of Latent Classes</th>
<th>$G^2$</th>
<th>AIC</th>
<th>BIC</th>
<th>$I$</th>
<th>VLMR-LR (df)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total Population</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>54.669</td>
<td>12325.860</td>
<td>12388.458</td>
<td>-</td>
<td>6151.930</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>25.795</td>
<td>12285.578</td>
<td>12382.320</td>
<td>-</td>
<td>6125.789</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>14.543</td>
<td>12278.315</td>
<td>12409.202</td>
<td>-</td>
<td>6116.158</td>
</tr>
<tr>
<td>1a</td>
<td>2</td>
<td>99.092</td>
<td>13999.531</td>
<td>14016.603</td>
<td>-</td>
<td>6996.766</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Females Only</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>50.038</td>
<td>6666.031</td>
<td>6722.104</td>
<td>-</td>
<td>3322.016</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>26.339</td>
<td>6638.444</td>
<td>6725.103</td>
<td>-</td>
<td>3302.222</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>14.075</td>
<td>6630.850</td>
<td>6748.098</td>
<td>-</td>
<td>3292.425</td>
</tr>
<tr>
<td>4a</td>
<td>2</td>
<td>343.661</td>
<td>7789.406</td>
<td>7804.698</td>
<td>-</td>
<td>3891.703</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Males Only</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th></th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>7a</th>
<th>Multi-Group Males/Females</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>26.714</td>
<td>17.125</td>
<td>11.812</td>
<td>72.583</td>
<td>77.915</td>
</tr>
<tr>
<td>8</td>
<td>5520.832</td>
<td>5513.994</td>
<td>5516.192</td>
<td>6111.212</td>
<td>15160.661</td>
</tr>
<tr>
<td>9</td>
<td>5574.584</td>
<td>5597.065</td>
<td>5628.582</td>
<td>6125.872</td>
<td>15291.549</td>
</tr>
<tr>
<td>7a</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>7557.331</td>
</tr>
<tr>
<td></td>
<td>2749.416</td>
<td>2739.997</td>
<td>2735.096</td>
<td>3052.606</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(p&lt;.0000)</td>
<td>(p=.5464)</td>
<td>(p=.5708)</td>
<td>(p&lt;.0000)</td>
<td>(invariant)</td>
</tr>
<tr>
<td>2</td>
<td>18.839(6)</td>
<td>9.802(6)</td>
<td>18.839(6)</td>
<td>491.782(2)</td>
<td>316.338</td>
</tr>
<tr>
<td></td>
<td>695.095(6)</td>
<td>18.839(6)</td>
<td>9.802(6)</td>
<td>491.782(2)</td>
<td>16475.675</td>
</tr>
<tr>
<td>10</td>
<td>6826.838</td>
<td>8439.455</td>
<td>-</td>
<td>-</td>
<td>16932.745</td>
</tr>
<tr>
<td>10a</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>8439.455</td>
</tr>
</tbody>
</table>

Source: NSNHP Panel 1, 2014: compiled by author