The Association of Neighborhood Characteristics and Domestic Violence in Santiago, Chile

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ABSTRACT *The growing tension between conservative attitudes and liberal policies on gender issues in Chile is reflected by the high rates of domestic violence juxtaposed by a strong governmental policy aimed at preventing this social problem. Attempts to understand factors associated with domestic violence in Chile, and in other countries as well, have not paid much attention to neighborhood-level factors. This manuscript examined the extent to which selected neighborhood characteristics were associated with domestic violence against women. Relying on theories of social disorganization and social stress, this study conceptualized residence in a disadvantaged neighborhood as a source of stress and examined the relationship between detrimental physical and social characteristics of neighborhoods and the chance of women experiencing domestic violence. Results revealed that a higher level of trash in neighborhoods was associated with increased rates of domestic violence above and beyond individual characteristics. Findings also suggested that the relationship between high levels of trash in neighborhoods and domestic violence was greater for women with higher levels of financial stress. Given the potential role of neighborhood environments in reducing domestic violence, a comprehensive approach incorporating both neighborhood- and individual-level factors may be critical in designing effective preventive interventions for domestic violence.*

KEYWORDS *Chile, Domestic violence, Neighborhood context*

Recent scholarship has raised concerns about Chile's conservative attitude on gender issues including abortion and divorce.¹ In contrast to these concerns, however, Chile has shown much progress in other crucial areas of gender policy—namely domestic violence policy—by enacting a domestic violence law in 2005 that prioritizes women's rights and increases funds for the administration of related programs.² In fact, Chile is one of the few South American countries that actively supports the prevention of domestic violence at a policy level.² Yet, despite the presence of this legislation, recent studies across different age cohorts from diverse geographic areas in Chile have unanimously reported relatively high prevalence rates of domestic violence ranging from 25 % to 32 %.^{3–5}

Previous studies have documented that women with experience of domestic violence display a host of adverse mental health outcomes including depression and

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posttraumatic stress disorder³ and even physical health problems,⁶ and thus these studies have highlighted the importance of domestic violence as a public health concern. Moreover, considering the potentially harmful effects of childhood exposure to domestic violence including externalizing and internalizing problems, lack of social competence, and poor academic performance,^{7,8} domestic violence in families with children requires special attention. Therefore, the examination of ecological factors that are associated with the use of domestic violence against women in Chile, and particularly those with children and adolescents, is an important topic that merits further examination.

PROXIMAL CONTEXTS AND NEIGHBORHOOD EFFECTS

Due to the private and intimate nature of domestic violence that occurs within the family, the examination of the potentially detrimental association between macro-level factors and domestic violence has largely been limited to discussions of theories that emphasize the culture of society as a whole.⁹ For example, some gender theorists have suggested that socially constructed ideas of a masculine culture may have legitimized the use of violence against women as a means to secure male authority and position in the family, particularly when their “normative” higher social status is challenged by the female intimate partner.⁹ However, the exponential growth of studies on “neighborhood effects” across disciplines¹⁰ has recently led researchers to revisit the question of domestic violence in the context of proximal neighborhood factors.¹¹ These neighborhood effects studies have effectively illuminated various mechanisms of how community characteristics may influence individual outcomes, including domestic violence. In this sense, although societal culture and proximal environments both represent macro-level factors, proximal contexts are distinctive from cultural factors of society (e.g., ideas of masculinity) as they refer to physical (e.g., prevalence of trash, green space), structural (e.g., level of poverty, crime), and social (e.g., social interactions among residents) conditions that depict the characteristics of the geographic areas in which domestic violence takes place.

Generally, neighborhood effects studies conducted in the US center around the idea that the geographic concentration of poverty and other negative socioeconomic indicators within neighborhoods can have a detrimental influence on a variety of individual outcomes including health, education, and employment.^{12,13} Similarly, concerns over neighborhood effects have led scholars to examine its potential impact on residents living in disadvantaged neighborhoods in many countries outside the US as well, including Chile. In studying the channels through which the spatial concentration of socioeconomic disadvantages may be associated with individual outcomes, Chilean scholars have found evidence that residential segregation may similarly reduce opportunities for the individuals living in poor neighborhoods in Chile.^{14,15} Overall, these Chilean scholars have demonstrated a consensus concerning the potentially harmful effects of the current geographic concentration of poverty in Chile with regard to the socioeconomic opportunities and risk behaviors of marginalized families living in disadvantaged neighborhoods. Therefore, an examination of domestic violence which acknowledges the role of neighborhoods in individual and family outcomes may enhance our understanding of the mechanisms concerning aggressive behaviors in the family.

THEORETICAL FRAMEWORK

Given the recent expansion of interest in neighborhood effects, there have been growing theoretical discussions as well as emerging empirical evidence that implicate neighborhood effects in the etiology of domestic violence.^{11,16–18} Miles-Doan's pioneer study¹⁹ found that neighborhoods with greater resource deprivation characterized by absolute poverty and income inequality had higher rates of domestic violence. This study pointed to the lack of both community crime prevention strategies (e.g., reporting of suspicious activities, bystander intervention) and public institutions of social control in addition to high rates of unemployment as potential risk factors that were associated with domestic violence in impoverished neighborhoods.

Most studies examining domestic violence in the neighborhood context at the turn of the century,^{19,20} however, have relied on compositional information such as unemployment and poverty rates from census data,²¹ without directly incorporating neighborhood contextual factors into their research models. In contrast, the work by Browning¹⁸ shows much progress in this sense by expanding social disorganization theory into research on domestic violence in the neighborhood context and empirically revealing that specific neighborhood characteristics, including neighborhood cohesion and informal social control capacity, were associated with nonlethal partner violence. In accordance with predictions of social disorganization theory²² which asserts that macro-level relational attributes of communities, such as the quality of social ties and level of informal social control, determine a community's ability to reach mutual social goals and are also key to shaping ecological conditions for crime or violence, Browning concluded that collective efficacy plays a large protective role in partner violence.

On the other hand, more recent qualitative work by Yonas and colleagues¹¹ has extended this line of research by conceptualizing disadvantaged neighborhoods (characterized by lack of opportunities for employment, vacant housing, and poor trash management) as the source of social stress and examining the impact of these disadvantaged neighborhoods on domestic violence as the level of social stress increases within the family. The study conducted by Yonas and colleagues¹¹ was grounded in ideas from social stress theory that maintain that the distribution of stressors varies across social strata and that there is a strong link between social position and distress.^{17,23} Such elevated level of social stress among members of disadvantaged neighborhoods can be expected to similarly induce greater rates of domestic violence in marginalized communities in Santiago, Chile, as well.

MECHANISMS

While existing research on domestic violence has conceptualized neighborhoods as a source of social control and cohesion¹⁸ or a source of social stress,¹¹ there is still lack of understanding of specific mechanisms that link these factors with domestic violence. Several mechanisms that explain how neighborhood-level socioeconomic disadvantages are related to domestic violence in the family can be drawn from the general neighborhood effects literature. For example, Pearlin²⁴ described how poverty and living in disadvantaged neighborhoods may provoke fear of crime in residents as an environmental stressor. Also, Latkin and Curry²⁵ revealed that living in disadvantaged neighborhoods functions as a chronic stressor leading to higher levels of depression symptoms. In greater detail, Steptoe and Feldman²⁶ suggested

several features of neighborhoods that may be potential chronic stressors including dirt and noise, antisocial behavior of residents, and decaying fabric of the built environments.

Notably, the intersection of theories of social disorganization and social stress may provide a unique opportunity to further illuminate the link between community-level stressors and residents' distress.^{27,28} For example, Perkins and colleagues²⁸ suggested that the high level of social incivilities (e.g., drug dealing, public drunkenness, and loitering youth) and physical incivilities (e.g., trash, abandoned cars, and unkempt lots) in neighborhoods are associated with the fear of crime. Umberson and colleagues²⁹ have suggested that violent behavior is a behavioral expression of psychological distress. Therefore, community-level stressors induced by disruptive social and physical environments of disadvantaged neighborhoods may contribute to violence-inducing stressors. Particularly, since community-level stressors are usually hard to alleviate at the individual-level, they are more likely to remain unresolved and develop into chronic stressors.³⁰ Therefore, it is plausible to hypothesize that individuals exposed to high levels of community-level stressors may be more likely to engage in family violence as a second order consequence of the unresolved stress situation.

On the other hand, previous literature has also documented positive community-level mechanisms which could serve as protective factors in the link between chronic stressors in neighborhoods and residents' psychological well-being. For example, the presence of strong interpersonal bonds across community members and the availability of green areas in the neighborhood physical environment are both features of a positive residential environment that may foster desirable behaviors. In detail, communities with greater social cohesion and shared values may be able to directly prevent violence in the family through communal monitoring mechanisms such as increased collective awareness and action.^{11,18} Indirectly, social cohesion may serve as a coping strategy for individuals that buffer against stress carried over from other life domains to the family³¹ or induce lower levels of neighborhood violence,³² and may improve individual's mental and behavioral health. Therefore, we hypothesized that strong neighborhood-based social networks would be associated with a lower incidence of domestic violence. Similarly, the presence of green landscape areas, or "greenspace", has been found to have a positive link with physical and mental health.³³ From this study, one can expect that natural and green space in urban areas which provides a more peaceful social milieu, may lend fewer opportunities for antisocial behavior, including aggressive behavior and domestic violence.

CONTRIBUTION

Drawing on theories of social disorganization and social stress, the present study examined a variety of stress-inducing and protective factors in the physical and social environments of neighborhoods and their relationship with domestic violence in low-income families residing in Santiago, Chile. Specifically, this paper examined whether the unequal distribution of stressors (e.g., neighborhood drug problem and trash management) and protective factors (e.g., green space and social support network) across neighborhoods in Santiago were associated with increased rates of domestic violence against women. Additionally, this research used block-level data obtained from a Systematic Social Observation of neighborhood characteristics. This approach may contribute to overcoming some

methodological limitations of previous studies that have used census data or solely relied on the respondent's perception to define community boundaries and measure neighborhood characteristics.^{34,35}

METHODS

Data

Data are from a National Institute on Drug Abuse-funded study of 1,080 adolescents and 959 parents from municipalities of lower-middle to low-socioeconomic status in Santiago, Chile, who were interviewed between 2007 and 2010. Participants were recruited from an earlier study of iron and nutritional status at the University of Chile.³⁶ The youth and a parent, mainly the mother, completed a 2-h interviewer-administered questionnaire in Spanish with comprehensive questions on actual alcohol/drug use and opportunities, as well as demographic, familial, peer, and neighborhood characteristics.

In this study, we utilized data from the parent interviews. Specifically, the analytic sample for the current study includes the 619 mothers (or mother figures) who were interviewed as part of the adult data collection of the SLS. For purposes of the current study, we included only those mothers (or mother figures) living with a spouse or a partner. We, therefore, excluded three types of families: single mother ($n=98$, 9.2 %), single mother living with extended family ($n=91$, 8.5 %), and grandparents only ($n=36$, 3.4 %). Aside from these 225 interviewees (21.1 %), an additional 80 (8.9 %) non-mother (or mother-figure) interviewees (maternal grandmother, paternal grandfather, legal guardian, or other parent such as aunt and uncle) were excluded from the analyses. Lastly, a total of 35 father (or father figure) interviewees were excluded from the analyses because of a higher chance of men's underreporting nonlethal severe violence,¹⁸ as well as limitations in the size of the sample of men in SLS data (3.3 %).

In addition, the study includes data from a Systematic Observation of Neighborhoods in which study participants resided. The essence of this systematic observation was that each "block face" of the neighborhood block where the study participant resided was assessed by an independent observer. The observer walked counter clockwise around the block, assessing characteristics of each of the four block faces. Neighborhood characteristics assessed included items such as the extent to which there were green spaces, trees, trash, deteriorated sidewalks, and the presence of street animals.

Measures

Demographics. Demographic variables included mother age (in years), partner employment status ($0=employed$, $1=unemployed$), marital status, number of children at home, and socioeconomic status. To determine marital status, women were asked to describe the family living arrangements for their children. Marital status was coded $0=married$ when women described their child(ren) as living with "both parents" or "both parents and extended family" and $1=unmarried$ if women described their child(ren) as living with "mother and live in partner" or "mother and live in partner and extended family." Number of children at home was dichotomously recoded: $0=three$ or fewer children living at home, $1=four$ or more children living at home per Lown and Vega.³⁷ Socioeconomic status was measured using a score that consisted of a weighted linear combination of four items measuring mother's completed years of education, father's completed years of

education, maximum level of combined occupational prestige between mother and father, and family income. Higher scores reflected greater socioeconomic status.

Neighborhood Variables. Neighborhood characteristics were measured using two different types of methodology—systematic social observation of neighborhood characteristics and respondent’s subjective perception of the neighborhood. Two objective measures of neighborhood conditions from these block assessments were included in this study to capture two types of community-level stressors or buffers: physical incivilities (i.e., trash) and green space (i.e., trees). Respondents’ subjective perception of their neighborhood was assessed using four items from the National Survey of American Life. The first two items (neighborhood crime and drug problems) captured neighborhood social incivilities. The second two items (relationship with neighbors and neighborhood clubs) assessed whether the respondents, mothers, belonged to social networks in their neighborhoods.

Physical Incivilities. The indicator for trash represents the count of the number of different types of trash that the rater observed in a given neighborhood. Block observations coded up to eight types of trash (e.g., broken glass or bottles, paper or similar, plastic trash or bottles, cans of food or drinks, organic trash, underbrush or dried grass, dead animals, and furniture or kitchen utensils) observed on the block. In their qualitative investigation of neighborhoods, Yonas and colleagues¹¹ suggest that the proliferation of trash is an important neighborhood stressor, and we treated this variable as an independent community-level stressor.

Green Space. “Trees” was measured using an assessment of the number of trees on a given block. Response options included: 0=There are no trees, 1=There are only trunks / stumps, 2=There are some trunks and trees or 3=There are many trees.

Social Incivilities. Neighborhood crime was measured with the question, “How often are there problems with muggings, burglaries, assaults or anything else like that in your neighborhood?” Response options were: “1=Never,” “2=Hardly ever,” “3=Not too often,” “4=Fairly often,” and “5=Very often.” Neighborhood drug problems were based on the question, “How much a problem is the selling and use of drugs is in your neighborhood?” Response options included: “1=Never,” “2=Not serious at all,” “3=Not too serious,” “4=Fairly serious,” and “5=Very serious.”

Supportive Relationships with Neighbors. Relationship with neighbors was measured with the question, “How often do you get together with any of your neighbors, that is, either visiting at each other’s homes or going places together?” Response options were: “0=Never,” “1=A few times a year,” “2=At least once a month,” “3=A few times a month,” “4=At least once a week,” and “5=Nearly every day.” To establish whether there were any neighborhood groups that might provide support to residents, respondents were asked, “Are there any groups in this neighborhood such as block clubs, community associations, social clubs, helping groups, and so forth?” Response options were “1=yes” or “0=no.”

Individual Variables. We considered financial stress and both male and female drinking problem as individual variables related to domestic violence.

Financial Stress. Financial stress was assessed using the composite score of four items: “job instability of head of household,” “absence of head of household,” “important debts,” and “economic stress (major or habitual).” Women were asked whether each of these situations happened during the past 12 months. Responses were coded as 0=*did occur in the past 12 months* or 1=*did not occur in the past 12 months*. Cronbach’s alpha was 0.72 for this sample.

Drinking Problems. Both male and female drinking problems were measured by asking female respondents to indicate the number of binge drinking episode they or their partners had in past 30 days. Women were asked, “In the past 30 days, how many times have you had four or more drinks (wine, beer, liquor) in one sitting?” Women responded to the same question about the drinking behavior of their spouse or partner. Responses were coded as 0=*no episodes* or 1=*one or more episodes*.

Dependent Variable. Domestic violence was measured with the physical subscale of the widely used Conflict Tactics Scale.³⁸ Straus proposed three subscales for measuring spousal conflict including reasoning, verbal aggression, and physical aggression. We selected the physical aggression scale because it consists of items that measured whether events with a high probability of causing injury happened or not.²⁰ Women were asked whether their male spouse or partner engaged in each of four behaviors during disagreements over the past year. Each behavior was rated with six-point scale, ranging from 0 *never* to 5 *more than once a month*. The physical subscale asks women, “how often did your spouse or partner do each of these things in the past year when there were a disagreement between the two of you,” to indicate whether their male spouse or partner engaged in the following four behaviors: (1) *throwing something at the spouse or partner*, (2) *pushing, grabbing, or shoving*, (3) *hitting but not with anything*, and (4) *hitting with a hard object*. Cronbach’s alpha was 0.81 for this sample. Because the distribution of male partner’s physical aggression in our sample was heavily skewed toward low levels of physical aggression, we recoded response options as 0 = *male partners never engaged in physical aggression* and 1=*male partners engaged in at least one of the possible physically aggressive behaviors at least once*.

ANALYSIS

Our dependent variable (any domestic violence behavior) was dichotomous. Therefore, logistic regression was an appropriate analytic technique for this analysis. Logistic regression examines the relationship of a number of independent variables with the “log-odds” of a dependent variable of interest.³⁹ Because use of coefficients representing the log-odds may be difficult to interpret, we report our coefficients transformed into the somewhat more intuitively understandable odds ratio. Odds ratios above 1.0 indicate that a particular independent variable is associated with increased odds of the outcome (in this case, domestic violence) while odds ratios below 1.0 indicate that a particular independent variable is associated with decreased odds of the dependent variable of interest (domestic violence). Odds ratios that do not differ in a statistically significant way from 1.0 indicate that a particular independent variable is not associated with changes in the odds of the outcome (domestic violence).

As noted above, our sample suffered from some missing data. In order to account for this missing data, we employed a multiple imputation procedure.⁴⁰ Schafer⁴¹ provides a good overview of the rationale for multiple imputation. Briefly, our procedure was to employ multiple imputation procedures to impute the missing data ten times in ten separate data sets. Each of the ten data sets was then separately analyzed using logistic regression. Once analyses had been conducted, β coefficients and standard errors from each of these ten regressions were averaged according to the procedures outlined by Royston⁴⁰ to create a single set of final results.

While odds ratios provide a somewhat more intuitive presentation of results than simple estimates of the relationship of the independent variables with the log-odds of the outcome of interest, odds ratios cannot be directly interpreted as effect sizes.⁴² Therefore, for several of the statistically significant variables, we calculated predicted probabilities at various points in the distribution to provide more straightforward effect size estimates for statistically significant results.

RESULTS

In this sample of 619 mothers or mother figures, a total of 91 women (15 %) reported experiencing at least one instance of domestic violence from their spouses or partners during the last year. In terms of individual-level risk factors for domestic violence, 33 % of women indicated that their spouses or partners had at least one binge drinking episode during the last month. On the other hand, only 6 % of women reported at least one episode of their own binge drinking during the same period. On average, women in this sample experienced two financial stress-inducing events during the previous year with 60 % of women ($n=370$) reporting “important debts” and 53 % of women ($n=327$) reporting “economic stress (major or habitual).” With respect to neighborhood stressors and protective factors, on average, participants perceived that crime happens “not too often” in their neighborhoods (mean [M]=3.0, standard deviation [SD]=1.2), yet participants reported drug problems as being “fairly serious” ($M=4.0$, $SD=1.2$). Block observational data revealed that neighborhoods contained a high level of green space ($M=2.8$, $SD=0.7$) with “many trees” on each block. On average, two types of trash were present on each block ($M=2.3$, $SD=0.9$). Descriptive information for the study sample is provided in Table 1.

Table 2 presents the results of the bivariate and multiple logistic regression analyses examining the association between individual and neighborhood factors and domestic violence. In the bivariate analyses, we examined the relationship between domestic violence and each independent variable separately. Among neighborhood variables, results of bivariate analyses indicated that trash (odds ratio [OR]=1.64, 95 % confidence interval [CI]=1.26–2.13) and neighborhood drug problems ($OR=1.34$, $CI=1.07$ –1.67) were associated with greater odds of women experiencing domestic violence. Financial stress in past year ($OR=1.31$, $CI=1.12$ –1.54), male drinking problem ($OR=2.02$, $CI=1.26$ –3.22), and number of children ($OR=1.71$, $CI=1.04$ –2.79) were also associated with greater odds of domestic violence against women. In addition, higher socioeconomic status ($OR=0.83$, $CI=0.76$ –0.91) was associated with lower odds of domestic violence. Next, we tested two different multiple logistic regression models. In the first model, we examined the relationship between neighborhood factors and domestic violence. In the second model, we tested whether neighborhood effects remain after controlling for individual characteristics to establish whether neighborhood factors influence

TABLE 1 Descriptive characteristics of the sample ($n=619$)

Variables	Mean (SD) or %	Range
<i>Dependent variable</i>		
Male physical aggression (yes=1)	14.7 %	—
Demographics		
Female age (in years)	40.6 (6.3)	19.0–62.3
Socioeconomic status	−0.09 (2.7)	−9.2–11.6
Number of children ($n \geq 4$, yes=1)	2.5 (1.2)	1.0–9.0
Marital status (unmarried=1)	11.6 %	—
Male unemployment (yes=1)	8.5 %	—
Individual variables		
Financial stress in past year	1.9 (1.4)	0.0–4.0
Male drinking problem (yes=1)	33.4 %	—
Female drinking problem (yes=1)	6.1 %	—
Neighborhood variables		
Observed via neighborhood assessment		
Trash	2.3 (0.9)	0.0–5.8
Trees	2.8 (0.7)	0.0–5.5
Adult self-report		
Neighborhood crime	3.0 (1.2)	1.0–5.0
Neighborhood drug problem	4.0 (1.2)	1.0–5.0
Get together with neighbors	1.4 (1.9)	0.0–5.0
Existence of social groups (yes=1)	72.7 %	—

domestic violence above and beyond individual characteristics. The multiple logistic regression analysis of the neighborhood model, which simultaneously considered all neighborhood variables, indicated that both trash ($OR=1.60$, $CI=1.22$ – 2.10) and drug problems ($OR=1.36$, $CI=1.10$ – 1.68) were associated with greater odds of women experiencing domestic violence. In comparing the results of the neighborhood and the full model, we found that trash ($OR=1.54$, $CI=1.16$ – 2.03) remained associated with increased odds of women experiencing domestic violence even after controlling for individual and demographic factors. However, neighborhood drug problems were not associated with increased odds of domestic violence in the full model.

Among individual and demographic variables, financial stress was associated with greater odds of domestic violence ($OR=1.23$, $CI=1.03$ – 1.48) and socioeconomic status was associated with lower odds of women experiencing domestic violence ($OR=0.90$, $CI=0.81$ – 0.99). However, female age, number of children, marital status, and male unemployment were not significantly associated with domestic violence.

In order to determine if any one variable might be responsible for the lack of association between neighborhood drug problems and increased odds of domestic violence in the full model, we conducted additional analyses. We added individual and demographic variables, one at a time, to the neighborhood model and examined how the significance level of neighborhood drug problems changed. We found that male binge drinking episodes and socioeconomic status were the two major factors contributing to neighborhood drug problems no longer being predictive of greater odds of domestic violence in the full model.

For a more exact measure of effect size, we calculated predicted probabilities of women's experiencing domestic violence by the level of trash in neighborhoods.

TABLE 2 Predictors of domestic violence against women (*n*=619)

Variables	Bivariate		Neighborhood		Full model	
	Odds ratio	95 % CI	Odds ratio	95 % CI	Odds ratio	95 % CI
Neighborhood						
Observed via neighborhood assessment						
Trash	1.64	1.26, 2.13	1.60	1.22, 2.10	1.54	1.16, 2.03
Trees	0.98	0.69, 1.39	1.01	0.71, 1.45	1.02	0.70, 1.49
Adult self-report						
Neighborhood crime	1.14	0.94, 1.38	0.99	0.87, 1.12	0.99	0.79, 1.24
Neighborhood drug problem	1.34	1.07, 1.67	1.36	1.10, 1.68	1.18	0.92, 1.53
Gets together with neighbors	1.00	0.88, 1.12	0.98	0.88, 1.09	0.97	0.86, 1.10
Existence of social groups (yes=1)	0.74	0.44, 1.24	0.72	0.42, 1.23	0.81	0.45, 1.44
Individual						
Financial stress in past year	1.31	1.12, 1.54			1.23	1.03, 1.48
Male drinking problem (yes=1)	2.02	1.26, 3.22			1.59	0.95, 2.66
Female drinking problem (yes=1)	1.74	0.76, 3.99			1.20	0.48, 3.01
Demographics						
Female age	0.99	0.95, 1.03			0.97	0.93, 1.02
Socioeconomic status	0.83	0.76, 0.91			0.90	0.81, 0.99
Number of children (<i>n</i> >=4, yes=1)	1.71	1.04, 2.79			1.51	0.85, 2.71
Marital status (unmarried=1)	1.39	0.73, 2.67			1.61	0.76, 3.38
Male unemployment (yes=1)	1.26	0.57, 2.77			0.77	0.32, 1.86

For ease of interpretation, we used bold text to highlight statistically significant findings at *p*<0.05
CI confidence interval

While holding all other variables at their means, we calculated predicted probabilities of domestic violence when the level of trash in the neighborhood is either high (M+2 SD=3.9915) or low (M−2 SD=0.5673). Using data from the descriptive analysis reported in Table 1 and the raw coefficients (log odds) in the full model, we calculated predicted probabilities from the following formula:

$$\Pr(Y = 1|X_1, X_2, \dots, X_K) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_K X_K)}}$$

The results revealed that the probability of experiencing domestic violence for women living in neighborhoods with low levels of trash was 14.1 %. On the other hand, the probability of domestic violence for women in neighborhoods with high levels of trash was 44.6 %, which is about 30 percentage points higher than their counterparts.

Finally, to examine the combined effects of multiple stressors at both neighborhood- and household-level, we calculated the predicted probability of domestic violence for women nested within a household with high levels of financial stress

FIGURE 1. Probability of domestic violence by the levels of trash and financial stress.

(maximum=4, M+2 SD is not applicable in this case because M+ 2 SD produces out-of-range value of this variable) and a neighborhood with high levels of trash. If women were exposed to high levels of financial and neighborhood stressors at the same time, the probability of women experiencing domestic violence was 55 % while holding all other variables at their means. In a further detail, Figure 1 indicates that the association between trash and domestic violence differed depending upon whether women lived in a household with high levels of financial stress or one with low levels of financial stress (minimum=0). Women with high levels of financial stress indicated a greater increase in the probability of domestic violence compared with their counterparts, as the level of trash in a neighborhood increases.

DISCUSSION

In this study, we examined the association between both neighborhood and individual factors and the likelihood of women experiencing domestic violence. Given the growing literature on neighborhood effects and emerging evidence that neighborhood stressors and protective factors may be important for understanding domestic violence, this study made an important contribution by examining how macro-level factors are related to grave public health concerns in a socially and economically transitioning country, such as Chile.

Overall, 14.7 % of women in this sample reported at least one instance of domestic violence during the past year. While the percentage of women experiencing domestic violence was lower than that found in previous studies examining other mid to low socioeconomic status individuals (25 % to 32 %),³⁻⁵ the fact remains that one in seven women in our sample reported a form of abuse known to be associated with devastating mental health outcomes including depression and posttraumatic stress disorder³ in addition to physical health problems.⁶ One possible reason for this discrepancy may be the different age range of females who were sampled across studies, particularly given findings which suggest that female age is negatively associated with the chance of experiencing domestic violence.³⁷ In detail, it is important to note that the average age of female participants in our study as 40 years old compared with 34 years old in the study by Ceballo and colleagues³ which reported higher rates of domestic violence. Therefore, our finding on the

prevalence of domestic violence in Santiago, Chile, should be carefully interpreted in consideration of the average age of women as it may underestimate the prevalence of domestic violence in other age cohorts.

Consistent with the literature, our findings supported the hypothesized relationship between physical incivilities in the neighborhood (i.e., trash or litter) and increased odds of domestic violence. To our knowledge, this is the first empirical finding which supports the results of qualitative study by Yonas and Colleagues,¹¹ which suggested poor trash management as an independent community-level stressor. Also, the results of our analysis on the probability of domestic violence by the level of trash and financial stress suggested that it is critical to identify a high-risk female group for domestic violence with multiple stressors at both neighborhood- and individual-levels. On the other hand, social incivilities (neighborhood drug problems and crime) were not associated with domestic violence. Given that male binge drinking and socioeconomic status may mediate the relationship between neighborhood drug problems and domestic violence, the mechanism of the effect of this neighborhood stressor on family violence warrants further investigation in future studies of domestic violence.

In examining potential neighborhood protective factors for domestic violence (green spaces, social networks), we found that neither of these factors proved to be significantly protective for domestic violence. The lack of a significant relationship between green space and domestic violence could be attributable to the limited number of items in this dataset that could be used to construct the "green space" measure. Although the present study contributed to advancing the neighborhood effects literature by utilizing Systematic Social Observation data collection methods, a more comprehensive measure of green space that incorporates other forms of natural environments such as parks and green fields may be important for understanding how landscape is linked with domestic violence. Additionally, gathering with neighbors and availability of social groups in the community were not significant contextual predictors of domestic violence. Kessler and McLeod⁴³ suggested that the mental health impact of stress is buffered by emotional and perceived social support but not by membership per se in social networks. Therefore, future research should examine the association between measures of social support and collective efficacy to establish whether social relationships in the neighborhood may serve as protective factors for domestic violence.

Consistent with previous literature, financial stress and lower socioeconomic status were associated with an increased likelihood of women experiencing domestic violence.¹⁷ On the other hand, both male and female drinking problems were not significantly related with domestic violence. This result is contrary to the previous literature which reported that both male and female drinking problems are highly associated with domestic violence.^{44,45} The relatively large standard deviation of the two variables in our data widened the confidence interval and in turn contributed to the non-significance of them.

As with any study, this study had several limitations. First, this study was based on women's reports of their experiences with domestic violence, leaving room for possible bias such as underreporting the extent of violence due to the personal nature of these questions. Second, because the sample size was reduced to limit the study to women who had a partner living with them, the generalizability of the analysis for women who do not live with an abusive partner or who previously had an abusive partner with whom they no longer live is limited. Third, because this study design is cross-sectional, the directionality of relationships cannot definitively

be established. However, given the nature of our dependent variable, it is highly unlikely that domestic violence in the home would contribute to shaping neighborhood factors, though it is possible that individuals who are prone to violent behavior may have selected themselves into disadvantaged neighborhoods. Despite these limitations, the strengths of this study include being one of the few studies to have examined objective measures of neighborhood effects on domestic violence, using a relatively large community-based international sample of families.

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