frontiers | Frontiers in Political Science

TYPE Original Research
PUBLISHED 15 April 2025
DOI 10.3389/fpos.2025.1547823

OPEN ACCESS

EDITED BY
Aleixandre Brian Duche-Pérez,
Catholic University of Santa María, Peru

REVIEWED BY
Mario Marinov,
South-West University "Neofit Rilski", Bulgaria
Ceren Kasım,
University of Hildesheim, Germany

*CORRESPONDENCE
Pablo Cadena-Urzúa
✉ pacaur@alumni.uv.es

RECEIVED 18 December 2024
ACCEPTED 31 March 2025
PUBLISHED 15 April 2025

CITATION
Cadena-Urzúa P, Briz-Redón Á, Guardiola J and Montes F (2025) Violence against women in Chile: a criminogenic approach to guide public policy in the global south.
Front. Polit. Sci. 7:1547823.
doi: 10.3389/fpos.2025.1547823

Violence against women in Chile: a criminogenic approach to guide public policy in the global south

Pablo Cadena-Urzúa[1]*, Álvaro Briz-Redón[2], Javier Guardiola[3] and Francisco Montes[2]

[1]Doctoral Programme in Law, Political Science and Criminology, Department of Criminal Law, Universitat de València, Valencia, Spain, [2]Department of Statistics and Operational Research, Universitat de València, Burjassot, Spain, [3]University Research Institute of Criminology and Criminal Science, Universitat de València, Valencia, Spain

Violence against women is a pervasive social issue across the Global South, and Chile is no exception. This study aims to identify and analyze the criminogenic factors associated with violence against women in the cities of Concepción, Santiago, and Valparaíso during the period 2015–2019. A Poisson model with spatiotemporal covariates was employed to examine the influence of various factors, including previous incidents within the same area and neighboring areas, specific time slots, weekends, and demographic characteristics. The findings reveal a significant association between violence against women and these factors, underscoring the importance of temporal and spatial conditions in its occurrence. These results contribute to a deeper understanding of the phenomenon and emphasize the necessity of targeted public policies that integrate these variables for the effective prevention of violence against women in these regions. Additionally, this study highlights the need for further research that addresses the complexity of this form of violence from a comprehensive perspective, encompassing economic, social, and cultural factors. Overall, the research offers valuable tools for formulating intervention strategies aimed at reducing the prevalence of violence against women in Chile and improving the safety and well-being of affected individuals. These insights have broader implications for guiding future research and public policy in the Global South.

KEYWORDS

Chile, criminogenic factors, evidence-based public policies, Poisson model, spatiotemporal analysis, violence against women

1 Introduction

Violence is a severe and widespread issue in the Global South, affecting a significant number of people, particularly women. According to UN Women (2022), violence against women (VAW) is a pervasive and devastating issue, addressed in international human rights frameworks. While CEDAW does not explicitly recognize VAW or GBV, its Committee's General Recommendations, particularly No. 19 (1992) and No. 35 (2017), clarify that discrimination against women, as prohibited under CEDAW, includes gender-based violence as a form of discrimination (CEDAW Committee, 2017). Additionally, the Belém do Pará Convention explicitly defines and condemns violence against women. Chilean legal frameworks, including Law 20.066, establish specific mechanisms for addressing VAW. It is estimated that more than one-third of all women experience violence at some point in their lives, resulting in serious physical, mental, and social consequences (Ellsberg et al., 2008).

VAW persists as a constant shadow in contemporary societies, hindering progress in human rights and gender equality.

VAW encompasses a wide range of forms, including intimate partner violence, sexual violence outside of partnerships, female genital mutilation, honor crimes, and human trafficking (OMS, 2013). It also includes men and boys victimized due to their gender identity (Boyle, 2019). VAW is distinct from gender-based violence (GBV). GBV includes violence affecting all genders due to societal norms, while VAW refers specifically to violence targeted at women due to their gender. International treaties such as the Belém do Pará Convention and the Istanbul Convention explicitly define and address violence against women (VAW). Although CEDAW does not originally conceptualize VAW or GBV as separate categories, its Committee has progressively interpreted gender-based violence as a form of discrimination under Article 1 (CEDAW General Recommendation No. 35, 2017). Furthermore, recent academic and policy debates emphasize the term 'gender-based violence against women' (GBVAW), which incorporates the structural and systemic gender inequalities that drive this form of violence (UN Women, 2022). Such violence may also involve violations of the victim's economic or property autonomy, as stipulated by Chilean Law 20.066 (2005). These concepts underscore the complexity and diversity of violence experienced by women, adolescents, and girls globally, reinforcing the need for comprehensive and multidisciplinary approaches (UNRIC, 2023).

In the Latin American context, VAW represents a profound social problem with significant individual and community-level implications. Various studies have examined different aspects of VAW in the region, including case studies, analyses of government policies, and legal frameworks (Bolt et al., 2019). According to the Corporación Latinobarómetro (2018), domestic violence against women is perceived as the most detrimental factor to national development in Latin America (64%), followed by domestic violence against children (63%). In Chile, this scourge has gained significant attention on the public agenda, prompting the implementation of various legislative measures, public policies, and research initiatives aimed at its eradication. Programs such as the Prevention of Violence against Women and the Care, Protection, and Reparation for Violence against Women, led by the Ministry of Women and Gender Equity (SERNAMEG), strive to address the issue (Castillo et al., 2022).

Public policies in the Global South constitute a particularly active and intricate area of study, characterized by distinctive challenges and innovative responses tailored to diverse socio-political and economic contexts. In Chile, these processes of policy formulation and implementation reflect the specific realities faced by the country and provide opportunities to evaluate their effectiveness in addressing systemic issues such as VAW. The need for comprehensive empirical analysis and a robust theoretical foundation is critical, as it provides insights into the effectiveness of various strategies and the lessons learned from both successes and failures.

Despite these efforts, VAW remains a daily reality for many Chilean women, necessitating in-depth analysis and comprehensive solutions (Red Chilena Contra la Violencia hacia las Mujeres, 2023). This violence not only constitutes a violation of human rights but also negatively affects the physical and mental health of victims, as well as the well-being of their families and communities (García-Moreno et al., 2005; Gracia et al., 2018).

The existing literature provides a solid framework for understanding the various factors that influence VAW. Gender inequality is identified as a primary driver (Our Watch, 2015). Other relevant factors include cultural influences (Russo and Pirlott, 2006), neighborhood environments (Beyer et al., 2015; Voith, 2019), victims' economic dependence on perpetrators (Anderberg et al., 2016), and substance abuse (Cunradi, 2009). Contextual elements such as socio-economic inequality, unemployment, and area-level disadvantage are also associated with VAW (Anderberg et al., 2016; Oliver and Valls, 2004). These findings underscore the importance of considering broader socio-political and economic environments when designing public policies. Recent studies have highlighted the critical role of interdisciplinary approaches and the direct linkages between policy actions and developmental outcomes, reinforcing the need for innovative and context-sensitive responses to this pressing issue.

This research employs an innovative methodological approach within the Chilean context, using a Poisson regression model with space–time components to analyze VAW in the cities of Concepción, Santiago, and Valparaíso during the 2015–2019 period (INE, 2017). These urban settings, capitals of the three most populous regions in Chile, collectively represent 61% of the estimated population for 2024. By focusing on a stable period, excluding disruptive events such as the COVID-19 pandemic, this study aims to identify specific criminogenic factors (Calle-Ramirez et al., 2021).

The hypothesis posits that VAW in Chile is influenced by specific criminogenic elements, including spatial factors (location and neighborhood environment), temporal aspects (time of day and day of the week), demographic variables (such as the proportion of young, elderly, and foreign populations), and formal education levels. The findings are expected to have significant implications for the development of effective policies to eradicate VAW in Chile.

This article is structured as follows: Section 2 presents the main characteristics of the data, variables, and model used. Section 3 outlines the key results of this research. Section 4 discusses the findings, and Section 5 concludes with the key insights and suggests directions for future research.

2 Materials and methods

2.1 Data and variables

The data utilized in this study were obtained from the Criminal Studies and Analysis Center (CEAD) of the Undersecretariat of Crime Prevention, part of the Ministry of the Interior and Public Security of Chile. The CEAD dataset categorizes VAW incidents under Chilean law, distinguishing between physical, psychological, economic, and sexual violence. However, potential biases in reporting, particularly concerning foreign-born victims, should be considered when interpreting the data. The dataset comprises 17,175 police-reported cases of violence against women (VAW) recorded in the cities of Concepción, Santiago, and Valparaíso during the period 2015–2019. These data are georeferenced, enabling the precise mapping of each incident within the corresponding census areas of the respective cities. Concepción is divided into 76 census areas, Santiago into 128, and Valparaíso into 166.

In addition to geospatial data, the dataset includes information on the date, time, and demographic characteristics of the victims (age,

gender, education level, and immigration status). Supplementary demographic data for the census areas were sourced from the 2017 Census conducted by the National Institute of Statistics of Chile (INE).

The georeferenced coordinates of each assault allow for the spatial identification of incidents within the relevant census areas and the construction of Table 1, which presents the mean and standard deviation of assaults on women per area in each city over the five-year period analyzed. Figure 1 illustrates the spatial distribution of assaults on women within the census areas of Santiago. It suggests the existence of spatial autocorrelation between the number of aggressions within the census areas, which justifies the inclusion of spatial components in our model. The graphs for Valparaíso and Concepción show similar patterns, but have not been included in order not to overload the article.

The primary dependent variable in this study—the number of assaults on women—is a discrete numerical variable with non-negative values. Accordingly, we employ a Poisson regression model, as detailed in the subsequent section. The use of census areas as the spatial unit of analysis is motivated by the availability of additional socio-demographic data for these areas, derived from the 2017 Census (Vargas, 2021).

The covariates used in this analysis are summarized in Table 2 and are grouped into four categories. The first group comprises variables related to the characteristics of the assaults, specifically the time slot and day of the week during which the incidents occurred. These categorical variables were derived from the assault database. The second group includes demographic information at the census area level, such as the proportion of foreign residents (foreign), young population (young), and elderly population (elderly). The third group pertains to educational levels, encompassing basic (basic), secondary (secondary), and higher (higher) education. The final group consists of variables that provide spatial and temporal information: assaults that occurred in the same area during the previous year (ylag1) and the average number of assaults in neighboring areas during the previous year (vlag1). A Queen-type neighborhood structure was utilized to define spatial contiguity, based on maps of census area divisions in the cities (Cliff and Ord, 1973).

Certain variables require additional clarification. The time slot variable categorizes the hour of the day during which each assault occurred into four periods corresponding to human activity: early morning, morning, afternoon, and night. The specific durations of these time slots are defined in Table 2. The time slot and day of the week variables exclude the early morning and Monday categories, respectively, as their inclusion would lead to perfect multicollinearity. Similarly, no variable for the proportion of illiterate individuals is included, given the absence of sufficient variation in this measure.

TABLE 1 Mean and standard deviation of the number of assaults on women per area in each city.

Covariate	Concepción		Santiago		Valparaíso	
	Mean	SD	Mean	SD	Mean	SD
2015	8,04	5,03	11,98	9,39	7,95	6,93
2016	5,86	3,85	13,27	10,07	6,84	6,54
2017	6,93	4,45	14,63	10,91	5,81	5,16
2018	7,26	5,01	13,86	10,61	6,73	6,25
2019	8,22	5,31	14,52	11,13	6,72	5,72

Figure 2 presents a heatmap showing the ratio of assaults per 10,000 women for each day of the week across the three cities over the five-year period. As observed in the figure, the highest concentration of incidents occurs at night and during weekends, supporting the hypothesis that periods of increased social interaction correlate with a higher risk of VAW.

A summary of the numerical covariates is provided in Table 3, including the means and standard deviations of the proportions that define them (see Table 2). These measures were derived from data at the census tract level for each city. No reference is made to a specific year, as the data were drawn from the 2017 Census, which represents the midpoint of the study period and the most recent data available. This census was used consistently for all analyses.

2.2 Poisson model

The Poisson random variable, commonly used to describe phenomena involving the number of occurrences of a given event, derives its name from the French mathematician who introduced it. Its properties and characteristics can be found in any classical probability text, such as Feller (1968). A notable property of this variable is that its mean and variance are equal. In particular, if X follows a Poisson distribution of parameter μ, it holds that both the mean and variance of X are equal to μ.

The fitting of a linear model to count data can be achieved using a generalized linear model (GLM) with the logarithmic link function. In general, if Y_i denotes the number of counts for observation i, the Poisson GLM allows assuming that the mean of Y_i, μ_i, depends on a set of covariates through the following log-linear relationship:

$$\log \mu_i = \sum_{j=i}^{p} \beta_j x_{ji},$$

where $x_1, x_2, \ldots, x_p$ are the p covariates considered for explaining the phenomenon, and $\beta_1, \beta_2, \ldots, \beta_p$ represent the effect of the covariates on the mean number of counts. Hence, a positive (negative) estimate for one of these parameters suggests that the corresponding covariate is associated with an increase (decrease) in the expected number of counts. For more details on the Poisson GLM, see Agresti (2015). The R programming language (R Core Team, 2022) was used for the proposed analysis.

3 Results

This study analyzed the number of reported assaults against women in the cities of Concepción, Santiago, and Valparaíso from 2015 to 2019. To detect the impact of the covariates described in Table 2 on these assaults, the dependent variable was defined as the number of assaults per year, census tract, time of day, and day of the week. The full GLM considered for the analysis assumes the following log-linear relationship based on the previously described covariates:

FIGURE 1
Assaults on women by census zone in Santiago.

$$\log \mu_i = \beta_0 + \beta_1 \text{time}_i\_\text{period} + \beta_2 \text{day}\_\text{week}_i + \beta_3 \text{foreign}_i + \beta_4 \text{young}_i + \beta_5 \text{older}_i + \beta_6 \text{basic}\_\text{ed}_i + \beta_7 \text{higher}\_\text{ed}_i + \beta_8 \text{superior}\_\text{ed}_i + \beta_9 \text{ylag1}_i + \beta_{10} \text{vlag1}_i + \log\left(\text{expected}\_\text{women}_i\right)$$

where the logarithm of the expected number of assaults for observation I, derived from the population of women in each census tract, is included as an offset ($\log\left(\text{expected}\_\text{women}_i\right)$).

The estimated coefficients for each city, as presented in Table 4, indicate that the time of day has a significant effect on the number of assaults. In all three cities, there is a marked increase in assaults during the morning, afternoon, and night. Furthermore, the proportion of the foreign-born population and educational attainment exhibit significant effects, although these effects vary across cities.

Regarding temporal effects, the impact of the time-of-day and day-of-week categories must be interpreted relative to their respective reference categories—early morning for time of day and Monday for day of the week. Morning, afternoon, and night show significantly greater effects than early morning in all cities, which is expected given that the early morning corresponds to typical sleeping hours. Periods of heightened activity are thus associated with higher rates of victimization of women compared to rest periods. Notably, the nighttime period (8:00 PM to midnight), encompassing family interaction or leisure activities, exhibits similar rates of victimization despite being only two-thirds the length of the morning or afternoon periods (4 versus 6 h).

Weekends also show notable effects, with higher rates of assaults compared to Mondays, particularly on Sundays, which aligns with periods of family or leisure time. Among the cities, Concepción records the lowest number of assaults compared to Santiago and Valparaíso. Interestingly, in Santiago, assault rates significantly decrease on Tuesdays, Wednesdays, and Thursdays (but not Fridays) relative to Mondays, a trend that is less straightforward to interpret.

The effects of demographic covariates reveal mixed patterns. In Santiago, a high proportion of foreign-born residents (28.16%) is not

TABLE 2 Covariates.

Group	Covariate	Categories and description
Associated with assaults	Time period	Morning (08:00–14:00), Afternoon (14:00–20:00), Night (20:00–00:00)
	Day week	Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday
Population	Foreign	Proportion of population born outside the country
	Young	Proportion of population aged 15–29
	Elderly	Proportion of population aged 65 or more
Education	Basic	Proportion of population with basic education
	Secondary	Proportion of population with secondary education
	Higher	Proportion of population with higher education
Spatial	ylag1	Number of assaults in the census area in the previous year
	vlag1	Average number of assaults in first-order neighbors in the previous year

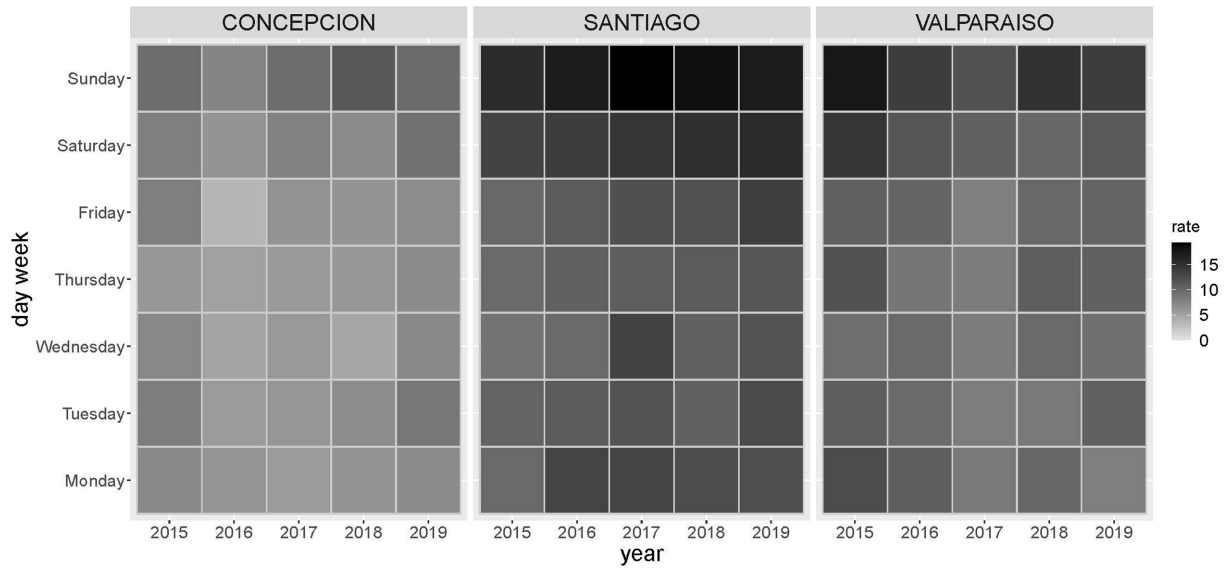

FIGURE 2
Heat maps for assaults rate per year and day week.

TABLE 3 Mean and standard deviation per census tract and city for proportions associated with the numerical covariates from Table 2.

Covariate	Concepción		Santiago		Valparaíso	
	Mean	SD	Mean	SD	Mean	SD
Foreign	0,0220	0,0196	0,2,816	0,0964	0,0242	0,0235
Young	0,2,923	0,0741	0,3,102	0,0549	0,2,534	0,0483
Elderly	0,1,304	0,0454	0,0746	0,0348	0,1,465	0,0385
Basic_ed	0,2,747	0,1,049	0,1799	0,0702	0,3,149	0,0882
Secondary_ed	0,3,213	0,0784	0,2,741	0,0935	0,3,944	0,0614
Higher_ed	0,3,791	0,1,654	0,5,144	0,1,653	0,2,564	0,1,324

associated with higher assault rates within census tracts. In contrast, in Concepción and Valparaíso, where the foreign-born populations are much smaller (2.20 and 2.42%, respectively), a statistically significant positive association with assault rates is observed. This discrepancy suggests that Santiago may exhibit distinct social dynamics influencing the prevalence of VAW.

Concerning the older adult population, when statistically significant (in Concepción and Valparaíso), this demographic is associated with an increase in assault rates. Meanwhile, the influence of the young population varies: in Santiago, it is negatively associated with assault rates, whereas in Valparaíso, it shows a positive association. This divergence further underscores the variability in social dynamics between cities.

Educational attainment does not follow a consistent pattern across the three cities. Generally, higher levels of education correlate with lower assault rates, a trend observed in other contexts such as Spain (Sanz-Barbero et al., 2019). In Valparaíso, this negative association is evident, although not all coefficients are statistically significant. Conversely, in Concepción, all three education levels (basic, secondary, and higher) show significant positive effects, particularly for basic and secondary levels. In Santiago, only the secondary and higher education levels are significant, and both are associated with positive effects.

Finally, the variables ylag1 and vlag1, which account for the number of assaults in the same area and neighboring areas during the previous year, respectively, reveal a clear spatial effect in VAW. Specifically, assaults in the previous year within the same census tract consistently increase the likelihood of assaults in the following year across all three cities. However, assaults in neighboring census tracts have contrasting effects: they are negatively associated with assault rates in Concepción and Valparaíso but positively associated in Santiago.

These findings provide valuable insights into the influence of demographic characteristics and spatiotemporal factors on VAW across different Chilean cities. The next section will examine these results in greater detail and contextualize them within the broader body of literature.

4 Discussion

This study has identified significant patterns of VAW in the Chilean cities of Concepción, Santiago, and Valparaíso, emphasizing the influence of spatiotemporal and demographic factors. The analysis revealed that violence varies by time of day and day of the week, with a notable increase during daytime, evening, and night compared to the early morning rest period, and higher incidence during weekends compared to weekdays. These findings indicate that VAW occurs more frequently during family and leisure periods, particularly in domestic settings, reinforcing the need for targeted interventions against domestic violence. Additionally, differentiated effects of demographic variables—such as the proportion of foreign-born residents, age, and education levels—were observed across the three cities, although some patterns remain challenging to explain.

The findings are consistent with previous research documenting spatiotemporal variability in violence. The spatial characteristics

TABLE 4 Results of the Poisson model fit for each city.

Covariate	Concepción		Santiago		Valparaíso	
	Coeficient	*p*-value	Coeficient	*p*-value	Coeficient	*p*-value
Morning	1,0038	**< 2e-16**	0,5932	**< 2e-16**	0,9171	**< 2e-16**
Afternoon	1,1643	**< 2e-16**	0,8139	**< 2e-16**	0,9846	**< 2e-16**
Nigth	1,0267	**< 2e-16**	0,8842	**< 2e-16**	0,9251	**< 2e-16**
Tuesday	0,0811	0,3241	-0,1092	**0,0173**	-0,0124	0,8348
Wednesday	-0,0999	0,2459	-0,1115	**0,0152**	-0,0089	0,8817
Thursday	-0,0432	0,6108	-0,1466	**0,0016**	0,0261	0,6581
Friday	-0,0845	0,3247	-0,0448	0,3211	0,0209	0,7230
Saturday	0,1800	**0,0252**	0,1417	**0,0010**	0,1504	**0,0087**
Sunday	0,4078	**0,0000**	0,3393	**< 2e-16**	0,3738	**0,0000**
Foreign	23,0167	**< 2e-16**	0,3282	0,1169	13,5749	**< 2e-16**
Young	-0,0420	0,9313	-2,3971	**0,0000**	1,4220	**0,0047**
Elderly	1,5543	**0,0259**	0,4576	0,4778	4,5860	**0,0000**
Basic_ed	7,7629	**0,0043**	-0,4170	0,7429	3,1655	**0,0013**
Secondary_ed	10,0401	**0,0001**	5,6108	**0,0000**	0,5617	0,5733
Higher_ed	5,6589	**0,0335**	2,7567	**0,0203**	-0,4888	0,6086
ylag1	0,0332	**0,0000**	0,0239	**< 2e-16**	0,0290	**< 2e-16**
vlag1	-0,0272	**0,0035**	0,0062	**0,0103**	-0,0160	**0,0002**

*Significant *p*-values (<0,05) are highlighted in bold.

observed in this study align with Tobler's (1970) First Law of Geography, which states that everything is interconnected, with stronger relationships occurring between spatially proximate elements. Specifically, the results demonstrate that events occurring in a zone and its neighboring areas 1 year prior influence the current incidence of violence; however, the effects of neighboring areas vary among the three cities. Regarding temporal characteristics, weekends—particularly Sundays—were associated with the highest number of incidents, with violence being more probable between 08:00 and 00:00. These results align with international studies indicating that VAW tends to increase during periods of heightened family interaction (Calle-Ramirez et al., 2021).

The influence of foreign-born populations and education levels has also been explored in other contexts, revealing similar patterns of vulnerability and protection (Jayme and Sau, 2004). In Santiago, a high proportion of foreign-born residents is not associated with higher VAW rates. In contrast, in Concepción and Valparaíso, where foreign-born populations are significantly smaller (2.20 and 2.42%, respectively), the presence of foreign residents within census areas is a significant predictor of VAW. This finding underscores the need for tailored policies to address the unique social dynamics of these populations. The relationship between foreign-born populations and VAW should be interpreted cautiously, considering socioeconomic factors and potential reporting biases. Santiago's high foreign-born population (28.16%) does not correlate with increased VAW, whereas in Concepción and Valparaíso, where the foreign-born population is lower, the association is stronger. This suggests that economic and social vulnerability, rather than immigration status alone, may play a role.

With respect to education levels, we observed a positive correlation between higher education levels and recorded violence in Concepción and Santiago, while in Valparaíso, a negative (albeit statistically insignificant) correlation was found. The positive association in Concepción and Santiago may be influenced by increased empowerment and willingness to report incidents among victims, as suggested by studies such as Barbier et al. (2022) and Yakubovich et al. (2018). This phenomenon may be specific to the Chilean context, where higher education levels are linked to greater reporting of violent incidents, as indicated by the Encuesta de Violencia Intrafamiliar contra la Mujer (CEAD, 2020). This survey shows that only 1 in 5 victims report VAW incidents, suggesting that higher education may facilitate reporting rather than indicating an actual increase in cases. Consequently, our results may reflect improved reporting practices rather than higher prevalence, given that the study relies on officially recorded data.

In Concepción and Valparaíso, a higher proportion of elderly residents was associated with increased VAW cases. This could be related to the economic and social vulnerability often experienced by this demographic, consistent with previous findings by Mont et al. (2012), which highlight the need for policies addressing the specific vulnerabilities of older adults.

Despite its significant findings, this study has certain limitations. One limitation is the lack of detailed socioeconomic covariates at the census zone level, due to restricted access to data from the Encuesta de Caracterización Socioeconómica Nacional (CASEN, 2017). Additionally, the analysis focuses on the 2015–2019 period and does not account for subsequent events, such as the COVID-19 pandemic, which may have altered patterns of violence. These factors warrant further investigation and could provide valuable comparisons with the present findings.

This study successfully identified specific, consistent, and significant patterns of VAW, highlighting high-risk periods and areas, which form a solid foundation for targeted interventions. The observed relationships between demographic factors and violence underscore the

importance of tailoring prevention policies to the distinct characteristics of each city.

Based on these findings, we recommend the development of public policies aimed at enhancing community safety and support during weekends and prioritizing areas with high proportions of foreign-born and elderly populations. It is also essential to consider inter-city differences when designing interventions, ensuring that strategies are responsive to local contexts, which our findings indicate are significant. Replicating this study in other cities and regions could help validate these results and contribute to the creation of a more generalizable framework for VAW prevention.

5 Conclusion

VAW carries both descriptive and normative significance. It describes a factual situation while also defining a punishable act, with harmful effects impacting the victims and society as a whole, affecting health, well-being, and progress. Although Chile has implemented measures to prevent and eliminate VAW, primarily through the Executive branch's public policies aimed at establishing an institutional framework to address this issue (Centro de Derechos Humanos, 2018), much work remains.

This research contributes to understanding the spatiotemporal and demographic characteristics of VAW in Chile. While this violence is present in all three cities studied, its incidence is lower in Concepción. The characterization of the issue, from the perspective of influencing covariates, is similar in Concepción and Valparaíso, while Santiago exhibits certain peculiarities, explainable by both the dynamics of the crime in this city and its population structure and predominant education level.

In this multidimensional phenomenon, where violence results from individual, relational, environmental, community, social, and cultural factors (Sánchez-Blanco, 2017), some covariates in our model help better understand the problem and suggest general recommendations. It is crucial to promote a culture of respect for human rights and integrate a gender perspective into all prevention strategies. Inter-institutional coordination, along with enhanced surveillance and resource availability during weekends and daytime, is essential. This extends to police patrols, aligning with the "smart patrols" approach proposed by Koper (1995).

It is crucial for law enforcement officers to receive specialized training on the dynamics of violence against women, including its intersection with broader forms of gender-based violence. Training should emphasize victim-centered approaches, effective case handling, and the reduction of biases in law enforcement institutions. Moreover, the involvement of professionals such as psychologists and social workers in police units, especially during high-prevalence days and hours, is essential to prevent the re-victimization of assaulted women.

In conclusion, this study contributes to understanding the factors influencing VAW in the Chilean cities analyzed. The findings highlight the importance of spatiotemporal and demographic variations, providing an empirical basis for developing more effective and locally adapted public policies. However, the data indicate that the complexity of the factors involved requires a multidisciplinary and adaptive approach. Future research should address current limitations to deepen the understanding of this issue and improve intervention strategies aimed at eradicating violence against women in Chile. Particularly work-related gender-based violence and the influence of the age and level of education of the perpetrators, which have not been taken into account due to the lack of specific data in the CEAD database.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Author contributions

PC-U: Writing – original draft, Writing – review & editing. ÁB-R: Writing – original draft, Writing – review & editing. JG: Writing – original draft, Writing – review & editing. FM: Writing – original draft, Writing – review & editing.

Funding

The author(s) declare that no financial support was received for the research and/or publication of this article.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The authors declare that no Gen AI was used in the creation of this manuscript.

Publisher's note

References

Agresti, A. (2015). Foundations of linear and generalized linear models. Hoboken, NJ: John Wiley and Sons, Inc.

Anderberg, D., Rainer, H., Wadsworth, J., and Wilson, T. (2016). Unemployment and domestic violence: theory and evidence. *Econ. J.* 126, 1947–1979. doi: 10.1111/ecoj.12246

Barbier, A., Chariot, P., and Lefèvre, T. (2022). Intimate partner violence against ever-partnered women in Europe: prevalence and associated factors—results from the violence against women EU-wide survey. *Front. Public Health* 10:1033465. doi: 10.3389/fpubh.2022.1033465

Beyer, K., Wallis, A. B., and Kevin Hamberger, L. (2015). Neighborhood environment and intimate partner violence: a systematic review. *Trauma Violence Abuse* 16, 16–47. doi: 10.1177/1524838013515758

Bolt, S., Guedes, A., Ruiz-Celis, A. P., and Mendoza, J. A. (2019). Intimate partner violence in the Americas: a systematic review and reanalysis of national prevalence estimates. *Rev. Panam. Salud Publica* 43:e26. doi: 10.26633/RPSP.2019.26

Boyle, K. (2019). What's in a name? Theorising the inter-relationships of gender and violence. *Fem. Theory* 20, 19–36. doi: 10.1177/1464700118754957

Calle-Ramirez, X. M., Infantes-Juárez, L. M., Castillo-Menor, C. E., and Saavedra-López, M. A. (2021). Producción científica latinoamericana sobre violencia de género durante el confinamiento por COVID-19. *Aten. Primaria* 54:102212. doi: 10.1016/j.aprim.2021.102212

CASEN. (2017). *Encuesta de caracterización socioeconómica nacional 2017*. Ministerio de Desarrollo Social y Familia. Observatorio Social. Gobierno de Chile. Available online at: https://bit.ly/3YhKdkO.

Castillo, I., Fernández, Y., Mondaca, C., Sepúlveda, C., Aravena, A., and del Solar, A. (2022). Dossier informativo: 2021–2022 Violencia contra las mujeres en Chile. Available online at: http://www.nomasviolenciacontramujeres.cl.

CEAD. (2020). *Centro de Estudios y Análisis Delictual*. Available online at: https://cead.spd.gov.cl/estudios-y-encuestas/.

CEDAW Committee. (2017). *General recommendation no. 35 on gender-based violence against women, updating general recommendation no. 19*. United Nations. Available online at: https://www.ohchr.org/en/documents/general-comments-and-recommendations/general-recommendation-no-35-gender-based-violence.

Centro de Derechos Humanos. (2018). *Informe del CDH: Regulación chilena sobre violencia contra la mujer no cumple con estándar internacional*. Available online at: https://derecho.uchile.cl/noticias/141590/informe-del-cdh-aborda-regulacion-de-la-violencia-contra-la-mujer.

Chilean Law 20.066 Violencia Intrafamiliar. (2005). *Biblioteca del Congreso Nacional de Chile*. Available online at: https://www.bcn.cl/leychile

Cliff, A. D., and Ord, K. (1973). Spatial autocorrelation. London: Pion.

Corporación Latinobarómetro. (2018). *Informe 2018*. Santiago de Chile. Available online at: https://www.latinobarometro.org/latNewsShow.jsp.

Cunradi, C. B. (2009). Intimate partner violence among Hispanic men and women: the role of drinking, neighborhood disorder, and acculturation-related factors. *Violence Vict.* 24, 83–97. doi: 10.1891/0886-6708.24.1.83

Ellsberg, M., Jansen, H. A. F. M., Heise, L., Watts, C. H., and Garcia-Moreno, C. (2008). Intimate partner violence and women's physical and mental health in the WHO multi-country study on women's health and domestic violence: an observational study. *Lancet* 371, 1165–1172. doi: 10.1016/S0140-6736(08)60522-X

Feller, W. (1968). An introduction to probability theory and its applications. *3rd* Edn. New York: John Wiley & Sons, Inc.

García-Moreno, C., Jansen, H. A. F., Ellsberg, M., and Heise, L. (2005). Estudio multipaís de la OMS sobre salud de la mujer y violencia doméstica contra la mujer. Ginebra: Organización Mundial de la Salud.

Gracia, E., López-Quílez, A., Marco, M., and Lila, M. (2018). Neighborhood characteristics and violence behind closed doors: the spatial overlap of child maltreatment and intimate partner violence. *PLoS One* 13:e0198684. doi: 10.1371/journal.pone.0198684

Instituto Nacional de Estadísticas. (2017). *Censo 2017: Primera entrega de resultados definitivos - Cantidad de personas por sexo y edad*. Available online at: https://bit.ly/4cVwwN6 (Accessed December 23, 2020).

Jayme, M., and Sau, V. (2004). Psicología diferencial del sexo y el género. Barcelona: Icaria.

Koper, C. S. (1995). Just enough police presence: reducing crime and disorderly behavior by optimizing patrol time in crime hotspots. *Justice Q.* 12, 649–672. doi: 10.1080/07418829500096231

Mont, D., Jance, T. F., Cohen, M. M., Hyman, I., and Romans, S. (2012). Changing help-seeking rates for intimate partner violence in Canada. *Women Health* 41, 1–19. doi: 10.1300/J013v41n01_01

Oliver, E., and Valls, R. (2004). *Violencia de género*. Investigaciones sobre quiénes, por qué y cómo superarla. El Roure.

OMS. (2013). *Global and regional estimates of violence against women: Prevalence and health effects of intimate partner violence and non-partner sexual violence*. Department of Reproductive Health and Research, London School of Hygiene and Tropical Medicine, South African Medical Research Council. Available online at: https://www.who.int/publications/i/item/9789241564625.

Our Watch. (2015). *Change the story: A shared framework for the primary prevention of violence against women and their children in Australia*. Our Watch, Melbourne, Australia. Australia's National Research Organisation for Women's Safety (ANROWS) and VicHealth. Available online at: https://bit.ly/3WD1xQ4.

R Core Team (2022). R: A language and environment for statistical computing. Vienna, Austria: R Foundation for Statistical Computing.

Red Chilena Contra la Violencia hacia las Mujeres. (2023). *Informe sobre Violencia Femicida en Chile 2022*. Available online at: https://bit.ly/3M05qs4.

Russo, N. F., and Pirlott, A. (2006). Gender-based violence. Concepts, methods, and findings. *Ann. N. Y. Acad. Sci.* 1087, 178–205. doi: 10.1196/annals.1385.024

Sánchez-Blanco, M. (2017). *Violencia Intrafamiliar: factor criminógeno preponderante en la comisión de delitos, en la población interna del CERESO de Tehuacán, Puebla*. (Primera Parte). Visión criminológica-criminalística, Año 5, Número 18 Abril-Junio 2017. Grupo Universitario de Puebla A.C.

Sanz-Barbero, B., Barón, N., and Vives-Cases, C. (2019). Prevalence, associated factors and health impact of intimate partner violence against women in different life stages. *PLoS One* 14:e0221049. doi: 10.1371/journal.pone.0221049

Tobler, W. R. (1970). A computer movie simulating urban growth in the Detroit region. *Econ. Geogr.* 46:234. doi: 10.2307/143141

UN Women. (2022). *UN Trust Fund to End Violence against Women annual report 2021*. Available online at: https://www.unwomen.org/sites/default/files/2022-07/UN-Trust-Fund-annual-report-2021-en.pdf.

UNRIC. (2023). *Violencia de género facilitada por la tecnología*. United Nations Regional Information Center. Available online at: https://bit.ly/3YkLfgc.

Vargas, M. (2021). *Censo2017: Base de Datos de Fácil Acceso del Censo 2017 de Chile, (2017 Chilean Census Easy Access Database)*. R package version 0.1. Available online at: https://CRAN.R-project.org/package=censo2017.

Voith, L. A. (2019). Understanding the relation between neighborhoods and intimate partner violence: an integrative review. *Trauma Violence Abuse* 20, 385–397. doi: 10.1177/1524838017717744

Yakubovich, A. R., Stöckl, H., Murray, J., Melendez-Torres, G. J., Steinert, J. I., Glavin, C. E. Y., et al. (2018). Risk and protective factors for intimate partner violence against women: systematic review and meta-analyses of prospective–longitudinal studies. *Am. J. Public Health* 108, e1–e11. doi: 10.2105/AJPH.2018.304428