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Abstract

Intimate partner violence (IPV) is a pressing international public health and human rights concern. Recent scholarship concerning causes of IPV has focused on the potentially critical influence of social learning and influence in interpersonal interaction through social norms. Using sociocentric network data from all individuals aged 16 years and above in a rural Senegalese village surveyed as part of the Niakhar Social Networks and Health Project (n = 1,274), we estimate a series of nested linear probability models to test the association between characteristics of respondents' social networks and

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residential compounds (including educational attainment, health ideation, socioeconomic status, and religion) and whether respondents are classified as finding IPV acceptable, controlling for individual characteristics. We also test for direct social learning effects, estimating the association between IPV acceptability among network members and co-residents and respondents' own, net of these factors. We find individual, social network, and residential compound factors are all associated with IPV acceptability. On the individual level, these include gender, traditional health ideation, and household agricultural investment. Residential compound-level associations are largely explained in the presence of the individual and network characteristics, except for that concerning educational attainment. We find that network alters' IPV acceptability is strongly positively associated with respondents' own, net of individual and compound-level characteristics. A 10% point higher probability of IPV acceptability in respondents' networks is estimated to be associated with a 4.5% point higher likelihood of respondents being classified as finding IPV acceptable. This research provides compelling evidence that social interaction through networks exerts an important, potentially normative, influence on whether individuals in this population perceive IPV as acceptable or not. It also suggests that interventions targeting individuals most likely to perceive IPV as acceptable may have a multiplier effect, influencing the normative context of others they interact with through their social networks.

Keywords
intimate partner violence, cultural contexts, social learning, norms, social networks

Introduction

In the last two decades, intimate partner violence (IPV) has been acknowledged to be a pervasive and significant human rights and public health issue (García-Moreno et al., 2015; World Health Organization, 2012). Encompassing acts of physical and sexual violence, psychological abuse and controlling behaviors, 30% of ever-partnered women globally are estimated to have experienced physical and/or sexual IPV. The lifetime prevalence of IPV among ever-partnered women is even higher in the WHO African region, estimated to be approximately 37% overall, and higher in many country-level analysis (Idoko, Ogbe, Jallow, & Ocheke, 2015; Speizer, 2010).

Current research on causal factors related to IPV and evidence from interventions aimed at reducing it in less developed parts of the world has focused

attention on the importance of normative factors alongside individual and structural factors. In this line of thinking, community or reference group norms are believed to have a strong influence through social learning and evaluation mechanisms in structuring individual beliefs and behaviors concerning IPV.

Despite the growing emphasis on the potential importance of social norms related to IPV, prior research in the area has been limited in two important ways. The first has been in the measurement of IPV ideation. Although it has been acknowledged that the circumstances under which individuals say they find IPV acceptable vary both within and across populations, virtually no prior research has attempted to model such differences. This is important because more nuanced measurement of the contours of this ideation is essential in estimating potential causal influences behind it, and in tailoring specific interventions to address IPV.

The second limitation of existing research has been in the measurement of the social context in which individuals develop their perceptions of the acceptability of IPV. In part, likely due to data limitations, the social context of ideation around IPV, with only one notable exception (Shakya et al., 2016), has previously been operationalized only through aggregated individual measures within defined geographic or political boundaries. Such aggregate measures assume that all individuals within these boundaries are exposed to a homogeneous informational or normative context. These measures are, however, poor, error-prone proxies for the heterogeneous interactional environments in which individuals develop their beliefs about what is appropriate and acceptable in this regard.

We have addressed the first of these problems in prior research, estimating a series of latent class models of attitudes related to the acceptability of IPV in the rural Senegalese population that is the object of the current study (Sandberg 2017a). In this article, we address the second problem, using unique data from an extensive social network survey collected from the same population. In modeling the acceptability of IPV as a function of individual characteristics in addition to the structural and ideational contexts within respondents' household compounds and, importantly, social networks, we identify potential social learning mechanisms related to the normative environment members of this population live in.

Background

IPV and other forms of violence against women have begun to receive increased political and research attention in recent decades (García-Moreno et al., 2015). Although both men and women experience IPV, women and girls

bear a much higher proportion of the global burden of IPV and its consequences. In 1993, the UN General Assembly established a framework for action to address IPV through the Declaration on the Elimination of Violence against Women (World Health Organization, 2012). Yet, almost 25 years later, one in three women worldwide experiences physical or sexual violence, typically by the hands of an intimate partner (World Health Organization, 2013). In addition to being an issue of basic human rights, IPV has been seen to have important associations with a number of adverse reproductive, physical, and mental health outcomes for women and their children, as well as with broader impediments to social and economic development (Abramsky et al., 2011; Arango, Morton, Gennari, Kiplesund, & Ellsberg, 2014; García-Moreno et al., 2015; Hindin, Kishor, & Ansara, 2008).

The literature concerning potential causal factors associated with IPV is large, encompassing structural, individual, and social factors (Heise, 2011). Structural factors may include legal, institutional, and organizational frameworks that support patriarchal control, constraining sanctions against perpetrators and support for victims. Individual factors that have been identified include the age of both partners, educational attainment, type of marriage or cohabitation, length of marriage or partnership, socioeconomic status, women's labor force participation, prior experience of violence, alcohol use, female autonomy within relationships, and beliefs about the acceptability of IPV (Abramsky et al., 2011; Hindin & Adair, 2002; Hindin et al., 2008; Jewkes, Flood, & Lang, 2015).

The current research and intervention literatures have largely focused, however, on social factors, particularly the potential influence of attitudes and social norms, especially concerning gender roles and the acceptability of spousal abuse. Such norms are seen as a primary causal factor behind IPV and (potentially) a critical point of intervention (Abramsky et al., 2011; Arango et al., 2014; Bott, Morrison, & Ellsberg, 2005; Ellsberg et al., 2015; Heise, 2011; Hossain et al., 2014; Jewkes et al., 2015; Jewkes, Levin, & Penn-Kekana, 2002; McCleary-Sills, 2013; Michau, Horn, Bank, Dutt, & Zimmerman, 2015; Pierotti, 2013; Shakya et al., 2016).

At their core, such normative explanations rely on the operation of social learning and evaluation mechanisms. They posit that individuals learn about, or are influenced in their perception of, IPV through social interaction. Empirical research into learning and evaluation mechanisms responsible for the development and evolution of such processes needs to take into account the structure of that interaction, the content of information or experience individuals are exposed to through it, and the cognitive mechanisms through which they are integrated at the individual level (Merton & Kitt, 1950). At this relatively early stage of investigation into normative influences on IPV,

the literature is faced with significant problems related to the first and second of these elements, and lacks a consensus model for the third, related to individual-level integration of normative influences.

The cognitive model we adopt here—the connectionist schema model—is well suited to understanding learning and influence through interaction. This model posits that schemas, or abstract representational frameworks that define for individuals what exists symbolically in a particular context, and structure perceived possibilities for action, are learned and modified as a function of aggregate stimuli, either experienced or learned through time (Brewer & Hewstone, 2004; Fiske & Taylor, 1991; Strauss & Quinn, 1998). Although such stimuli may take many forms, by far the most frequent involve interaction with others, either interpersonal or mediated. This model thus has explicit implications for mechanisms associated with the transmission of culture through interaction (D'Andrade, 1995; DiMaggio, 1997; Sewell, 1992; Smith & Queller, 2004; Strauss & Quinn, 1998; c.f. Bourdieu, 1977), of which the evolution of ideation, behavior, and norms related to IPV is a specific instance.

Current measurement of schemas associated with the (potentially normative) acceptability of IPV is rudimentary. The vast majority of extant research operationalizes these through either binary indicators of acceptability of any type of (or circumstance associated with) IPV, or simple summative indexes or averages of multiple measures (Heise & Kotsadam, 2015; Kishor & Subaiya, 2008; Tsai et al., 2017). Such measures are prone to error and discard information on variability in the latent structure of IPV schemas that may be potentially vital to explaining these processes. Although it is well known that there is variability in measures of IPV acceptability within populations, it has also been shown that there is often substantial variation *between* populations (Heise, 2011; Kishor & Subaiya, 2008). A simple binary variable indicating acceptability IPV in one scenario does not indicate acceptability in all, or indeed, any, others. Additive indexes ignore variation in the reasons for, or circumstances in which IPV is seen as acceptable. Both types of operationalization assume equality of all measures used in their ability to indicate the underlying latent constructs they are measuring. In combination, these assumptions fail to identify exactly the nuances in schemas associated with IPV that can improve explanatory power of its causes and consequences, and which may be exploited by interventions aimed at reducing its prevalence.

Regardless how the stimuli individuals are exposed to are measured, in the growing social norms literature in public health (of which IPV is a part) the operationalization of the broader social context of interaction is generally accomplished through the aggregation of individual measures to the survey sampling unit, village, community, or some other, often larger, areal or political boundary. This type of measurement strategy has explicitly been called for

regarding IPV (Linos & Kawachi, 2012) and implemented in numerous analyses on the topic (Boyle, Georgiades, Cullen, & Racine, 2009; Cau, 2020; Clark et al., 2018; Linos, Slopen, Subramanian, Berkman, & Kawachi, 2012). Conceptually, this aggregation is appropriate. Norms are defined as schemas, learned through experience and interaction, which imply rights to control the actions of an individual arising in response to some externality(ies) of that individual's action (Coleman, 1990). In the context of schemas concerning IPV, this clearly is the case, with violence employed as a consequence of action perceived as threatening patriarchal control. Norms then, as experienced by an individual, are the aggregated experience of such control attempts and their justification. The problem in the current literature lies with the operationalization of this aggregation. Such measures, it is sometimes acknowledged, introduce an unknown amount of measurement error through the assumption of homogeneous mixing. All individuals in a given aggregate are assumed to be exposed to the same fixed distribution of information (Lapinski & Rimal, 2005; Sandberg, 2005). This assumption is very difficult to support, however, unless the areal level the experience or information measured on is quite small and tenuous even then. Where there is even a small amount of heterogeneity in interactional stimuli on the individual level, there exists the real possibility that there will be variance how these schemas are learned. To address this problem, it is necessary to measure the individual-level context of learning and influence which people are exposed to through their everyday contacts, or social networks. This has been acknowledged in some of the normative literature concerning IPV and is the fundamental premise behind a large body of theoretical work in social demography and other areas of public health, particularly with regards to fertility, mortality, and HIV/AIDS perceptions (Behrman, Kohler, & Watkins, 2002; Bongaarts & Watkins, 1996; Montgomery & Casterline, 1996; Sandberg, 2006; Valente, Watkins, Jato, Van Der Straten, & Tsitsol, 1997). Recent research employing social networks as the localized interactional context of potential normative influence concerning IPV ideation has found, for example, using a simple binary indicator of any IPV acceptability, substantively significant associations between network alters' IPV ideation and respondents' (or ego's) own in a rural Honduran village (Shakya et al., 2016). This work, however, has suggested that identified network associations are largely explained by intra-household interaction, supportive of the influence of a homogeneous mixing mechanism operating at this level.

Current Investigation

In this article, we test a series of models of social learning related to the acceptability of spousal IPV using survey data from a population in rural Senegal.

We begin with a simple model of an empirically validated context-specific latent measure of IPV acceptability on individual characteristics. We then estimate models to evaluate the degree to which individual acceptability of IPV is associated with the structural and ideational contexts in respondents' residential compounds and social networks net of these. Individual-level characteristics as such function as controls for potential endogeneity associated with areal and network homophily in these models, allowing us to reduce potentially critical biases in the estimation of associations between schemas supportive of IPV and the influence of social interaction at each level.

Setting

The data used come from a rural population in the Siin region of Senegal, located approximately 150 km south-east of Dakar, which has been under continuous demographic surveillance for more than 30 years as part of the Niakhar Demographic and Health Surveillance System (NDHSS), a project maintained by the French national development research agency *l'Institute de Recherché pour le Développment* (IRD). Households in the surveillance zone are arranged into kin-based residential compounds, or *concessions*, which in turn are organized into neighborhoods (or *hameau)* within each village in the surveillance zone. The average compound incorporates 20 individuals (Delaunay, 2017) and 1.62 discrete households. The average neighborhood contains 13.6 such compounds. The region's economy is largely rooted in small livestock and agricultural production of millet and peanuts.

The Niakhar study zone's population is young (56.4% are below the age of 20 years), dense (220.3 inhabitants/sq.km), and experiencing rapid natural growth, with a total fertility rate (TFR) of 5.1 at the time of the survey (Delaunay, 2017). Educational attainment increased dramatically in the surveillance zone over the two decades prior to the survey. Although more than three fourth of those aged 50 years and above had never attended school, the same fraction of those between the age 5 and 19 years had attended at least primary school, and close to 50% of those 15 to 19 years old had attended, or were attending, middle school.

The majority of the study area's current population identifies as ethnically Sereer (97%) and Muslim (74%). However, 18% of the study zone population is Christian (Delaunay, 2017). A significant syncretism exists, however, with an indigenous monotheism practiced to a greater or lesser extent by most of the population. In combination with traditional religious belief, previous research, both qualitative and quantitative, has demonstrated that significant proportions of the population also hold traditional schemas concerning illness and medical therapy, supportive of an

indigenous ethnomedical system (Sandberg et al, 2017b). Elements of these schemas concern reproductive and child health, and likely are associated more broadly with schemas concerning traditional gender roles, and through these, those concerning IPV.

Hypotheses

Individual level. Individual-level characteristics potentially associated with the acceptability of IPV examined in this study included respondents' sex, age, educational attainment, household agricultural and material wealth, marital status, religion, and schemas related to health and illness. The first three of have been seen to be associated with IPV in prior literature (Abramsky et al., 2011; Jewkes et al., 2002) and may be associated with schemas supportive of it in this population as well. Women in many less developed contexts have been seen to have attitudes more supportive of IPV than men (Heise, 2011; Kishor & Subaiya, 2008; Speizer, 2010; Uthman, Lawoko, & Moradi, 2009), though this may be more a reflection of their perception of prevailing norms than of their own personal beliefs (Schuler & Islam, 2008). Although older women have been, in some contexts, found to be at lower risk of IPV than younger women, in this population we hypothesize that older individuals—holding more traditional beliefs about gender norms and power relations within households—will have cognitive schemas more supportive of it. Higher education and socioeconomic status are generally seen to be associated with lower prevalence of IPV. We also expect educational attainment to be associated with a lower likelihood of holding schemas supportive of IPV.

Because of the prevalence of subsistence agriculture in this population, we expect countervailing influences concerning different aspects of socioeconomic status and wealth. Material wealth is expected to be negatively associated with schemas supportive of IPV, as it may indicate a higher likelihood of engagement of at least some household members in the cash economy in which control over production (and labor) rests outside the household, where nontraditional schemas concerning gender may be encountered. Agricultural wealth, in contrast, while possibly also indicative of success at economic and market integration is, based on our qualitative research in this population, more likely to be negatively associated with schemas supportive of IPV. Agriculture in this area is a tightly controlled patriarchal enterprise, with the (male) head of the household commanding the labor of other family members, including their wives. For this reason, it is possible that those in households with greater investments in agriculture also have greater investments in maintaining traditional gendered roles and behaviors, including coercive violence directed against wives.

Those who have been married are more likely to have direct experience with IPV, causing their schemas concerning its acceptability to be different from those of respondents who have never been married. We have no expectations of the direction of this association. Although religion may obviously have an impact on the normative acceptability of IPV through doctrinal or interpretive aspects related to gender relations, we make no predictions about differences by religious affiliation. Finally, we expect more traditional schemas concerning health and illness, which as noted above also implicate gender relations and will be positively associated with schemas supportive of IPV.

In addition to their direct influences, these individual factors also serve, in models of social learning and influence, to control for potential biases arising from homophily associated with them. Homophily, the structural and psychological tendency toward association among those who are more alike than not, introduces bias into estimates of social learning by way of demographic and spatial constraints on who individuals have the possibility of interacting with ("baseline" homophily) and associational choice within these constraints ("inbreeding" homophily; McPherson, Smith-Lovin, & Cook, 2001). Association within residential compounds is bounded by substantial baseline homophily manifested through kinship ties, religious segregation, and degree of integration with agricultural activities. Social networks have been shown to be strongly homophilous with regard to age, religion, education, occupation, and gender, due to baseline homophily, inbreeding homophily, or some combination of the two (McPherson et al., 2001). If factors influencing the structure of social association and content of information exchanged within it through homophily or otherwise are uncontrolled in a model of social learning or influence, we risk overestimating these effects.

Residential compounds and social networks. To test for potential social learning or influence mechanisms associated with schemas supportive of IPV, we specify separate models including aggregate structural and ideational characteristics of respondents' residential compounds and social networks, controlling for individual characteristics which may bias estimates of these through homophily. These include educational attainment, material wealth, and agricultural investment, the proportion of residents or alters who were Christian,[1] and the average likelihood of traditional health ideation among members of each aggregate. The expected directions of the associations of each of these measures with respondents' schemas supportive of IPV are the same as described above regarding the individual-level characteristics. To test for direct social learning effects, we also include measures of the average likelihood of classification as supportive of IPV at each level. Specified in conjunction with the individual and other aggregate-level variables described

here, these measures provide estimates of the association between respondents' schemas concerning the acceptability of IPV and those of others with whom they live and interact with, net of baseline and inbreeding homophily effects. Following the cognitive schema model proposed here, we expect the associations between these measures and supportive IPV classification to be among the strongest in the model. We further expect that, because the network-level aggregate more closely captures the heterogeneous interactional environment individuals are exposed to, this measure will be more strongly associated with schemas supportive of IPV than that at the compound level. Comparison of the estimates across models will allow the identification of proximal sites of social learning or influence related to schemas concerning IPV, as well as their magnitude relative to each other and to individual-level characteristics.

Method

Data and Analytic Sample

The data used for the analysis presented here come from the first panel of the Niakhar Social Networks and Health Project (NSNHP), a large-scale longitudinal social network survey fielded in 2014 in collaboration with the NDHSS. The NDHSS has prospectively monitored demographic and health events for the entire populations of 30 contiguous villages in the surveillance zone since 1982, with a total population of 44,000 at the time the data used here were collected.

To test the hypotheses outlined above, we use three linked sources of data, the first panel of the NSNHP survey data, the NDHSS surveillance database, and a contemporaneous census of household wealth conducted by the IRD. The first panel of the main NSNHP survey was collected in 2014. It comprised a complete census of residents aged 16 years and above in one village, Yandé (the data analyzed here), and a supplementary sample of respondents from the rest of the NDHSS surveillance zone. The response rate was 95.4%. Using a name generator methodology, the network instrument elicited information on the presence, characteristics, and strength of network ties across 15 distinct types of interaction in four theoretically key domains (affective, exchange, temporal co-presence, and role relational) of association (Sandberg, 2018).[2] Respondents in Yandé named on average 40 network alters. Of these, 24 alters were uniquely identified (removing multiplexity, or nomination in multiple name generators). Alters who had ever had a record in the surveillance system database were linked to it using a record matching algorithm, yielding 19.5 linked, unique alters per respondent, on average. Underscoring

the fact that network alters are largely drawn from respondents' proximal social context, while at the same time the need to address the potential influence of heterogeneous network contacts, 23% of respondents' alters resided in the same compound, and 54% in the same neighborhood as respondents, on average. In addition to information on respondents' social networks, the survey also contains an extensive respondent questionnaire covering a number of substantive topics, including measures of health ideation and women's status from which the questions used to measure the likelihood of holding schemas supportive of IPV are drawn.

The NDHSS surveillance system provides contemporaneous information concerning age, gender, educational attainment, marital history, residential location, and religion for all respondents, their network alters, and their residential compound and neighborhood co-residents. The IRD census of household agricultural production, wealth, and material possessions conducted simultaneously with the network survey is used to generate measures of material wealth and agricultural investment.

In Yandé, the NSNHP completed 1,310 interviews. Due to a coding error in the CAPI software, complete social network data for 12 respondents were lost. This error was to our knowledge random, and to ensure accuracy of network aggregates, we remove these cases from the analysis. Toward the same end, 14 respondents were excluded from the analytic sample because they cited fewer than six network alters identifiable in the NDHSS. Given the scope of the network instrument, it was deemed implausible that a respondent citing so few alters had provided high-quality information. Item-missing data over the rest of the variables used here was slight, resulting in the loss of eight observations. Finally, respondents residing in household groups of fewer than three adults aged 16 years and older were also excluded, removing two observations. Because of the small number of cases lost, analyses are performed using listwise deletion of these cases. In total, our final analytic sample size is 1,274 individuals residing in 193 compounds across 10 neighborhoods.

Dependent Variable

The dependent variable in the present analysis is a binary indicator of IPV acceptability developed in a separate study. In that analysis, representative of the entire population of the NDHSS surveillance area and including the observations from Yandé, we estimated a series of latent class measurement models to assess the dimensionality of IPV acceptability as well as structural and measurement invariance between men and women (Sandberg et al., 2017a). This analysis employed five questions derived from the 2013

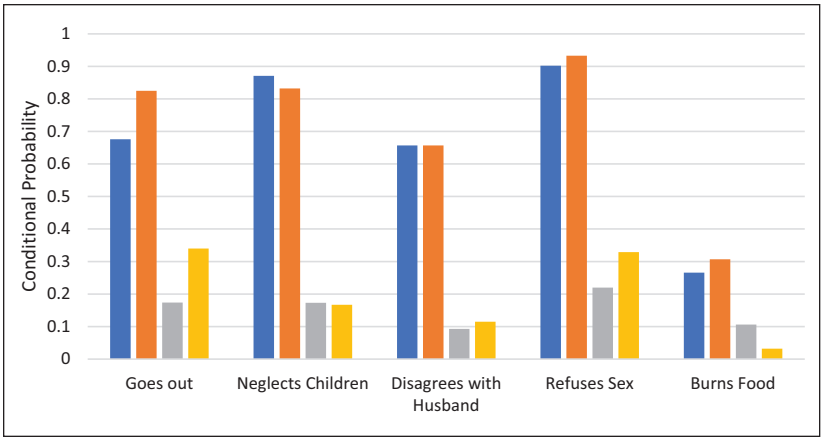

Figure 1. Conditional probablity of latent classification as finding intimate partner violence acceptable, by scenario justifying violence.
Source. (Sandberg et al., 2017a).

Senegal DHS concerning the acceptability of a husband beating his wife under different scenarios which were replicated in the NSNHP. These included (a) if she goes out without telling him, (b) if she neglects the children, (c) if she disagrees with him, (d) if she refuses to have sex with him, and (e) if she burns the food. The preferred measurement model that emerged from this analysis has two latent classes, allowing the likelihood of classification conditional on each indicator to vary between men and women. The estimated conditional probabilities of class membership for each indicator for men and women from this model are presented in Figure 1. Class 1, comprising 60.6% of the population of Yandé (71% women, 50% men) is generally supportive of IPV, 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 than are men, men slightly more likely than women to find violence justified by neglect of children acceptable. The second class is generally unsupportive of IPV, 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. The classification results from these models were used to generate the binary dependent variable used in this analysis, with the indicator category as classification as more accepting of spousal abuse, the reference category classification as less accepting.

Independent Variables

Individual-level measures. Sex is a binary variable indicating females. Educational attainment is categorical, coded as no education (the reference category), primary education, middle-school education and higher than middle-school education. Marital status is coded as single (the reference category) and ever married. Religion is coded with Islam as the reference category, and indicators for Catholic/other Christian, and a category comprising those whose primary religious identification is the indigenous local theism, other, or missing. These latter categories were collapsed due to relatively small numbers of respondents in each. Age is measured as a continuous variable. Measures of household wealth are derived from the census of household wealth conducted simultaneously with the first panel of the NSNHP. An exploratory factor analysis (not shown) was performed using 12 variables measuring ownership of livestock and agricultural implements and 11 measuring household building materials, access to electricity, small appliances, and water and sanitation infrastructure. Two negatively correlated factors with eigenvalues greater than one were extracted, corresponding to agricultural investment and material wealth. These were scored using the Bartlett method, with determinacy coefficients of .91 and .88, respectively (analysis available on request). Both scores were standardized relative to all households in Yandé, with a mean of zero and standard deviation of 1. Schemas concerning health and illness are operationalized with a categorical variable derived from a prior analysis which identified three classes of health ideation and behavior in Yandé. We have labeled these classes "ethnomedical," 'biomedical,' and "liminal." The ethnomedical class (30% of the sample) is most likely to cite only, or to prioritize ethnomedical causes of disease, prevention and treatment, and the least likely to cite biomedical options. They are also the most likely to believe that women should give birth either alone at home or with other household women, the least likely to believe they should give birth in a clinical setting, and most likely to think mystical protection and seclusion are the best preventive measures to be taken for pregnant women. The biomedical class (32% of the sample) is more likely to cite only, or prioritize, biomedical cause and treatment of illness, including prioritizing clinical attendance at childbirth. The biomedical class is the least likely to place responsibility for child mortality on the mother or other individuals. The liminal class (38%) mixes elements of both ethnomedical and biomedical classes.

Residential compound and social network measures. Data concerning educational attainment, religion, and household agricultural and material wealth, schemas concerning health and illness, and the acceptability of IPV were available for

the entire population of Yandé. In the present analysis, we employ measures of each of these, calculated omitting the respondent within each aggregate level to operationalize respondents' structural and ideational contexts within their compound and social networks. For the compound measures, this includes all compound members other than the respondents aged 16 years and above. For the social network measures, aggregation was done across all alters in respondents' synthetic networks (i.e., all unique alters cited in any of the 15 name generators) that were identifiable in the NDHSS.

For educational attainment, we measure the proportions of aggregate members with primary, and with middle school or higher education. These latter two categories were aggregated because, while non-negligible in the population, within these aggregates, particularly at the compound level, the proportion was vanishingly small in the majority of cases. Religion at both the compound and network levels is operationalized simply with the proportion of residents who were Christian because, after Islam, the proportion of co-residents and network alters with other religious affiliations in the population was also small. Agricultural investment and material wealth are calculated as the arithmetic mean of individual factor scores aggregated to each level. These two compound-level measures were standardized relative to other compounds in Yandé, whereas the network measures were standardized to other households in the village. Coefficients associated with these measures may be interpreted as the association of a one standard deviation difference in the average agricultural investment or material wealth of the households in respondents' residential compounds relative to other compounds in the village, and a one standard deviation difference in the average of these measures among network members relative to other village households, respectively. Schemas concerning health and illness are operationalized as the arithmetic mean of the estimated probability of ethnomedical and liminal classification among co-residents and network alters (again omitting the respondent). To operationalize compound and network schemas supportive of spousal violence, potentially representing direct normative influence, we include measures of the average probability of classification as supportive of IPV at each level. Finally, in models including social network characteristics, we include a measure of absolute size of the respondents' personal network, which may proxy a number of unobserved mechanisms related to diffusion and social learning, a common control in such analyses (Valente, 2010). It may also have a substantive interpretation. In the network analysis of IPV acceptability in Honduras noted above, a negative association between absolute network size and acceptability was found. The authors concluded that this indicates that more isolated individuals are more likely to be supportive of IPV in that context (Shakya et al., 2016).

Modeling strategy. We employ a nested modeling strategy using ordinary least squares (OLS) regression, with a fixed effect for respondents' neighborhood to test the hypotheses above. The larger neighborhood around each compound represents an additional potential context of social learning in addition to the compound and social network. Estimating the associations between IPV support classification and each variable on all three levels simultaneously, however, raises problems of multicollinearity associated with aggregation. This may lead to opposite signs of the variables on different levels, depending on the strength of their bivariate associations, and incorrect standard errors. The fixed effects strategy chosen allows for conditioning on effects related to social learning at the neighborhood level (and indeed, on all neighborhood level effects), accounting for clustering at the neighborhood and compound levels. The OLS linear probability model was chosen over a conditional (fixed-effects) logit model (which produced nearly identical estimates and identical inferential results) because of its ability to reproduce accurate marginal predictions, which the conditional logit model does not. The coefficients estimated here can be interpreted as the marginal (in the case of a continuous variable) or discrete (in the case of a categorical variable) change in probability of respondents holding schemas supportive of IPV associated with a one-unit positive change in the independent variable. Finally, it should be noted that though inferential tests for coefficients are presented in the following tables, these estimates are of population parameters for Yandé. As such, they should not be evaluated as referencing a larger population but may be seen as supplementary information concerning the strength of associations estimated. One-tailed tests of statistical significance are reported for all directional hypotheses made above.

We begin with estimates of the bivariate, or zero-order associations between each variable and IPV acceptability. We then proceed to specify multivariate models, starting with a baseline specification of only individual characteristics. Following this, we estimate models adding social network and compound characteristics to the baseline specification separately. For both the network and compound models, we include two specifications: the first includes all covariates except the average probability of supportive IPV classification at that level. The second includes this measure to test for direct learning effects. Finally, we present models including both network and compound characteristics simultaneously, again including one specification omitting the measures of average probability of IPV support classification at both levels, the second including them. Comparing the estimates across the zero-order results and each multivariate specification allows us to evaluate how much of the association between each component is explained or interpreted by the inclusion of the others, and the relative strength of association of each.

Results

Table 1 presents descriptive statistics for the analytic sample used in the following analysis. A majority of respondents had no education, but more than one quarter had a middle-school education or higher. Looking at respondents' social networks, we see that roughly one quarter of network alters had primary education, slightly less than that at least some secondary education. Estimates of the central tendencies for rest of the network characteristics largely mirror those for the respondents. The same holds true for both the compound and neighborhood-level characteristics, as would be expected.

Table 2 presents estimates from the zero order and multivariate models of IPV acceptability classification on individual, network, and compound characteristics. The first column contains the zero-order associations of each variable and classification as supportive of IPV from simple logistic regressions. On the individual level, we see strong, significant associations between sex, primary and greater than middle-school education relative to no education, and having ever been married. This latter is positively associated with supportive IPV classification. More traditional and liminal health ideation, as well as household agricultural investment and material wealth all also have strong associations in the predicted directions.

All of the network level measures, with the exception of average probability of traditional health ideation and the proportion Christian in the network are also strongly associated with IPV classification in the predicted directions. Network size is estimated to be positively associated with the likelihood of finding IPV acceptable. The likelihood of being classified as finding IPV acceptable increases 14.4% points from the fifth percentile of the network size distribution (12 alters) to the 95th (36 alters). Of particular interest here are the coefficients for the proportion of network alters with at most primary education, and the mean probability of liminal health schemas. That associations between these network measures and schemas supportive of IPV are much stronger than their individual level analogs suggests, at least at this unconditional level, that these are significant channels of social learning and diffusion of norms. The strongest association here, however, is clearly that related to the average probability of supportive IPV classification among respondents' network alters. On the compound level, we see associations in the expected directions between classification as supportive of IPV and the proportion of respondent's co-residents with middle-school or higher education, average liminal health ideation, and both agricultural investment and material wealth, though the former is relatively weak. We also see a relatively strong association between the average likelihood of supportive IPV classification within the compound and respondent's own, though not of the magnitude seen in its network-level analog.

Table 1. Means, Proportions, and Standard Deviations for Variables Used in Multivariate Analyses, Yandé (*N* = 1,274).

	M/Proportions	*SD*
Individual characteristics		
Classified as supportive of IPV (ref. = no)	0.606	0.489
Sex (ref. = male)	0.535	0.499
Age	35.840	16.270
Education (ref. = no education)		
Primary education	0.184	0.387
Middle school education	0.165	0.371
Higher than middle school	0.111	0.314
Ever married/missing (ref. = single)	0.647	0.478
Health ideation (ref. = biomedical)		
Liminal	0.384	0.487
Most traditional	0.297	0.457
Agricultural investment	0.000	1.000
Material wealth	0.000	1.000
Religion (ref. = Muslim)		
Catholic/Other Christian	0.108	0.310
Traditional/missing	0.027	0.161
Social network characteristics		
Number of network alters	23.070	7.896
Proportion with primary education	0.249	0.134
Proportion with middle school + education	0.228	0.170
Mean agricultural investment	0.000	1.000
Mean material wealth	0.000	1.000
Proportion Christian	0.119	0.167
Mean probability liminal health ideation	0.381	0.170
Mean probability traditional health ideation	0.296	0.166
Mean probability classified as supportive of IPV	0.612	0.178
Compound characteristics		
Proportion with primary education	0.220	0.177
Proportion with middle school + education	0.269	0.205
Mean agricultural investment	0.000	1.000
Mean material wealth	0.000	1.000
Proportion of alters are Christian	0.108	0.233
Mean probability liminal health ideation	0.378	0.234
Mean probability traditional health ideation	0.306	0.232
Mean probability classified as supportive of IPV	0.613	0.228

Source. Compiled by author.
Note. IPV = Intimate partner violence.

Table 2. Marginal and Discrete Change in the Probability Spousal Violence Classification on Individual, Social Network, and Compound Covariates, Adults Age 16+ years, Yandé City (n = 1,274).

	Zero Order	M1	M2	M3	M4	M5	M6	M7
Individual characteristics								
Sex (ref. = male)	0.238***	0.220***	0.218***	0.172***	0.226***	0.231***	0.226***	0.187***
Age	0.000	−0.001	−0.001	−0.001	−0.001	−0.001	−0.001	−0.001
Education (ref. = no education)								
Primary school	−0.132**	−0.107**	−0.105**	−0.097**	−0.111**	−0.110**	−0.109**	−0.101**
Middle school	−0.027	−0.030	−0.023	−0.019	−0.032	−0.032	−0.029	−0.025
Middle school+	−0.262***	−0.201***	−0.204***	−0.187***	−0.207***	−0.201***	−0.208***	−0.191***
Ever married/missing (ref. = single)	0.061*	−0.028	−0.043	−0.048	−0.031	−0.032	−0.041	−0.044
Health ideation (ref. = biomedical)								
Liminal	0.118***	0.081*	0.046†	0.041	0.074*	0.073*	0.050†	0.044†
Most traditional	0.110**	0.080*	0.065*	0.065*	0.094*	0.097**	0.076*	0.076*
Agricultural investment	0.035*	0.025†	0.000	0.003	0.057*	0.057*	0.048*	0.047*
Material wealth	−0.035*	−0.022†	−0.018	−0.021	−0.028	−0.029	−0.042	−0.038
Religion (ref. = Muslim)								
Catholic/Other Christian	−0.017	0.014	−0.004	−0.01	−0.011	−0.013	−0.011	−0.02
Traditional/missing	0.063	0.042	0.048	0.068	0.039	0.039	0.058	0.072
Social network characteristics								
Number of network alters	0.006***		0.007***	0.006***			0.007***	0.006***
Proportion with primary education	−0.465***		−0.158†	−0.107			−0.135	−0.093
Proportion with middle school+	−0.225**		−0.052	0.004			0.033	0.075
Mean probability liminal ideation	0.306**		0.176*	0.108			0.197†	0.131
Mean probability traditional ideation	0.022		−0.141	−0.186			0.014	−0.053

(continued)

Table 2. (continued)

	Zero Order	M1	M2	M3	M4	M5	M6	M7
Mean agricultural investment	0.060***		0.050*	0.038†			0.068**	0.054*
Mean material wealth	−0.040**		0.000	0.005			0.011	0.016
Proportion Christian	−0.041		0.039	0.047			−0.046	−0.046
Mean probability classified as supportive of IPV	0.772***			0.436***				0.371***
Compound characteristics								
Proportion with primary education	−0.012				−0.097	−0.082	−0.061	−0.052
Proportion with middle school+ education	−0.118*				−0.161*	−0.137*	−0.155*	−0.134†
Mean probability liminal ideation	0.153*				0.077	0.043	−0.007	−0.014
Mean probability traditional ideation	−0.045				−0.183*	−0.185*	−0.219*	−0.186*
Mean agricultural investment	0.023†				−0.045	−0.046	−0.074*	−0.069*
Mean material wealth	−0.035***				0.002	0.007	0.011	0.005
Proportion Christian	−0.032				0.048	0.048	0.062	0.072
Mean probability classified as supportive of IPV	0.200**					0.176**		0.061
Constant		0.541***	0.430***	0.195	0.629***	0.520***	0.462***	0.223
F		10.71***	8.03***	8.81***	7.59***	7.63***	6.54***	6.84***
R^2		.124	.148	.159	.135	.140	.155	.168
rho[a]		0.04*	0.04*	0.02	0.03*	0.02	0.03*	0.02

Source. Compiled by author.
Note. IPV = Intimate partner violence.
[a]Stars reported correspond to null hypothesis that all fixed effects are simultaneously zero.
†$p < .1$. *$p < .05$. **$p < .01$. ***$p < .001$.

Turning to Model 1, the first multivariate specification, we see the magnitude of all the individual-level associations is somewhat reduced relative to the zero order models. Estimated differences in the marginal probability of supportive IPV classification associated with educational attainment and health ideation in those models, though still large, are partially explained by this joint specification, marital status almost completely. Overall, the individual characteristics as specified here explain an estimated 12.4% of the variance in the probability of supportive IPV classification.

Model 2 builds on the specification of Model 1, including the social network variables. As a set, these network characteristics significantly improve model fit relative to the Model 1 by an incremental F test. This model explains an estimated 14.8% of the variance in the probability of supportive IPV classification. Only the coefficients for average agricultural investment of network alters' households maintains a similar magnitude relative to its zero-order analog. The network education coefficients, though still negative, are greatly reduced in magnitude in the presence of the individual-level and other network-level variables. Relative material wealth of the network is completely explained. Also of interest is the effect of network health ideation. The coefficient for the average probability of network traditional health ideation switches signs, and that for liminal health ideation decreases dramatically relative to the zero-order estimates. At the same time, the marginal change associated with their individual-level analogs is reduced. Finally, it is notable that inclusion of the network characteristics completely explains the marginal effect of individual-level household agricultural investment, and some of that associated with individual material wealth.

Model 3 adds the average probability that social network alters will be classified as supportive of IPV to the specification from Model 2. This measure significantly increases model fit over that specification, with a corresponding increase in variance explained of 1.1%. The magnitude of the association, though diminished from that seen in the zero-order results, is the strongest in the model. Here, a 10% point higher aggregate social network probability of supportive classification is associated with an approximately 4.5% point higher likelihood of supportive IPV classification for respondents, controlling for individual and other network characteristics. Inclusion of this measure explains a substantial proportion of the network education and health ideation effects, and some of the network agricultural investment effect seen in Model 2. This model also indicates, however, that some of the individual-level associations identified in the previous model, particularly those for sex and educational attainment, are explained in part by network members' schemas concerning IPV.

Model 4 presents the first specification with compound characteristics entered simultaneously with the individual covariates. This model is only a marginally significant improvement over the individual characteristic-only specification of Model 1, $F(7, 1246) = 2.12$, $p = .039$). The zero-order associations between proportions of compound co-residents with secondary or higher education are replicated here and perhaps slightly magnified. The magnitude of the association with IPV classification for the individual-level educational attainment measures remains relatively unchanged, however. Although the coefficient for the average probability of other compound members' classification as holding traditional health schemas is much larger than in its corresponding zero-order model and negative, this is likely due to collinearity with its individual-level analog. More importantly, controlling for the individual-level characteristics, the zero-order associations between respondents' classification and compound-level material wealth and agricultural investment are completely, that for liminal health ideation partially, explained.

Model 5 includes the measure for the average probability of IPV support classification among compound co-residents to the specification from Model 4. The marginal effect of this variable is relatively large and, though somewhat less than that seen on the network level in Model 3, results in a significant improvement in model fit relative to Model 4. Furthermore, on comparing Models 4 and 5, it appears that compound level context concerning IPV ideation is independent of both individual-level and other compound-level characteristics. The slight exception to this is the proportion of co-residents with secondary or higher education, which is partially explained.

Model 6 presents the first joint specification of all three levels, individual, network, and compound simultaneously, omitting the measures for average IPV classification probability at each level. Releasing the constraints on the network covariates here results in a significant improvement in fit relative to Model 4, with just the individual and compound covariates, $F(8, 1238) = 3.73$, $p = .000$. Compared with that model, we see a small increase in the (negative) marginal probabilities associated with agricultural investment and liminal health ideation, but little else different on the compound level. This model also increases in fit relative to Model 2 by releasing the constraints on the compound covariates, but only marginally so, $F(7, 1238) = 2.13$, $p = .038$. As with the compound-level covariates, we see few differences in the marginal probabilities associated with those on the network level in comparison to that model. Comparing Models 1, 2, 4, and 6, and looking at the individual-level covariates, we see that the marginal effect of health schemas (both liminal and most traditional), as well as agricultural investment appear to be explained to a greater degree by the network-level covariates than by those on the compound level.

In Model 7, the final model, we add the measures of average probability of IPV approval at the network and compound levels to the specification from Model 6. Here, in comparison to Models 3 and 5, we can gauge the relative importance of covariates on each level, including the likelihood of holding schemas supportive of IPV. While the network level marginal effect remains the largest in the model, that for the compound level is completely explained, and the next largest compound level effect, the proportion of co-residents with a middle-school or higher education is diminished, while the other network level associations stay relatively stable in comparison with Model 5. This suggests that relative to heterogeneous interaction at the network level, aggregate characteristics at the compound level are much less strongly associated with respondents' schemas concerning IPV. This is reinforced in the evaluation of relative model fit. Although releasing the constraints on the network coefficients results in a significantly better model than with compound characteristics alone (Models 7 vs. 5; $F(9, 1236) = 4.65$, $p = .000$), the converse does not (Models 7 vs. 3; $F(8, 1236) = 1.59$, $p = .125$).

Discussion

In this article, we have presented an analysis aimed at assessing relative associations between individual characteristics and those related to both the structural and (potentially normative) ideational context of individuals' social networks and residential compounds with respondents' schemas concerning IPV. There are a number of limitations which should be kept in mind when evaluating the results presented. First, the indicators used in the latent class model from which the dependent variable and independent variables measuring the average likelihood of classification as supportive of IPV at the network and compound levels are relatively limited. Including only standard DHS indicators of the scenario-based acceptability of IPV, these measures do not include indicators of the experience, either direct or witnessed, of IPV. Although such measures may capture to some degree the cumulative impact of such experience, filtered through beliefs and attitudes, they do so imperfectly, and especially at the individual level, they may be strongly influenced by personal experience which is not measured here.

It is also possible that there remains uncontrolled endogeneity through baseline or in-breeding homophily, where individuals are constrained in their interaction with co-residents or network members, or select them based on their shared experience or beliefs, or some other, unmeasured characteristic associated with these. These latter may include individual-level correlates of IPV identified in previous literature noted above and not measured here, including type of marriage or cohabitation (monogamous vs. polygamous),

length of marriage or partnership, women's labor force participation, prior experience of violence, alcohol use, and female autonomy within relationships. Although we cannot rule out potential bias from these sources, the conditioning strategy we have used here is designed to minimize this. For such bias to exist, it would be necessary for individuals to select their compound co-residents or network alters based on their schemas concerning IPV or one of these factors *independently* of all other individual, network, and compound level factors specified in these models, and independently of neighborhood-level characteristics controlled through the fixed effects as well. We believe, given the traditional social organization of the present context, this is highly unlikely.

Despite these limitations, we have confidence we have identified important mechanisms for learning and diffusion of potentially normative schemas concerning IPV in this population. The zero-order associations presented here provide evidence supportive of individual, social network, and compound-level influences. The multivariate models, however, suggest that, with some nuances, heterogeneous interaction through social networks clearly appears to have a stronger influence over individual IPV schemas than the interaction among compound co-residents and in some cases, respondents' individual characteristics.

Individual characteristics do have important associations with schemas concerning IPV. Throughout the models presented, women, and those holding liminal and more traditional health/gender schemas were estimated to be more likely to hold schemas supportive of IPV than men and those with more biomedical oriented health/gender schemas, respectively. Those whose household wealth was more concentrated in agricultural production were also estimated to be more likely to hold these schemas than those whose households were less so. These characteristics of respondents to some degree shape the content of stimuli encountered through their networks. The reduction of network-level associations in the presence of individual characteristics—particularly educational attainment and potentially agricultural investment—provides strong evidence for network endogeneity due to homophily—these network characteristics being associated with IPV ideation in part through a process whereby individuals associate with those more like themselves in these dimensions.

That the relative associations between respondents' positive IPV classification and both individual and network schemas related to gender and health are reduced when both levels are specified simultaneously also provides some evidence for homophily effects. It suggests however, at the same time, a potential learning, or diffusion effect through networks related to the transition from traditional to Western belief systems concerning gender and health,

one which manifests in individual level schemas. Such a potential diffusion or learning effect through networks is also suggested in relation to household material wealth and, particularly, agricultural investment. Individual-level associations with these measures of socioeconomic status are largely explained in the presence of the network covariates when the compound-level aggregates of these measures are not included in specifications, and are offset by those analogs in models in which they do. It may be that the degree to which households are engaged in the agricultural sector matters, in part, due to their differential interaction with other agriculturalists, reinforcing cognitive schemas concerning IPV between them.

The positive association between IPV acceptability and absolute network size is consistent through all of these models. That this is in the opposite direction of the association identified in the results reported concerning the Honduran network study (Shakya et al., 2016) does not imply a contradiction between the two. It may be that net of the other network characteristics specified in both papers; this measure captures an unobserved aspect of social learning or influence that depends on the population level of acceptability. In areas where population levels of IPV acceptability are low, such as in Honduras, as well as where they are high, such as the present population, larger networks may be differentially reinforcing of the overall ideational context.

Perhaps most striking, however, are the "direct" learning or normative effects of network schemas concerning IPV. These are first seen in Model 3, the best fitting and technically preferred model in this analysis, and later in Model 7, which includes the compound-level covariates. These are the strongest associations in the models presented here. In the specifications in which this measure is included, the difference in the marginal probability of holding schemas supportive of IPV between a network in which no alters are classified as approving of IPV and one in which all are is estimated to be twice as large the difference between respondents having a middle-school education and no schooling, and four times as large the difference between those with a primary education and none. It is twice as large as the difference in marginal probability associated with the sex of the respondent, and four times as large as a that associated with a two-standard deviation difference in mean household agricultural investment.

Equally important is what controlling for network schemas concerning IPV reveals about potential mechanisms related to social learning and influence. The associations between network levels of educational attainment and gender/health ideation with respondents' schemas concerning IPV are partially explained by inclusion of this measure. This provides evidence that these associations are due, in part, to the schemas concerning IPV those types of network members hold. More educated network members, as well as those

adhering to liminal gender/health schemas and those less involved with agricultural production influence their alters, at least in part, through the less supportive schemas concerning IPV they hold. Network members' schemas concerning IPV also explain, in part, individual-level associations related to respondents' educational attainment and sex. Taken together, these findings indicate that in part, the association between individual educational attainment and IPV ideation may be driven by differential IPV ideation of network alters of varying levels of educational attainment, in combination with educational homophily. With regards to sex, this is likely indicative of gender stratified interaction; women in this population interact more with other women than with men. Because, on average, women hold schemas (or cite perceived norms) more supportive of IPV, this is potentially reinforced through network interaction. The association between sex and IPV acceptability remains in these models, however. Shakya and colleagues (2016), in their network analysis of IPV acceptability in rural Honduras find no association between network interaction outside the household for women, but a slight positive association for men. In supplemental models interacting the proportion of alters supportive of IPV and sex (not shown), we find here that this association holds for both sexes and is slightly stronger for women.

From a broad perspective, as hypothesized, measures associated with homogeneous mixing on the compound level were not as strongly associated with the likelihood of classification as supportive of IPV as the network measures, with one notable exception. Proportions of co-residents with a middle-school education or higher are independently, negatively, associated with respondents' schemas concerning IPV net of educational attainment within social networks (of which co-residents are a substantial part), and these effects appear to be additive to the association with their own educational attainment. That other compound-level factors—notably material wealth, agricultural investment, and liminal health schemas—are explained in the presence of the individual-level covariates suggests that compound-level effects work through their association with individuals' household wealth and to some degree, their own schemas concerning gender and health.

When modeled only with other compound level and individual covariates, compound-level schemas concerning IPV appear to have a strong independent association with respondents' IPV classification, partially explaining the outstanding compound educational attainment association. This suggests again that, as in the case of social networks, education works at least in part through the ideational context it creates. The association between the compound-level context of IPV ideation and respondent's IPV classification, however, is completely explained by the network covariates when entered simultaneously in Model 7. This provides clear evidence that at least for

direct social learning and (potentially normative) influence, the heterogeneous context of interaction at the network level is potentially more powerful than the homogeneous context within compounds.

In total, controlling for neighborhood effects and those associated with the individual and social network levels, compound-level context appears to have relatively less impact outside of the educational sphere. This is not to say that the interactional context of compounds does not matter. Compounds are the proximal context from which a plurality of social network alters are drawn. These results, however, suggest heterogeneous association within (and outside of) the compound through networks has a stronger association with IPV schemas than the "general," context within compounds.

Conclusion

Recent research and intervention results concerning IPV have focused on the potentially critical role of normative factors in shaping attitudes and behaviors, working through social learning and influence mechanisms in social interaction. This research has been limited, however, in the measurement of both the ideational and interactional contexts in which such learning and influence are hypothesized to take place. The present research is unique in advancing this literature by utilizing a data-driven measurement model of IPV ideation allowing for heterogeneity in classification across different scenarios in combination with detailed measurement of the social interactional context through which learning and influence take place. It also advances this literature by framing the interactional mechanisms hypothesized in a general theoretical framework, organized around the connectionist schema model, which is well suited to evaluating social learning and normative influence. Our results have established at least some, tentative, evidence for the relative importance of heterogeneous social interaction in creating the ideational, perhaps normative, context of the acceptability of IPV experienced at the individual level.

We have found, as discussed above, that though some network associations can be explained by homophilous interaction, significant associations of IPV ideation with individual-level characteristics, including health ideation and socioeconomic status are to some degree explained by network interaction. Our analysis also finds a large direct learning effect, where the acceptability of IPV among network alters appears to directly influence acceptability among respondents. This association is larger, across its distribution, than those associated with gender, individual-level educational attainment and socioeconomic status, all of which likely are associated with individual IPV ideation in part through the differential IPV ideation of alters with those characteristics.

Aside from the obvious relevance to general understanding of processes of learning and normative influence, these results have implications for intervention work aimed at reducing the prevalence of IPV. Targeted intervention strategies aimed at shifting schemas through social interaction are worth exploring. To be most effective, however, such efforts must first attempt to understand the contours of contextualized interactional structure, ideation, and their interaction as has been attempted here. Contemporary social network interventions for health behavior change take several forms. In what is known as the "individual" approach, they may target individuals identified opinion leaders, thought to be capable of changing belief or behavior others, or bridging individuals who act as brokers within a target population and inducing them to become change agents. Network interventions may also focus on all members of certain segments of networks to achieve a threshold level of awareness within a particular group, attempt to stimulate or activate the diffusion of information or behavior through existing network ties, or alter networks through the addition or deletion of ties (Valente, 2012). In our opinion, the first approach is most likely to be successful in changing schemas concerning the acceptability of IPV in a context such as that studied here. Schemas supportive of IPV appear in some proportion in most individuals' networks, suggesting a segmentation approach would be less useful, whereas interventions aimed at changing networks through, for example, the formation of interest-based groups may be less successful because networks are generally not malleable in the longer term, as they are reciprocally implicated in the maintenance of strong institutions (such as the family) and structures (such as residential and co-residential forms, as well as economic production).

Although it is sometimes desirable to select low-threshold adopters for interventions using the individual approach (increasing the likelihood of adoption on their part and diffusion), this may not be as effective as identifying and tailoring interventions specifically to change beliefs among those who hold them most closely. Changes to the aggregate experience of the broader population in whose networks these individuals are embedded may have a multiplicative effect. Obvious targets for such interventions in the population studied here would include those with little or no formal education, those possessing more traditional health and gender schemas, and those more involved in agricultural production. This research has shown that, in this population, homophilous interaction explains some of the associations between these factors and IPV schemas. In other cases, doing so may seem counter-intuitive. Many current IPV interventions are aimed at changing the beliefs and behaviors of men (Arango et al., 2014). This makes intuitive sense, as men are the perpetrators of violence against

their wives. However, we have seen that part of the difference between men and women in terms of their support for IPV here may be explained by reinforcement of (potentially normative) schemas among women in interaction with each other. If this inference is correct, it suggests that intervention efforts targeting women may have an outsize impact on other women, and through them the population as a whole, through their social networks.

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Notes

1. Because the vast majority of respondents identify primarily as Christian or Muslim, those identifying as adhering to traditional religious practice or some other belief primarily are omitted at all aggregate levels because they constitute a vanishingly small proportion of networks, co-residents, and neighbors.
2. A full list of the name generators used, along with distributional characteristics of alters named, uniquely named, and identifiable in the NDHSS along with a complete description of the name generators, name interpreters, and general survey questions employed are available in the codebooks for the first panel survey at the NSNHP website, www.nsnhp.org.

Supplemental Material

Supplemental material for this article is available online.

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