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A Multilevel Analysis of Individual, Household, and Neighborhood Correlates of Intimate Partner Violence Among Low-Income Pregnant Women in Jefferson County, Alabama

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Abstract

Objectives—We examined individual, household, and neighborhood correlates of intimate partner violence (IPV) before and during pregnancy.

Methods—We used multilevel modeling to investigate IPV among 2887 pregnant women in 112 census tracts who sought prenatal care in 8 public clinics in Jefferson County, Alabama, from 1997 through 2001. Data were collected from the Perinatal Emphasis Research Center project, the 2000 Census, and the local Sheriff and Police Departments Uniform Crime Reports for 1997 through 2001.

Results—Participants were predominantly young, African American, on Medicaid, and residents of low-income neighborhoods. The prevalence of past-year male partner–perpetrated physical or sexual violence was 7.4%. Neighborhood residential stability, women performing most of the housework (lack of involvement among partners), being unmarried (being in an uncommitted relationship), and alcohol use were positively associated with elevated IPV risk. Significant protective factors for IPV included older age at first vaginal intercourse and a greater sense of mastery (e.g., the perception of oneself as an effective person).

Conclusions—Both neighborhood contextual and individual and household compositional effects are associated with IPV among low-income pregnant women. The results imply that combined interventions to improve neighborhood conditions and strengthen families may effectively reduce IPV.

Intimate partner violence (IPV) experienced by pregnant women is a public health concern in the United States because of its high prevalence and its potential for severe physical harm, including injury and death, to both the mother and unborn child. The prevalence of violence against pregnant women has been estimated at 3.9% to 8.3%, depending on the populations, specific periods of pregnancy, and screening tools.1 Thus, an estimated 152000 to 324000

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abused women deliver live-born infants annually.2 Serious consequences of IPV include delayed prenatal care, miscarriage and spontaneous abortion, and adverse birth and child outcomes.3 Homicide was the second leading cause of injury deaths among pregnant and postpartum women,4 and women abused during pregnancy are 3 times more likely to be murdered over the course of their lifetime than women who were abused outside pregnancy.5

The US Department of Health and Human Services has identified reducing the rate of physical assault by current or former intimate partners to 3.3 per 1000 persons aged 12 years and older to be a Healthy People 2010 health objective.6 Achieving this national goal will require further study of the factors associated with IPV, including the family characteristics that promote healthy relationships within a broad ecological systems context,7–9 and prevention targeted at potentially accessible populations for which IPV has both serious consequences and high prevalence. More than 95% of pregnant women make routine prenatal care visits, providing a stable opportunity in the community to screen and prevent IPV within a primary care setting.10,11 Because intimate partner violence during pregnancy occurs more often among couples of low socioeconomic status,1,3,12 low-income households may require special attention in a community to prevent IPV experienced by pregnant women.

Whereas most IPV prevention strategies focus on secondary and tertiary prevention based on identified individual-level risk factors, the national IPV prevention agenda highlights the importance of primary prevention and both contextual and protective factors for IPV.13,14 The use of an ecological systems framework holds promise for the study of IPV because it recognizes the complexity of IPV and puts a equal, joint focus on both the male–female dyad and multiple contexts.15,16 Prior research has identified neighborhood as an important context in understanding the prevalence of IPV. Significant neighborhood influences include low per capita income, high unemployment rate, resource deprivation, and concentrated disadvantage.17–23 Inconsistent findings have been reported for neighborhood residential mobility and neighborhood crime.18,20,23–25 Compared with the contextual study of IPV in developing countries,26 this line of research in the United States has benefited from a long history of social science studies examining neighborhood context and crime or delinquency.

Despite providing useful insights concerning study design, theoretical perspectives, and analytical methods, previous contextual studies of IPV have important methodological limitations. One ecological study measured IPV on the neighborhood level, but did not allow inferences about IPV at the individual level.18 Other studies20–22,24,27,28 examined clustered data with logistic regression models, which fail to account for the clustering inherent in the data. Several studies that used multilevel modeling17,19,23,25 had small samples with an average of about 1.6 to 2.5 study participants per neighborhood, resulting in numerous clusters with a single observation and unstable estimates of variances for binary outcomes.29 Whereas some studies have underrepresented low-income households in probability samples,19–21,25,27,28 others have overrepresented them in convenience samples, including reported incidents from police, screened events in hospitals, and parent studies on HIV.17,18,22–24 One contextual study of IPV has focused on women during pregnancy and post-partum.17

Improved understanding of how low-income couples can cope with environmental stressors and prevent IPV from occurring will greatly enhance the development of primary prevention programs. However, little is known about couple-level protective factors.13 Previous research has focused on individual- and household-level risk factors for IPV. Although IPV prevalence estimates varied by maternal race and age, consistent risk factors included low

socioeconomic status, low educational attainment, and use of alcohol.[1,3,12,19] Household-level risk factors for IPV included social norms (e.g., male dominance in the family), first-time parenting, unplanned or unwanted pregnancy, lack of social support, partner drug use, poor conflict management, stress, and resource inadequacy.[15,17,23,27,28,30]

Family is the primary proximal context for human development.[31] Strong social bonds and good marriages have been shown to reduce street crimes and IPV primarily through informal social control process.[32–40] Social bonds refer to "internalization of accepted norms, awareness, and sensitivity to the needs of others which promote conformity in society."[40(p534)] Each dimension of the bonds among partners—for example, commitment and involvement—ties partners to conventional society and societal rules, thus informally controlling and preventing IPV.[32,33,40]

Research designed to increase our understanding of the association of neighborhood contextual and couple-level factors with IPV among low-income pregnant women is needed. We conceptualized that IPV occurs within an ecological framework (Figure 1) that considers the interplay of neighborhood context, household factors (stressors, resources, and bonds among partners), and individual correlates of IPV. We designed this study to determine whether features of neighborhoods, being in an uncommitted relationship, and lack of involvement among partners were associated with a higher prevalence of IPV at the individual level among low-income pregnant women, when we controlled for relevant individual and household factors.

METHODS

We obtained individual and household information from the 1997–2001 Perinatal Emphasis Research Center (PERC2) project, a sample of pregnant women aged 14 years or older who sought prenatal care at any of the 8 clinics of the Jefferson County (Alabama) Department of Health.[41] Eligible cases included 12759 women of whom 3887 (30.5%) provided written informed consent for face-to-face interviews conducted by trained research nurses during a single visit at 22 to 23 weeks' gestation.

We used census tracts as proxies for neighborhoods. We classified 2 levels of data (one for neighborhood and another for individual and household) into census tracts and linked them together through geocoding. Addresses of 51 cases could not be geocoded. Fifty-seven cases were from outside Jefferson County. Fifty-five cases had missing information for variables of interest. Following Furstenberg et al.'s recommendation that a minimum of 5 residents per census tract provides the most stable data,[42] we excluded 64 women residing in census tracts with fewer than 5 respondents each. We excluded an additional 46 cases of races other than African American or Caucasian because the groups were too small for meaningful analysis. Finally, data for 727 PERC2 participants were unavailable because they were enrolled in other clinical trials. This left a final sample of 2887 women residing in 112 census tracts in this study, averaging about 25 (range, 5 to 82) study participants per neighborhood. Figure 1 and Table 1 provide an overview of analytical variables and hypothesized effect, grouped by hierarchical levels.

Outcome Variables

We defined the dependent variable as male partner–perpetrated physical violence during this pregnancy and physical violence or forced sexual activity in the past year, and assessed it with 3 main questions and their follow-up questions from a validated Abuse Assessment Screening tool.[43] We determined physical violence from the responses to questions asking whether women had been slapped, kicked, or otherwise physically hurt by someone (e.g., choked, hair pulled, dragged across the floor, locked or tied up). We determined forced

sexual activity from responses to a question asking whether the woman had been forced to have sexual activity (e.g., forced to perform sexual acts against her will). Male partners were identified by women as a boyfriend, ex-boyfriend, baby's father, fiancé,exfiancé, husband, or ex-husband, when answering "If yes, by whom?" Combining physical and sexual violence into 1 dependent variable followed the general IPV definition44 and practices in other studies.19,22,23

Neighborhood-Level Variables

We measured 2 neighborhood structural characteristics as continuous variables with data obtained from the US 2000 Census summary tape files45 for 112 census tracts in Jefferson County, Alabama. Concentrated disadvantage is a structural antecedent to disorganized neighborhoods and has been defined as an economic disadvantage factor.46 Concentration of resource disadvantage in racially segregated urban neighborhoods has been noted.46,47 Concentrated disadvantage may increase male frustration and expose residents to greater risks of violence in the streets and neighborhoods, as it has been argued that a culture of violence prevails in such environments.47–49 Concentrated disadvantage index was composed of 5 items: percentage unemployed, percentage African Americans, percentage of households on public assistance, percentage of households below the poverty line, and percentage of single-parent households. Modeled on work from Sampson et al.46,50 and Benson et al.,20,21,27,28 all 5 items used were correlated strongly with the concentrated disadvantage index; percentage unemployed had the lowest correlation (0.74), and the correlations between this index and the remaining 4 items all exceeded 0.85. Based on summation of equally weighted z-scores (minus the mean of each item and divided by its standard deviation) divided by the number of items, this index demonstrated adequate internal consistency for this sample with a coefficient α of 0.91.

Residential stability reflects social turnover in the neighborhood residential structure.46 High levels of home ownership and low transience help form social relationships and social networks,46 but those among low-income neighborhoods are associated with a longer exposure to social disorder, seemingly intensive social ties, and a lack of social order.20,51–53 We used 2 census measures separately and jointly as an index.20,25,46,51,54 Neither owner-occupied housing measure nor the index contributed substantially to the initial model. We therefore omitted those in subsequent analyses. Residential stability was operationalized as the percentage of households staying in the same residence for at least 5 years.51

We geocoded and aggregated crime data to census tracts as the third continuous measure. High neighborhood violent crime is associated with the acceptance of violence as a social norm in neighborhoods, thus making violence more acceptable at home within intimate relationships.18,25,55 Although the literature reported the measurement of violent victimization from the community survey aggregated at the neighborhood level25 and overall crime17 from Uniform Crime Reports, we used the Uniform Crime Reports measures of violent crimes, which are more likely to be widely revealed and happen in intimate relationships.56 Access to crime data was facilitated by law enforcement staff, who identified appropriate measures and developed routines for pulling the data from their management information systems. We calculated neighborhood violent crime by classifying geocoded violent crime events annually (i.e., murder, rape, robbery, aggravated assault, and domestic assaults) per 1000 census tract residents by using data for 1997 through 2001 collected from the Jefferson County Sheriff's Office and the Birmingham and Bessemer City Police Departments.

Household-Level and Individual-Level Variables

The PERC2 project collected data about several household- and individual-level variables that have been theoretically or empirically linked to IPV. Involvement among partners refers to the participation in activities and the amount of time invested in the pursuit of a partner role.[39,40] A low-income pregnant woman performing most of the housework during pregnancy indicates (1) little involvement in housework from the male partner and weak informal social control for prevention of IPV, and (2) the man's adoption of traditional gender ideology, which is associated with increased prevalence of IPV.[28,57–59] Therefore, lack of involvement among partners was operationalized when women answered "yourself" to the question "Who usually does most of the household chores in the place where you are living/staying? (Yourself, shared, other, or did not answer)." Not living with partner was also considered a measure of lack of involvement.[34]

Commitment among partners indicates the degree of dedication to the joint benefit of each partner and their future.[34,40,60–62] Males' commitment to their partners, gauged as investments in a long-term intimate relationship, was the strongest factor in the mediation of the effect of violent family heritage on later IPV.[34] Currently dating adolescents become less likely to use violence as their commitment to the relationship with the partner increases because commitment may promote cooperative strategies for conflict resolution.[61] Lower levels of interpersonal commitment to one's partner and a greater risk of violent interaction were reported among cohabiters because the partner is less informally controlled by significant others and the victim is more isolated.[60,62,63] Being in an uncommitted relationship was operationalized as "being unmarried," including being separated, divorced, widowed, or never married.

We measured education as a continuous variable as years of education. We determined age at first vaginal intercourse by women's response to "How old were you the first time you had vaginal sex with a man?" We measured both self-esteem and mastery by using validated abbreviated scales to assess psychosocial status in pregnancy.[64] Mastery is the perception of oneself as an effective person and was assessed by women's responses to "I have little control over the things that happen to me. There is little I can do to change many of the important things in my life. I often feel helpless in dealing with the problems of life. There is really no way I can solve some of the problems I have."[64] The Cronbach α coefficient was 0.72 for self-esteem and 0.69 for mastery, indicating acceptable reliability.[65]

We dichotomized no paying job just before pregnancy according to women's response to "Did you have a paying job just before you became pregnant?" We dichotomized maternal alcohol use as whether women had had a drink in the past 3 months. We measured household resources and stressors by lack of car ownership, use of welfare, and unplanned pregnancy. We did not consider income because half of the study participants did not provide income information. We considered including having 1 or more children prior to this pregnancy, but it could not be included because of the multicollinearity between the parity measure and maternal age.

We assessed potential multicollinearity by examining Pearson correlation coefficients between each pair of independent variables. Only 3 pairs of variables had correlations exceeding 0.566: neighborhood concentrated disadvantage and violent crime rate (r=0.687), self-esteem and mastery (r=0.508), and not living with partner and unmarried (r=0.603). Self-esteem and not living with partner were therefore omitted in multilevel analysis. We retained both neighborhood concentrated disadvantage and violent crime because they were conceptually distinct elements of the conceptual framework.[50] Unplanned pregnancy, no money from partner, and lack of car ownership were insignificant in multilevel analysis and, therefore, were dropped.

Analyses

We formulated a multilevel logistic regression model that represents the odds that a given pregnant woman living in a given neighborhood will report having been victimized by her intimate partner. We employed this strategy to account for the hierarchical structure of the 2-level data with 2887 individuals (level 1) nested within 112 neighborhoods (level 2) to differentiate true contextual effects from compositional effects.[67,68] Although conceptually we posed a 3-level model in Figure 1, operationally the dataset did not differentiate household characteristics from individual factors as separate levels but combined in the model-fitting process.

We defined $y_{ij} = 1$ if participant i living in neighborhood j reported IPV, whereas $y_{ij} = 0$ if participant did not. We were interested in the probability of IPV, Prob($y_{ij} = 1$) = p_{ij} . Rather than directly modeling the probability, we model log[p_{ij}/(1-p_{ij})], the natural logarithm of the odds ratio with the form

$$\log\left[p_{ij}/\left(1-p_{ij}\right)\right]=\beta \boldsymbol{x_{ij}}+\gamma \boldsymbol{w_j}+r_{ij}, \tag{1}$$

where x_{ij} is a vector of individual and household characteristics of participant i living in neighborhood j and w_j is a vector of neighborhood characteristics. The components of β characterize partial associations between individual or household characteristics and the IPV, whereas the components of γ characterize partial associations between neighborhood characteristics and the IPV; r_{ij} is a model intercept.

Our analysis begins with a baseline model to examine the impact of 1 individual covariate on the prevalence of IPV via equation 2. Next, 1 neighborhood-level characteristic is included in equations 3 and 4. Substitution of equations 3 and 4 into equation 1 gives the combined equation 5, as an intercepts- and slopes-as-outcomes model[68]:

$$\log\left[p_{ij}/\left(1-p_{ij}\right)\right]= \beta_{0j}+\beta_{1j}x_{ij} +r_{ij} \text{ (first level)}, \tag{2}$$

$$\beta_{0j}=\gamma_{00}+\gamma_{01}w_j+u_{0j} \text{ (second level)}, \tag{3}$$

$$\beta_{1j}=\gamma_{10}+\gamma_{11}w_j+u_{1j} \text{ (second level)}, \tag{4}$$

$$\log\left[p_{ij}/\left(1-p_{ij}\right)\right]= \gamma_{00}+\gamma_{10}x_{ij}+\gamma_{01}w_j +\gamma_{11}x_{ij}w_j+u_{0j} +u_{ij}x_{ij}+r_{ij}, \tag{5}$$

where i indicates a woman (1–2887) who resided in census tract j (1–112).

Specifically, a level-1 equation with 10 individual and household variables was specified as:

$$\begin{aligned}\log\left[p_{ij}/\left(1-p_{ij}\right)\right] = \; & \beta_{0j}+\beta_{1j}\left(\text{housework}_{ij}\right)\\ & +\beta_{2j}\left(\text{unmarried}_{ij}\right)\\ & +\beta_{3j}\left(\text{welfare}_{ij}\right)\\ & +\beta_{4j}\left(\text{age}_{ij}\right)\\ & +\beta_{5j}\left(\text{age at first vaginal intercourse}_{ij}\right)\\ & +\beta_{6j}\left(\text{mastery}_{ij}\right)\\ & +\beta_{7j}\left(\text{no paying job}_{ij}\right)\\ & +\beta_{8j}\left(\text{years of education}_{ij}\right)\\ & +\beta_{9j}\left(\text{alcohol}_{ij}\right)\\ & +\beta_{10j}\left(\text{African American}_{ij}\right)\\ & +r_{ij}. \end{aligned} \tag{2}$$

Modeled on the work of Rountree and Land,70 after initially assuming all coefficients to be variable across neighborhoods, a simplified model was estimated in which all coefficients that did not vary were specified as fixed. The effects of age at first vaginal intercourse, years of education, and alcohol use on IPV varied significantly across neighborhoods (P = .020, .043, and .011, respectively), represented by γ_{50}, γ_{80},and γ_{90}, respectively, below. The resulting level-2 equation is as follows:

$$\begin{aligned}&\beta_{0j}=\gamma_{00}+u_{0j},\\ &\beta_{5j}=\gamma_{50}+u_{5j},\\ &\beta_{8j}=\gamma_{80}+u_{8j},\\ &\beta_{9j}=\gamma_{90}+u_{9j},\\ &\beta_{qj}=\gamma_{q0} \quad \text{for} \quad q=1,2,3,4,6,7,10\end{aligned} \tag{3,4}$$

After substituting the level-2 equation into the level-1 equation, we estimated a full model with neighborhood-level characteristics added to account for the variability in adjusted mean IPV across neighborhoods and the variability in the effects of years of education, alcohol use, and age at first vaginal intercourse on IPV across neighborhoods. In results not shown here, we assessed and found neither the cross-level interaction between individual or household and neighborhood characteristics nor the interaction consisting of 2 neighborhood characteristics51,53,54 significant. This yields the final model:

$$\begin{aligned}\log\left[p_{ij}/\left(1-p_{ij}\right)\right] = [&\gamma_{00}+\gamma_{01}\left(\text{concentrated disadvantage}_j\right)\\ &+\gamma_{02}\left(\text{stability}_j\right)+\gamma_{03}\left(\text{crime}_j\right)\\ &+\gamma_{10}\left(\text{housework}_{ij}\right)+\gamma_{20}\left(\text{unmarried}_{ij}\right)\\ &+\gamma_{30}\left(\text{welfare}_{ij}\right)+\gamma_{40}\left(\text{age}_{ij}\right)\\ &+\gamma_{50}\left(\text{age at first vaginal intercourse}_{ij}\right)\\ &+\gamma_{60}\left(\text{mastery}_{ij}\right)+\gamma_{70}\left(\text{no paying job}_{ij}\right)\\ &+\gamma_{80}\left(\text{years of education}_{ij}\right)+\gamma_{90}\left(\text{alcohol}_{ij}\right)\\ &+\gamma_{100}\left(\text{African American}_{ij}\right)\\ &+\left[u_{0j}+u_{5j}\left(\text{age at first vaginal intercourse}_{ij}\right)\right.\\ &+u_{8i}\left(\text{years of education}_{ij}\right)+u_{10j}\left(\text{alcohol}_{ij}\right)\\ &\left.+\ r_{ij}\right].\end{aligned} \tag{5}$$

Based on Wolfinger and O'Connell's pseudolikelihood techniques, the GLIMMIX macro and the GLIMMIX procedure in SAS version 9.1.3 (SAS Institute Inc, Cary, NC) were used in estimating the parameters in models containing random effects and binary outcomes.[29,71] All reported tests of statistical significance were 2-sided for fixed effects, and 1-sided for random effects as the default in the GLIMMIX macro, being guided by theoretical considerations.[69–71] An $\alpha<0.10$ was selected as the level of significance in fixed effects and an $\alpha<0.05$ for random effects.

RESULTS

In this sample of 2887 pregnant women, 7.4% reported IPV occurring during the past year (Table 1). Study participants lived predominantly in low-income census tracts in Jefferson County, Alabama, with average median household incomes (1999) markedly less than in nonsampled census tracts ($30 783 compared with $58 523). Most study participants were African American (85%), on Medicaid (87%), and young (aged 21.8 ± 4.5 years). The mean education was 11.5 (±1.6) years. The mean age at first vaginal intercourse was 15.7 (±2.1) years.

Table 2 presents theresults of themulti-level logistic regression analyses. Model 1 shows the unconditional model. Significant variation in the prevalence of IPV was found among neighborhoods ($P = .039$). Model 2 shows the effects of individual- and household-level variables only. Several variables were positively associated with IPV: women performing most of the housework, being unmarried, use of welfare, older maternal age, and use of alcohol. Individual-level variables negatively associated with IPV included older age at first vaginal intercourse, a greater sense of mastery, no paying job, and being African American. After we added neighborhood-level variables (model 3), those findings persisted. Neighborhood concentrated disadvantage and violent crime exhibited insignificant effects on IPV at the individual level, whereas neighborhood residential stability was positively associated with the prevalence rate of IPV independent of individual or household characteristics ($P < .10$). The between-neighborhood variance component was statistically significant in model 2, but not in model 3. This finding indicates that the neighborhood contextual variables adequately explained the variability of IPV among neighborhoods.

DISCUSSION

Our findings indicate that both contextual (neighborhood-level) and compositional factors (individual- or household-level) are associated with low-income pregnant women's experiences of IPV. Specifically, we found that neighborhood residential stability remains strongly associated with elevated risk of IPV when one controls for relevant individual and household factors. Intimate partner violence was associated with the individual- or household-level characteristics of women performing most of the housework (lack of involvement among partners), being unmarried (being in an uncommitted relationship), and use of alcohol. Significant protective factors for IPV included older age at first vaginal intercourse and a greater sense of mastery. The finding that the neighborhood context adequately explained the variability of IPV among neighborhoods suggests that interventions targeting individual or household factors without also considering the neighborhood context may minimize the effectiveness of the intervention. The results imply that combined interventions to improve neighborhood conditions and strengthen families may effectively reduce IPV among low-income pregnant women.

Multilevel Correlates and Implications

Our finding of a positive association between residential stability and IPV in a sample of women residing predominantly in low-income neighborhoods is consistent with the results of Benson et al.20 Conventional social science thought suggests that the more stable a neighborhood, the more easily neighbors form durable relationships,46 leading to a negative association between neighborhood residential stability and IPV. However, our findings are also consistent with studies focusing on other outcomes such as distress, homicide, and violent crime in Black neighborhoods,51,54,72 and support the hypothesis that in relatively low-income communities with lower levels of residential mobility, social isolation51 may be associated with a higher prevalence of IPV.

In such a perspective, residents of low-income, racially segregated neighborhoods with limited mobility options face high levels of distress. Not only must they deal with their own poverty, but also with the intense poverty of those around them. Some have suggested such places are "islands of distress"47,73 where high levels of neighborhood disorder associated with poverty are compounded by a sense of being trapped and powerless to escape these circumstances.51,52 These results imply that interventions to improve the residential mobility of low-income neighborhoods may reduce IPV. Policies such as housing vouchers to aid the low-income households in moving out of the disadvantaged neighborhood and securing their residence in middle-class neighborhoods74,75 may be effective in reducing IPV. Work by Sampson et al.50,75 demonstrates convincingly the significance of neighborhood effects on violent behavior over and above individual factors. To change rather than beat the odds,8 such community or contextual approaches have appeal over purely individual ones and need to be included in intervention study designs.

Couple-level factors remained associated with IPV after we controlled for relevant neighborhood and individual factors and other household factors. The positive associations between lack of involvement or commitment between partners and IPV are new in contextual research and of particular interest for IPV prevention. Latest knowledge shows that the formation of commitment helps couples adopt realistic goals and come closer to fulfilling those goals,49 which helps to prevent conflict and IPV.60

Meanwhile, adherence to male dominance in the family has been identified as one barrier for IPV primary prevention among low-income households.49 The shared burden of housework and strong ties between partners enhance the couple's sense of efficacy in managing their households, compensate for the dearth of neighborhood resources, and protect against

adverse neighborhood-level effects.57 Therefore, commitment and involvement between partners in couples become salient features among resilient low-income households to achieve positive adaptation in response to adversity,8,9 supporting the recent programs on strengthening the family as well as federal initiatives on healthy marriage and promoting responsible fatherhood.76 Although the Cairo Conference advocated the promotion of men's positive involvement in sexual and reproductive health and the engagement of men in achieving gender equality and being violence-free in their intimate relationships, we must be able to measure the construct of the responsible husband in a healthy marriage and must have early education to achieve it.76–79 Research focused on primary prevention of IPV should assess commitment and involvement between partners with sophisticated measures62,80,81 and help develop programs that attempt to enhance bonds among partners, especially in the low-income families.

Some individual factors remained associated with IPV when we controlled for relevant neighborhood and household factors. Consistent with other studies,19,23 our findings underscore the protective effect on IPV of women's greater sense of mastery and of older age at first vaginal intercourse and risk effect of women's use of alcohol. Primary prevention components for IPV should consider activities in a life-course perspective targeting early vaginal intercourse and alcohol use, while empowering women to control their lives.

Our study found that a low-income woman not having a paying job prior to pregnancy is a protective factor for IPV. This finding may at first appear counterintuitive; however, previous research examining the role of cultural factors at home on violent behaviors suggests that an employed woman living with an unemployed man in a traditional household instead of an egalitarian household is likely to diminish the man's breadwinner role, resulting in stress or even IPV.58 Incorporation of variables measuring cultural influences and interactive people-by-environment models may yield additional insights into the contribution of family dynamics to IPV. Furthermore, being an African American woman was protective against IPV in our study, consistent with findings reported by O'Campo et al. 17 We concur with previous authors that this finding must be interpreted with caution because race is associated with social factors and distinctive processes.17 Future studies need to carefully conceptualize and measure those factors and processes related to race.17

Strengths and Limitations

We utilized an integrated ecological paradigm and multilevel modeling statistical techniques to examine individual and couple-level protective factors for women together with characteristics of their neighborhoods in a larger study sample. Study participants were selected from low-income pregnant women routinely accessing prenatal care services in Jefferson County, Alabama, without reference to their potential IPV status. Although the prevalence of IPV in our study was lower than that found in other contextual studies on IPV, most of those studies used data from hospitals or parent studies on HIV.17,23,24 Future efforts are needed that use representative samples to further demonstrate the value of a population-based approach to the study of IPV and its correlates.

Our study is subject to several limitations. First, our findings may have limited generalizability to other metropolitan areas. Second, because of the cross-sectional nature of the study, causal relationships cannot be established. A longitudinal study design could prospectively assess the effects of age at first vaginal intercourse, a couple's characteristics before pregnancy, and the patterns of IPV episodes through time (e.g., preconception, pregnancy, and postpartum). Third, IPV may have been underreported because the variable is measured by self-report by pregnant women at a single prenatal care visit. Assessing IPV among both female and male partners and further detailed information is worthy of exploration in future studies.82

Our study is also subject to methodological and conceptual limitations in research on neighborhood effects on the health of individuals, including the definition of neighborhood, duration of residence in the neighborhoods, and operationalization of measures of neighborhood norms.26,83,84 Neighborhood social disorganization attenuates a community's capacity to regulate IPV through both informal and formal social controls.25,46 Although in this study we focused on bonds between partners, processes of informal social control also occur in broader social networks of family, occupational relationships, and neighborhood collective efficacy.32–39,50 Additional research into the mediating and moderating processes operating within neighborhoods and households may elucidate the role of informal social control in IPV.

Conclusions

Building community capacity for IPV prevention requires the involvement of state institutions, health care systems, voluntary groups, and families in the community.85 In Alabama, the low tolerance for gender equality together with underfunding of related programs and services to prevent violence against women86,87 makes focused research on the neighborhood context and protective factors that prevent IPV all the more important. Our findings highlight the combined roles of neighborhood-level interventions and programs designed to strengthen families to reduce IPV in low-income households. Future studies should focus on a variety of geographical settings, investigating a broad range of neighborhood contexts, social bonds, and resilient families with longitudinal study designs, and engaging multidisciplinary teams including public health and other disciplines.

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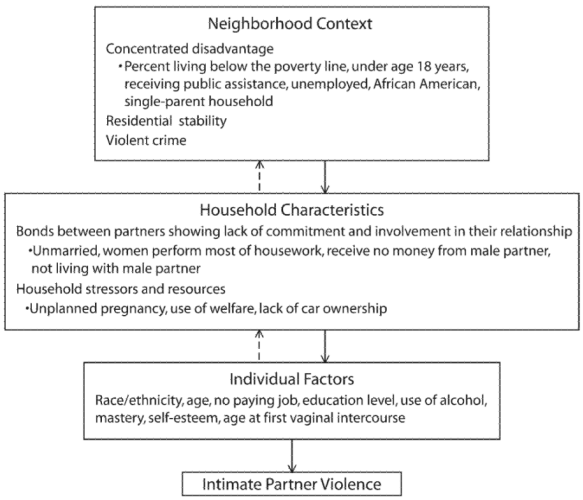

Note. Solid arrows depict hypothesized strong connections between 2 domains in the sequence. Broken lines represent weaker associations. Double arrows indicate a mutual influence between 2 domains.

FIGURE 1.

The ecological model of neighborhood and household contexts and influences on the experience of intimate partner violence among low-income pregnant women: Perinatal Emphasis Research Center Project, Jefferson County, Alabama, 1997–2001.

TABLE 1

Metrics and Descriptive Statistics of Individual, Household, and Neighborhood Characteristics, and Hypothesized Effect on Being Victimized: Perinatal Emphasis Research Center Project, Jefferson County, Alabama, 1997-2001

	Descriptive Statistics		
Variables	**Mean (SD) or %**	**Range**	**Expected Effect**
Dependent variable: intimate partner violence[a]	7.4	0-1	
Explanatory variables: individual or household level			
Age entering study, y	21.825 (4.542)	14-44	+/−
Age at first vaginal intercourse,[b] y	15.726 (2.082)	3-35[b]	−
Years of education	11.489 (1.621)	6-18	−
Self-esteem, score	26.863 (3.383)	10-30	−
Mastery,[c] score	14.539 (4.042)	4-20	−
No paying job[a]	28.9	0-1	+
Use of alcohol[a]	5.0	0-1	+
African American[a]	84.8	0-1	+/−
Performed most of housework[a]	41.2	0-1	+
No money from partner[a]	48.8	0-1	+
Unmarried[a]	86.1	0-1	+
Not living with partner[a]	79.7	0-1	+
Unplanned pregnancy[a]	85.6	0-1	+
Lack of car ownership[a]	12.6	0-1	+
Use of welfare[a]	28.0	0-1	+
Explanatory variables: neighborhood level			
Concentrated disadvantage[d]	0 (0.860)	−1.218 to 2.561	+
Unemployment, proportion	0.092 (0.086)	0.012-0.608	
Under the poverty line,[e] proportion	0.200 (0.129)	0.033-0.586	
Receiving public assistance, proportion	0.031 (0.028)	0-0.147	
African American, proportion	0.558 (0.344)	0-1.000	
Single-parent household, proportion	0.136 (0.074)	0.025-0.370	
Median household income, $	30 783 (11 480)	7610-60 058	
Residential stability			
Same residence,[f] proportion	0.551 (0.136)	0.129-0.810	+
Owner-occupied housing, proportion	0.630 (0.216)	0.007-0.950	+
Neighborhood violent crime, proportion	0.030 (0.028)	0.0001-0.149	+

[a] Coded 0 = no; 1 = yes.

[b] Age at first vaginal intercourse was 3 or 5 years for a single case each. Though ages at first vaginal intercourse were exceptionally low, cases have been reported of sexual abuse of children aged as young as 3 years. As only 2 cases are involved, the impact of these 2 cases is negligible.

[c] Mastery is the perception of oneself as an effective person and was assessed by women's responses to "I have little control over the things that happen to me. There is little I can do to change many of the important things in my life. I often feel helpless in dealing with the problems of life. There is really no way I can solve some of the problems I have."

[d] Concentrated disadvantage is based on summation of equally weighted z-scores (minus the mean of each variable and divided by its standard deviation) divided by the number of items.

[e] Poverty line as defined by the 2000 US Census.45

[f] Same residence is the proportion of the households living in the same residence for at least 5 years.

TABLE 2

Results of Multilevel Logistic Regression of Intimate Partner Violence Reported by Low-Income Pregnant Women: Perinatal Emphasis Research Center Project, Jefferson County, Alabama, 1997-2001

	Model 1		Model 2		Model 3	
Variable	**Coefficient (SE)**	**P**	**OR (95% CI) or Coefficient (SE)**	**P**	**OR (95% CI) or Coefficient (SE)**	**P**
Fixed effects						
Violence, mean						
Intercept			0.06 (0.04, 0.09)	<.001	0.02 (0.01, 0.06)	<.001
Concentrated disadvantage					0.84 (0.62, 1.13)	.248
Residential stability[a]					4.29 (1.13, 16.33)	.035
Violent crime					17.80 (0.01, ∞)	.517
Performed most of housework			1.42 (1.08, 1.87)	.011	1.46 (1.11, 1.92)	.007
Unmarried			1.41 (0.95, 2.12)	.093	1.45 (0.97, 2.18)	.071
Use of welfare			1.77 (1.35, 2.33)	<.001	1.80 (1.37, 2.36)	<.001
Age, y			1.03 (1.00, 1.07)	.048	1.03 (1.00, 1.07)	.049
Age at first vaginal intercourse, y			0.81 (0.75, 0.88)	<.001	0.81 (0.74, 0.88)	<.001
Mastery[b]			0.90 (0.87, 0.92)	<.001	0.89 (0.87, 0.92)	<.001
No paying job			0.65 (0.48, 0.89)	.006	0.65 (0.47, 0.88)	.006
Years of education			0.98 (0.88, 1.09)	.715	0.98 (0.88, 1.09)	.693
Use of alcohol			2.54 (1.38, 4.68)	.003	2.55 (1.38, 4.70)	.003
African American			0.52 (0.37, 0.75)	<.001	0.57 (0.38, 0.85)	.006
Random effects						
Variance components						
Intercept	0.154 (0.087)	.039	0.158 (0.091)	.041	0.129 (0.087)	.068
Years of education slope			0.047 (0.023)	.043	0.060 (0.033)	.034
Use of alcohol slope			2.340 (1.021)	.011	2.328 (1.025)	.012
Age at first vaginal intercourse slope			0.047 (0.023)	.020	0.050 (0.024)	.018

Notes. OR = odds ratio; CI = confidence interval. The neighborhood variables in fixed effects were indented to explain the variations in intimate partner violence across neighborhoods.

[a]Residential stability was operationalized as the proportion of households residing in the same residence for at least 5 years.

[b] Mastery is the perception of oneself as an effective person and was assessed by women's responses to "I have little control over the things that happen to me. There is little I can do to change many of the important things in my life. I often feel helpless in dealing with the problems of life. There is really no way I can solve some of the problems I have."