BOCA
BOLETIM DE CONJUNTURA

AN ANALYSIS OF VIOLENT CRIME FROM AN INTERNATIONAL PERSPECTIVE: POSITIONS, CONFIGURATIONS, AND SHIFTS

UMA ANÁLISE DO CRIME VIOLENTO SOB UMA PERSPECTIVA INTERNACIONAL: POSIÇÕES, CONFIGURAÇÕES E MUDANÇAS

UN ANÁLISIS DE LOS DELITOS VIOLENTOS DESDE UNA PERSPECTIVA INTERNACIONAL: POSICIONES, CONFIGURACIONES Y CAMBIOS

https://doi.org/10.56238/bocav25n83-028

Data de submissão: 21/09/2026 **Data de publicação:** 21/10/2026

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ABSTRACT

This study aimed to analyze the relative positions of countries in relation to violent crime between 2017 and 2023 by jointly considering social, economic, demographic, territorial, criminal, and punitive-response characteristics. A quantitative study was conducted using secondary data from 23 countries, totaling 161 country-year observations. Principal Component Analysis (PCA), a multivariate technique that synthesizes relationships among correlated characteristics and represents relative positions in a multidimensional space, was employed. The analysis included homicide, incarceration, income, urbanization, inequality-adjusted human development, and adolescent fertility as active variables, with employment included as a supplementary variable. Indicators of mafia-style groups and criminal networks were also examined in a complementary analysis. The results identified two dimensions that jointly explained 77.75% of the total variance. The first component differentiated configurations mainly according to homicide, adolescent fertility, human development, income, and urbanization. The second component established a differentiation primarily associated with urbanization, incarceration, and homicide. The findings indicate that similar homicide rates do not necessarily correspond to equivalent positions, since these positions result from the combination of the characteristics considered. The complementary analysis also indicated an association between organized crime actors and specific configurations of the first component, with no equivalent evidence for the second component.

Keywords: Violent Crime. Homicide. Relational Space. Principal Component Analysis.

RESUMO

Este estudo teve como objetivo analisar as posições relativas dos países em relação à criminalidade violenta entre 2017 e 2023, considerando conjuntamente características sociais, econômicas, demográficas, territoriais, criminais e de resposta punitiva. Desenvolveu-se uma pesquisa quantitativa com dados secundários de 23 países, totalizando 161 observações país-ano. Empregou-se a Análise de Componentes Principais (ACP),

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técnica multivariada que sintetiza relações entre características correlacionadas e representa posições relativas em um espaço multidimensional. A análise contemplou homicídios, encarceramento, renda, urbanização, desenvolvimento humano ajustado à desigualdade e fecundidade adolescente como variáveis ativas, enquanto o emprego foi considerado variável suplementar. Indicadores de grupos de tipo mafioso e redes criminosas também foram examinados complementarmente. Os resultados identificaram duas dimensões que explicaram conjuntamente 77,75% da variância total. Os achados indicam que taxas semelhantes de homicídios não correspondem necessariamente a posições equivalentes, pois estas resultam da combinação das características consideradas.

Palavras-chave: Criminalidade Violenta. Homicídios. Espaço Relacional. Análise de Componentes Principais.

RESUMEN

Este estudio tuvo como objetivo analizar las posiciones relativas de los países en relación con los delitos violentos entre 2017 y 2023 considerando conjuntamente características sociales, económicas, demográficas, territoriales, criminales y de respuesta punitiva. Se realizó un estudio cuantitativo utilizando datos secundarios de 23 países, con un total de 161 observaciones por país-año. Se empleó el Análisis de Componentes Principales (PCA), una técnica multivariada que sintetiza relaciones entre características correlacionadas y representa posiciones relativas en un espacio multidimensional. El análisis incluyó homicidio, encarcelamiento, ingresos, urbanización, desarrollo humano ajustado por desigualdad y fertilidad adolescente como variables activas, y el empleo se incluyó como variable complementaria. En un análisis complementario también se examinaron indicadores de grupos de estilo mafioso y redes criminales. Los resultados identificaron dos dimensiones que en conjunto explicaron el 77,75% de la varianza total. El primer componente diferenció configuraciones principalmente según homicidio, fecundidad adolescente, desarrollo humano, ingreso y urbanización. El segundo componente estableció una diferenciación asociada principalmente con la urbanización, el encarcelamiento y el homicidio. Los hallazgos indican que tasas de homicidio similares no necesariamente corresponden a posiciones equivalentes, ya que estas posiciones resultan de la combinación de las características consideradas. El análisis complementario también indicó una asociación entre los actores del crimen organizado y configuraciones específicas del primer componente, sin evidencia equivalente para el segundo componente.

Palabras clave: Crimen Violento. Homicidio. Espacio Relacional. Análisis de Componentes Principales.

1 INTRODUCTION

Cross-national differences in lethal violence are commonly examined through homicide rates, which provide a relevant indicator for comparing the magnitude and temporal variation of violence across societies. However, homicide rates alone do not capture the diversity of socioeconomic, demographic, institutional, and criminal conditions within which lethal violence occurs. Countries with comparable homicide rates may exhibit substantially different characteristics, while countries sharing certain structural conditions may follow distinct trajectories. This raises an analytical problem that extends beyond the measurement of homicide: how can national contexts be differentiated when violence and other relevant properties are examined jointly?

Cross-national research has addressed homicide through structural, demographic, institutional, and cultural perspectives (Koeppel *et al.* 2015). Studies have identified heterogeneous associations involving socioeconomic conditions and inequality (Santos *et al.* 2018), governance and formal social control (Cao and Zhang 2017; Ouimet *et al.* 2018), regional patterns (Croci and Chainey 2023), and temporal trajectories (Tuttle *et al.* 2018). Research has also demonstrated that differences in data sources, legal definitions, and recording practices affect international comparisons (Rogers and Pridemore 2023; Buil-Gil *et al.* 2026). These contributions demonstrate the complexity of cross-national homicide variation. Nevertheless, an additional analytical question concerns how homicide and other national characteristics jointly structure multidimensional differences among countries, rather than examining only particular associations or similarities in homicide trajectories.

This distinction is relevant because the magnitude of homicide and a country's position within a multidimensional configuration represent different analytical objects. Similar homicide rates may coexist with different combinations of incarceration, income, human development, urbanization, and demographic characteristics. Conversely, changes in these properties may alter a country's relative position without corresponding changes in homicide of similar magnitude. Examining these relationships makes it possible to identify forms of differentiation that are not evident when countries are compared exclusively according to homicide rates.

The theoretical orientation of this study draws on two complementary contributions, while recognizing their different analytical scopes. Social Disorganization Theory emphasizes that crime cannot be adequately understood through individual attributes or structural

disadvantage considered in isolation. Research on community organization and collective efficacy has demonstrated the importance of social networks, informal social control, and collective capacities in mediating relationships between contextual conditions and violence (Shaw and McKay 1942; Sampson and Groves 1989; Sampson *et al.* 1997). Because these mechanisms were developed and investigated primarily at the neighborhood and community levels, the present study does not assume their direct applicability to countries or claim to test them at the national scale. Their contribution here is to support a non-deterministic interpretation of contextual differences.

A second contribution derives from Bourdieu's relational perspective, according to which positions acquire meaning through relationships of proximity, distance, and opposition within a space structured by the distribution of relevant properties (Bourdieu 1989, 1996). In the present study, this perspective informs the examination of relative differences among countries. The multidimensional space constructed through Principal Component Analysis (PCA), however, is an empirical representation of relationships among selected indicators and should not be equated with the full structure of a Bourdieusian social space or interpreted as direct evidence of social interactions among countries.

This orientation is connected to previous investigations of the relational space of homicides, which examined the joint distribution of lethal violence, socioeconomic characteristics, territorial conditions, and governmental actions (Carneiro and Pedroso Neto 2024; Carneiro and Barbosa 2024; Carneiro and Oliveira 2025), as well as relational differences among individuals involved in criminal contexts (Carneiro 2023). These investigations contributed to the development of the Relational Space of Violent Crime (RSVC), understood as an analytical proposal under development rather than a consolidated causal theory. Its international application in this article is necessarily partial: it examines selected national indicators and their relative configurations, without claiming to capture the full range of socialization processes, institutional relationships, criminal dynamics, or individual trajectories relevant to violent crime.

Four analytical concepts organize the investigation. *Magnitude* refers to the observed level of a property, particularly the homicide rate; *position* denotes a country's relative location within the constructed multidimensional space; *configuration* refers to the combination of properties associated with that location; and *shift* describes changes in relative position over

time. These distinctions permit the investigation of whether similar levels of homicide correspond to different multidimensional configurations and whether countries' relative positions change across the period analyzed. Against this background, the study addresses the following research question: *How do countries differ in their relative positions and configurations when homicide, incarceration, socioeconomic, demographic, and urbanization indicators are considered jointly, and how do these positions change over time?* It also examines, as a complementary question, whether the configurations identified are associated with indicators of mafia-style groups and criminal networks.

The objective is to analyze the relative positions, configurations, and shifts of 23 countries between 2017 and 2023, based on 161 country-year observations. PCA is employed to examine the joint distribution of homicide, incarceration, income, urbanization, inequality-adjusted human development, and adolescent fertility, with employment treated as a supplementary variable. Indicators of mafia-style groups and criminal networks from the Global Organized Crime Index 2025 are examined separately in relation to countries' mean positions over the study period. Given the difference between the reference periods, this complementary analysis is interpreted as an association between measurements from distinct periods, without establishing temporal precedence or causality.

The study's contribution is to operationalize the distinction between homicide magnitude and multidimensional position in an international comparative setting, identifying how selected national properties combine to differentiate countries and how their relative locations change over time. Rather than estimating causal effects or treating national configurations as fixed categories, the analysis provides an exploratory representation of relational differentiation and examines its relevance to the continuing development of the RSVC. Because homicide is the direct measure of violence employed, the findings concern configurations associated with lethal violence and should not be generalized to all forms of violent crime. The article proceeds with a review of cross-national homicide research and the relational framework, followed by the methodological procedures, results and discussion, and concluding considerations.

2 VIOLENT CRIME AND RELATIONAL SPACE

2.1 VIOLENT CRIME, SOCIO-SPATIAL CONDITIONS, AND CONTEXTUAL DIFFERENTIATION

The spatial distribution of crime has long been examined in relation to the social and organizational characteristics of territories. Shaw and McKay (1942) demonstrated that variations in delinquency across urban areas could not be adequately understood through individual characteristics alone, directing attention toward the structural conditions and social organization of communities. Their contribution established a foundation for examining crime as a phenomenon embedded in differentiated social and territorial contexts.

Subsequent developments in Social Disorganization Theory refined the relationships between structural conditions and crime. Sampson and Groves (1989) emphasized the role of local social networks, organizational participation, and community supervision, indicating that the association between structural disadvantage and crime involves processes of social organization. The concept of collective efficacy further incorporated mutual trust and shared expectations for informal social control, demonstrating that communities experiencing comparable structural conditions may differ in their capacities for collective regulation and levels of violence (Sampson *et al.* 1997). These contributions challenge interpretations that treat socioeconomic disadvantage as a sufficient or necessary explanation for criminal outcomes.

Evidence from Brazil also illustrates the importance of examining the territorial articulation of social conditions and violence. In their study of Palmas, Carneiro *et al.* (2023) identified relationships involving the distribution of violent crime, income, literacy, urban infrastructure, and patterns of territorial occupation. Their findings reinforce the relevance of considering multiple territorial characteristics rather than interpreting crime exclusively through isolated socioeconomic indicators.

These theoretical and empirical contributions concern predominantly urban communities and neighborhoods. Their use in cross-national research therefore requires distinguishing mechanisms investigated at the local level from aggregate characteristics observable at the national level. Countries are not equivalent to neighborhoods, and national indicators do not directly measure community organization, informal social control, or collective efficacy. Nevertheless, a broader analytical implication remains relevant: structural

and institutional conditions should be examined in relation to other contextual properties, without assuming that any single condition determines the magnitude of violence.

2.2 HOMICIDE FROM A CROSS-NATIONAL COMPARATIVE PERSPECTIVE

Cross-national homicide research has investigated relationships between lethal violence and economic, demographic, institutional, and cultural characteristics. Koeppel *et al.* (2015) identified increasing theoretical and methodological diversification in this field, alongside persistent challenges concerning data comparability and the operationalization of explanatory factors.

Empirical findings indicate that socioeconomic conditions do not exhibit uniform associations with homicide across national contexts. Santos *et al.* (2018), examining 148 countries through quantile regression, found that inequality was positively associated with homicide across the distribution, whereas the association involving poverty was concentrated among countries with lower homicide rates. These findings suggest that relationships between economic conditions and lethal violence vary according to the contexts and homicide levels under examination.

Institutional characteristics constitute another important dimension of comparative research. Cao and Zhang (2017) identified an association between governance quality and homicide after considering socioeconomic and regional characteristics. Ouimet *et al.* (2018), analyzing 145 countries, examined relationships among adverse social conditions, formal social control, and homicide, indicating that institutional mechanisms should be considered alongside structural factors. In Latin America, Croci and Chainey (2023) identified associations involving government effectiveness, corruption, and homicide, while also questioning the explanatory sufficiency of the structural factors examined.

Temporal analyses have further demonstrated that international patterns of lethal violence are heterogeneous. Tuttle *et al.* (2018), examining 82 countries between 1980 and 2010, identified three distinct homicide trajectories associated with structural characteristics and regional location. More recently, Rutar (2025) found that firearm ownership was positively associated with firearm homicide but not significantly associated with the overall homicide rate, reinforcing the importance of distinguishing among measures and manifestations of lethal violence.

These findings must also be interpreted in light of measurement limitations. Rogers and Pridemore (2023) demonstrated that the choice of international homicide data source can affect estimated levels, trends, and statistical associations. Buil-Gil *et al.* (2026), examining 41 European countries, identified differences arising from legal definitions and statistical counting rules. Consequently, observed cross-national variation reflects not only differences in violence but also the institutional conditions under which homicide is recorded.

Taken together, this literature establishes the relevance of structural, demographic, and institutional dimensions while demonstrating heterogeneity in national trajectories and measurement practices. The present study builds on these contributions by addressing a complementary analytical problem: the joint differentiation of countries according to homicide and other national properties. Its purpose is not to replace explanatory models of homicide but to examine multidimensional configurations that may remain less evident when attention is restricted to individual associations or homicide rates alone.

2.3 SOCIAL SPACE, RELATIONAL POSITIONS, AND MULTIDIMENSIONAL ANALYSIS

Bourdieu's relational sociology provides a conceptual basis for examining differences among units through their relative positions. Social space is structured by the distribution of socially relevant properties, and positions acquire meaning through relationships of proximity, distance, and opposition rather than through isolated attributes (Bourdieu 1989, 1996). This perspective directs attention toward configurations of properties and the differences that emerge when units are considered in relation to one another.

Geometric data analysis offers methodological resources for representing multidimensional structures and examining relationships among observations and variables (Benzécri 1992; Lebart *et al.* 2000; Greenacre 2007; Le Roux and Rouanet 2010). Its use in relational sociology has contributed to the empirical investigation of social differentiation and positional structures (Rouanet *et al.* 2000; Duval 2015; Lebaron and Le Roux 2015; Bertoncelo 2022).

However, it is necessary to distinguish a sociologically constituted relational space from a statistical space derived from selected indicators. Principal Component Analysis represents patterns of covariation and relative differences within a defined dataset. The resulting distances and positions depend on the variables included, their measurement, the

observations considered, and the statistical procedures employed. They do not, by themselves, establish social interactions, mechanisms of influence, or causal relationships among the units. This distinction is particularly relevant to cross-national comparison. In the present study, countries are represented by country-year observations within a common multidimensional space constructed from homicide, incarceration, income, urbanization, inequality-adjusted human development, and adolescent fertility. Their coordinates indicate relative positions associated with the joint distribution of these properties. Changes in coordinates over time are interpreted as positional shifts within this constructed space, rather than as direct evidence of changes in social relations between countries.

Previous investigations of the relational space of homicides provide an empirical background for this approach. Carneiro and Pedroso Neto (2024), examining the Northern Region of Brazil, jointly considered homicide, socioeconomic conditions, and governmental actions to identify differentiated territorial positions. Related studies extended this analytical orientation to other configurations of homicide and territorial characteristics (Carneiro and Barbosa 2024; Carneiro and Oliveira 2025). These applications support the relevance of distinguishing observed levels of violence from the broader combinations of properties associated with the units under analysis.

Accordingly, the relational perspective adopted here concerns the empirical differentiation of countries within a multidimensional structure. Its contribution lies in identifying patterns of proximity, opposition, and positional change that can inform substantive interpretation, while recognizing that statistical configurations require theoretical contextualization and do not independently explain the social processes underlying violence.

2.4 FROM THE RELATIONAL SPACE OF HOMICIDES TO THE RELATIONAL SPACE OF VIOLENT CRIME

The Relational Space of Violent Crime (RSVC) emerges from a sequence of investigations concerned with relationships among violence, social conditions, territorial characteristics, and institutional processes. Initial applications examined homicide within differentiated territorial configurations (Carneiro *et al.* 2023; Carneiro and Pedroso Neto 2024; Carneiro and Barbosa 2024). Subsequent research involving incarcerated individuals incorporated educational, occupational, family, territorial, and criminal characteristics,

extending relational analysis toward differences among individual trajectories (Carneiro 2023).

These investigations contributed to the formulation of the RSVC as an analytical proposal under development. Its central premise is that violent crime should not be understood exclusively through the magnitude of criminal events or through isolated individual and contextual attributes. Instead, the proposal seeks to examine how social, territorial, institutional, and criminal properties are articulated in differentiated configurations, while preserving the distinction between structural conditions and individual agency.

At its broader conceptual level, the RSVC is concerned with processes through which individuals, groups, and territories become differently positioned in relation to violent crime, including processes of involvement, persistence, circulation, and disengagement. These processes cannot be inferred solely from aggregate national indicators. The present study therefore examines a restricted empirical dimension of the proposal: the relative positions of countries according to selected characteristics associated with lethal violence.

The international application focuses on three analytically distinguishable aspects. First, countries with similar homicide rates may occupy different positions because their remaining characteristics differ. Second, the joint distribution of the selected properties may reveal distinct configurations of national contexts. Third, changes in these properties between 2017 and 2023 may correspond to shifts in countries' relative positions within the constructed space. These aspects are examined descriptively and do not constitute causal hypotheses about the determinants of homicide.

The complementary analysis of mafia-style groups and criminal networks introduces indicators of organized crime actors into the interpretation of national differentiation. Because these indicators refer to 2025, they are examined separately in relation to countries' mean positions for 2017–2023. This procedure allows associations between distinct sets of measurements to be explored without incorporating the later indicators into the construction of the original space or inferring temporal precedence.

The international comparison thus contributes to the development of the RSVC by examining whether homicide magnitude adequately represents the multidimensional differentiation of national contexts. The configurations identified are contingent on the selected indicators, countries, and period, and their interpretation remains exploratory. Rather

than validating the RSVC as a causal theory, the study evaluates the empirical usefulness and limitations of a relational approach to cross-national differences associated with lethal violence.

3 METHODOLOGICAL PROCEDURES

3.1 COUNTRY SELECTION, UNIT OF ANALYSIS, AND TIME FRAME

The study adopted an exploratory longitudinal comparative design, with the country-year as the unit of observation. Countries were initially selected according to the availability of intentional homicide rates, followed by the collection and harmonization of the remaining indicators. The analysis covered 2017–2023, a period for which comparable information could be obtained across the selected countries. Extending the series to 2024 was constrained by incomplete data for certain indicators, particularly the Inequality-adjusted Human Development Index (IHDI).

Following data harmonization, 23 countries with complete information for the six active variables across all seven years were retained, yielding 161 country-year observations. No missing values were imputed or interpolated. Country inclusion was therefore determined by data availability rather than probabilistic sampling, limiting the generalizability of the findings beyond the selected cases.

Each observation was identified by country and year, allowing successive positions to be examined within a common multidimensional space. Although the dataset has a longitudinal structure, the analysis did not employ panel regression models or estimate causal relationships. Instead, it examined differences among countries and changes in their relative coordinates over time. Because the same countries were observed repeatedly, the 161 observations were not treated as independent national cases for inferential purposes.

3.2 VARIABLES AND DATA SOURCES

Violent crime was represented by the intentional homicide rate per 100,000 population (HOMIC), obtained from the United Nations Office on Drugs and Crime (UNODC 2026). Incarceration (INCARC) was measured as the number of persons held in prison establishments per 100,000 population, using data primarily from the World Prison Brief

(Institute for Crime & Justice Policy Research 2026) and, for European countries, SPACE I (Aebi and Cocco 2026).

The socioeconomic and demographic indicators comprised Gross National Income per capita at purchasing power parity, expressed in constant 2021 international dollars (INCOME); the percentage of the population living in urban areas (URBAN); the Inequality-adjusted Human Development Index (IHDI); and adolescent fertility (FERTILITY), measured as live births per 1,000 women aged 15–19. INCOME, URBAN, and FERTILITY were obtained from the World Development Indicators (World Bank 2026a, 2026c, 2026d), while IHDI was obtained from the United Nations Development Programme (UNDP 2025).

Employment (EMPLOYMENT) corresponded to the employment-to-population ratio for persons aged 15 years and older, based on International Labour Organization estimates available through the World Development Indicators (World Bank 2026b).

These indicators were selected to represent distinct dimensions of national differentiation relevant to the comparative analysis of lethal violence. HOMIC measured the magnitude of intentional homicide; INCOME and IHDI characterized economic resources and inequality-adjusted human development; URBAN and FERTILITY represented demographic and socio-spatial characteristics; and INCARC described the extent of imprisonment relative to population size. These measures were treated as descriptive properties rather than direct indicators of the social mechanisms underlying violent crime. In particular, incarceration was not considered a direct measure of state capacity, and adolescent fertility was not interpreted as a causal determinant of homicide. The final active set comprised HOMIC, INCARC, INCOME, URBAN, IHDI, and FERTILITY. EMPLOYMENT was retained as a supplementary variable, allowing its association with the extracted dimensions to be examined without influencing their construction. HOMIC was the only direct measure of violence, delimiting the empirical analysis to lethal violence.

3.3 STATISTICAL PROCEDURES

The active variables were standardized using z-scores to account for differences in measurement scales:

$$Z_{ij} = \frac{X_{ij} - \bar{X}_j}{s_j} \qquad (1)$$

where Z_{ij} denotes the standardized value of observation *i* for variable *j*, X_{ij} the observed value, X_j the variable mean, and S_j its standard deviation.

Pearson correlations were examined to assess linear associations among the indicators. The suitability of the correlation matrix for Principal Component Analysis (PCA) was evaluated using the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity.

The initial PCA specification comprised seven active variables: HOMIC, INCARC, INCOME, EMPLOYMENT, URBAN, IHDI, and FERTILITY. EMPLOYMENT presented a comparatively low communality (0.270), indicating limited representation within the extracted component structure. Its removal from the active set was accompanied by an increase in the overall KMO from 0.688 to 0.738. Accordingly, EMPLOYMENT was retained as supplementary, and the final PCA was estimated using the correlation matrix of the six remaining active variables.

PCA was employed to identify the principal dimensions of joint variation among the selected properties and represent the 161 country-year observations within a common multidimensional space. Component loadings informed the interpretation of the dimensions, while observation scores were used to examine relative positions and temporal shifts.

Component retention considered eigenvalues, the Kaiser criterion, and cumulative explained variance. The unrotated solution was retained to preserve the original component axes and the comparability of observation coordinates. The expected average contribution of observations to each component was calculated as: ***100/n*** where *(n)* represents the number of active observations. For 161 country-year observations, the reference value was approximately 0.621%, providing a descriptive benchmark for identifying cases contributing above the expected average.

Positional shifts were examined by comparing each country's coordinates across successive years. Because the components were estimated using the pooled country-year observations, all positions were represented within the same statistical space. However, this approach does not separately estimate between-country differences and within-country

temporal variation. Accordingly, shifts were interpreted as descriptive changes in relative position rather than causal effects or direct measures of changes in homicide rates.

Statistical analyses were conducted using jamovi, version 2.7 (The jamovi project 2025), with R, version 4.5 (R Core Team 2025), as the computational environment.

3.4 COMPLEMENTARY ANALYSIS OF ORGANIZED CRIME ACTORS

The complementary analysis examined the *Mafia-style groups* and *Criminal networks* indicators from the Criminal Actors component of the *Global Organized Crime Index 2025* (GI-TOC 2025). Both indicators range from 1 to 10, with higher scores representing greater assessed presence and influence of mafia-style organizations and criminal networks, respectively. Because these indicators refer to 2025, whereas the main PCA covers 2017–2023, mean CP1 and CP2 coordinates were calculated for each country across the study period. The unit of analysis consequently changed from country-year to country, yielding 23 observations.

Pearson correlations were calculated between the mean CP1 and CP2 coordinates and the organized crime indicators. A separate PCA was subsequently performed using four variables: mean CP1, mean CP2, *Mafia-style groups*, and *Criminal networks*. The analysis employed the correlation matrix and examined eigenvalues, explained variance, component loadings, and the relative positions of countries.

This complementary PCA generated a distinct statistical space without modifying the main analysis. Its results were interpreted as descriptive associations between mean national positions for 2017–2023 and organized crime indicators for 2025. The temporal difference between these measures precludes claims of temporal precedence or causality. Furthermore, the GI-TOC indicators were treated as comparative assessments of criminal actors rather than direct counts of criminal organizations, members, or incidents.

4 RESULTS AND DISCUSSION

4.1 RELATIONSHIPS AMONG THE PROPERTIES AND MATRIX ADEQUACY

The initial correlation analysis made it possible to examine how the properties considered vary jointly before constructing the multidimensional space. Table 1 presents the Pearson correlation coefficients among the seven variables initially considered in the analysis.

Table 1

Pearson correlation matrix among the standardized variables

Variável	HOMIC	ENCAR	RENDA	EMPREGO	URBAN	IHDI	FECUND
HOMIC	1,000						
ENCAR	0,252	1,000					
RENDA	-0,436	-0,118	1,000				
Z_EMPREGO	-0,178	0,127	0,260	1,000			
Z_URBAN	0,106	0,270	**0,563**	0,179	1,000		
Z_IHDI	**-0,500**	-0,064	**0,881**	0,367	**0,552**	1,000	
Z_FECUND	**0,642**	0,262	**-0,671**	0,060	-0,146	**-0,673**	1,000

Source: Author's elaboration based on the research data. **Note:** Z_HOMIC = standardized intentional homicide rate; Z_INCARC = standardized incarceration rate; Z_INCOME = standardized income; Z_EMPLOYMENT = standardized employment-to-population ratio; Z_URBAN = standardized urbanization; Z_IHDI = standardized Inequality-adjusted Human Development Index; Z_FERTILITY = standardized adolescent fertility rate. Coefficients correspond to Pearson correlations. Values in bold indicate correlations of greater magnitude highlighted in the analysis.

Among the associations involving homicide, the strongest was observed with adolescent fertility ($r = 0.642$). Homicide was also negatively correlated with IHDI ($r = -0.500$) and income ($r = -0.436$). Within the sample and period analyzed, higher homicide rates therefore tended to coexist with higher adolescent fertility and lower levels of inequality-adjusted human development and income. These relationships represent patterns of covariation among properties and should not be interpreted as evidence that any of these conditions independently produces higher or lower levels of lethal violence.

This qualification is particularly relevant in light of cross-national homicide research. Previous studies have shown that socioeconomic and demographic conditions are associated with homicide in ways that vary across national contexts and according to the dimensions considered (Cao and Zhang 2017; Santos et al. 2018; Ouimet et al. 2018). The correlations identified here are consistent with the broader observation that lethal violence is related to socioeconomic and demographic differentiation, but they do not establish a uniform

relationship between disadvantage and homicide. Rather, they indicate how these properties covary within the specific set of countries and years examined.

The structure of the remaining correlations reinforces this interpretation. Income and IHDI were strongly and positively correlated ($r = 0.881$), while both properties were negatively correlated with adolescent fertility ($r = -0.671$ and $r = -0.673$, respectively). Urbanization was positively correlated with income ($r = 0.563$) and IHDI ($r = 0.552$). Adolescent fertility, in turn, combined a positive relationship with homicide with negative relationships with income and IHDI. Rather than representing independent associations, these results reveal a pattern of interdependence among socioeconomic, demographic, and violent-crime properties.

At the same time, not all properties followed this pattern. The correlation between homicide and urbanization was weak ($r = 0.106$), as was the correlation between homicide and employment ($r = -0.178$). Incarceration showed a positive but comparatively limited correlation with homicide ($r = 0.252$). These differences are analytically relevant because they indicate that countries cannot be positioned along a single continuum ranging from more favorable socioeconomic conditions and lower violence to less favorable conditions and higher violence. Some properties vary together strongly, whereas others introduce additional differentiation into the structure.

This finding is consistent with the analytical distinction between magnitude and configuration developed in the previous section. A homicide rate represents the magnitude of one property, whereas the correlations indicate that this property is embedded within a broader system of relationships. Consequently, two country-year observations with similar homicide rates may differ in income, IHDI, urbanization, incarceration, or adolescent fertility and may therefore occupy different positions once these properties are considered jointly. The correlation matrix provides the first empirical indication that examining the joint structure of the properties may reveal differences that cannot be inferred from homicide rates alone.

The suitability of this relational structure for dimensional reduction was subsequently assessed. In the first PCA specification, which comprised all seven variables, the overall KMO was 0.688, and Bartlett's test of sphericity was statistically significant, $\chi^2(21) = 657.99$, $p < 0.001$. However, EMPLOYMENT presented a communality of 0.270, indicating comparatively weak representation in the component structure. Considering its low communality and the

improvement in overall matrix adequacy after its removal, EMPLOYMENT was excluded from the active set and retained as a supplementary variable.

After this adjustment, the overall KMO increased from 0.688 to 0.738, while Bartlett's test remained statistically significant, χ^2 (15) = 585.00, $p < 0.001$. In the final specification, the individual KMO values were 0.722 for homicide, 0.621 for incarceration, 0.750 for income, 0.609 for urbanization, 0.748 for IHDI, and 0.838 for adolescent fertility. Although incarceration and urbanization presented comparatively lower individual KMO values, all six indicators were retained because they contributed substantively distinct properties to the multidimensional space and remained within an overall matrix that showed acceptable adequacy for PCA.

The final specification therefore comprised six active properties: HOMIC, INCARC, INCOME, URBAN, IHDI, and FERTILITY. EMPLOYMENT was retained as a supplementary property, allowing its relationship with the resulting dimensions to be examined without contributing to the determination of the country-year positions. The PCA presented in the following subsection thus moves from pairwise associations toward the joint representation of the properties, allowing the analysis of how their combinations structure relative positions within the multidimensional space.

4.2 DIMENSIONAL STRUCTURE OF THE RELATIONAL SPACE

The PCA, performed using the six active properties, identified two components with eigenvalues greater than 1. The first principal component (CP1) had an eigenvalue of 3.133 and explained 52.22% of the total variance, while the second principal component (CP2) had an eigenvalue of 1.532 and accounted for 25.53%. Together, the two components explained 77.75% of the variance among the properties analyzed. The remaining components had eigenvalues below 1 and were not retained for interpretation.

The distribution of the 161 country-year observations was represented in a two-dimensional factorial plane consisting of two perpendicular axes. CP1 corresponds to the horizontal axis, which comprises two opposing poles: the right-hand side, corresponding to positive coordinates, and the left-hand side, corresponding to negative coordinates. CP2 corresponds to the vertical axis, which also comprises two opposing poles: the upper side, associated with positive coordinates, and the lower side, associated with negative coordinates. The intersection of these axes defines four quadrants in which country-year

observations are distributed according to the combinations of properties considered in the analysis.

The interpretation of positions requires the simultaneous consideration of both components. An observation located on the right-hand side of CP1, for example, may occupy either an upper or a lower position on CP2, depending on the combination of its characteristics. Thus, proximity between observations in the factorial plane indicates greater similarity in their coordinates on the two retained components, whereas distance indicates greater differentiation along these dimensions.

The results indicate that CP1 is structured primarily by the relationships among IHDI, INCOME, FERTILITY, and HOMIC, while CP2 presents a configuration predominantly characterized by URBAN, INCARC, and HOMIC. An initial finding is that HOMIC participates in both dimensions, although it is associated with different properties. This differentiation indicates that the magnitude of lethal violence, considered in isolation, is insufficient to characterize the multidimensional position occupied by a country-year observation.

The factorial representation therefore makes it possible to examine how different combinations of national characteristics are expressed in relative positions and how these positions change between 2017 and 2023. The components represent statistical dimensions of differentiation and should not be interpreted as causal factors or definitive classifications of countries.

4.3 FIRST COMPONENT: HUMAN DEVELOPMENT, INCOME, ADOLESCENT FERTILITY, AND HOMICIDE

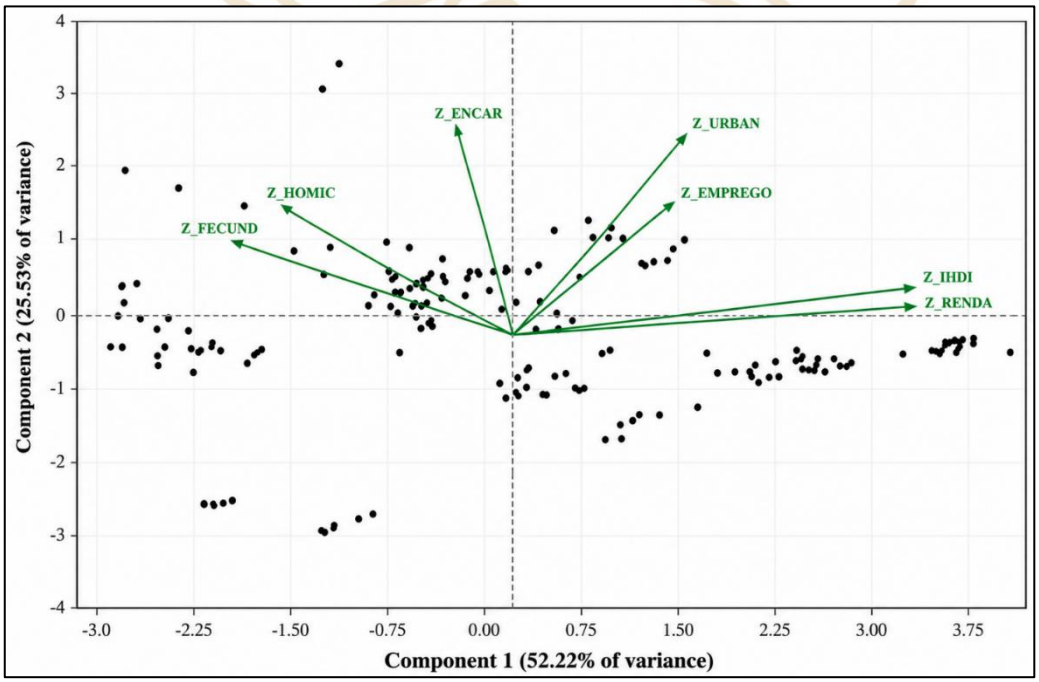
CP1, represented by the horizontal axis of the factorial plane, explains 52.22% of the total variance and constitutes the main dimension of differentiation among country-year observations. This axis comprises two opposing poles: the right-hand side, corresponding to positive coordinates, and the left-hand side, corresponding to negative coordinates. Its structure is characterized by positive loadings for IHDI (0.932) and INCOME (0.922), in opposition to negative loadings for FERTILITY (−0.840) and HOMIC (−0.659). URBAN (0.484) is also associated with the positive pole, although less strongly, while INCARC (−0.198) presents a comparatively small association with the negative pole. As illustrated in Figure 1, the farther country-year observations are positioned to the right, the higher their

levels of income and inequality-adjusted human development tend to be, accompanied by lower adolescent fertility and homicide rates. Urbanization follows the same positive direction, although with a smaller contribution. Conversely, the farther observations are positioned to the left, the higher their adolescent fertility and homicide rates tend to be, accompanied by lower levels of income and inequality-adjusted human development.

CP1 therefore reveals a dimension of socioeconomic, demographic, and criminal differentiation in which lethal violence does not appear in isolation but is associated with other properties characterizing national contexts. The direction of the loadings indicates that the opposition between human development and income, on the one hand, and adolescent fertility and homicide, on the other, constitutes the principal configuration identified in the sample.

Figure 1

Representation of the active variables and the supplementary variable in the first two PCA components



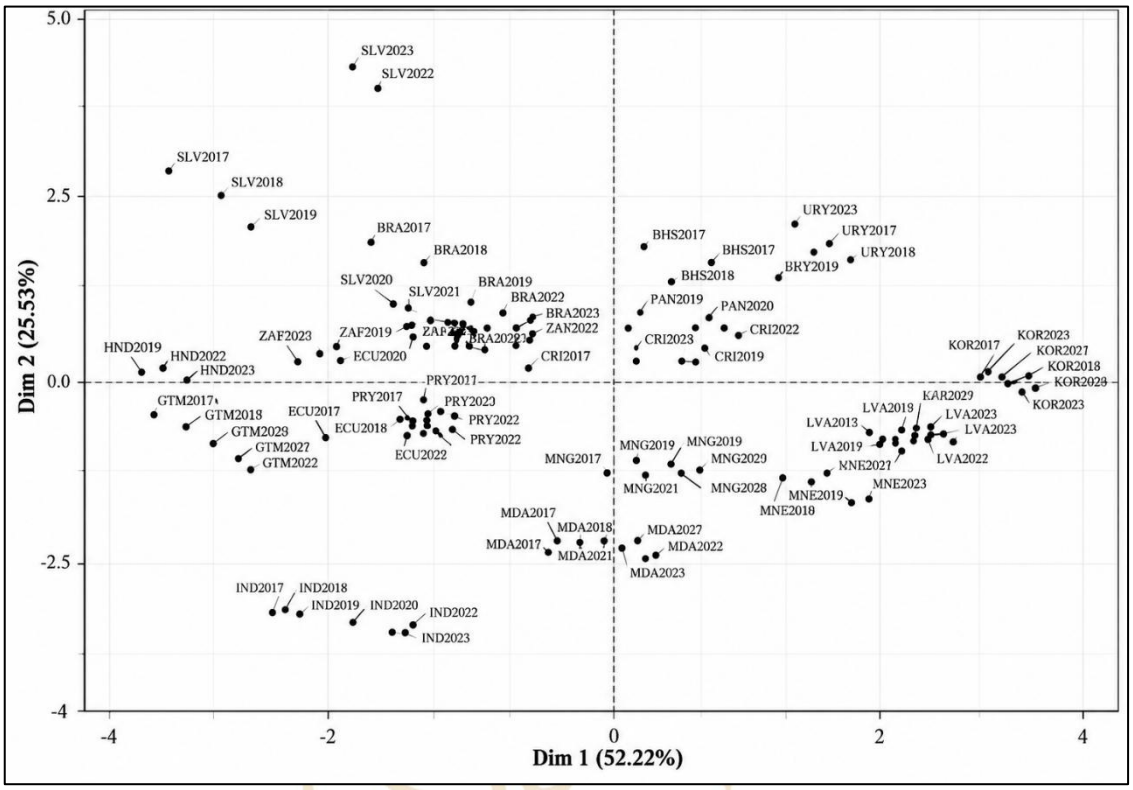
Source: Author's elaboration based on the research data. **Note:** Homicide, incarceration, income, urbanization, IHDI, and adolescent fertility are active variables. Employment was projected as a supplementary variable and did not contribute to the construction of the components. CP1 and CP2 explain 52.22% and 25.53% of the variance, respectively.

These findings are consistent with international research identifying associations between homicide and socioeconomic and demographic conditions. Santos *et al.* (2018), for example, demonstrated that the relationship between economic deprivation and homicide varies across the international distribution of lethal violence, while Ouimet *et al.* (2018) examined the relationships between adverse social conditions and formal social control. The present study contributes to this discussion by providing a joint representation of these properties, making it possible to examine not only isolated associations but also the multidimensional configuration within which homicide is situated.

However, the opposition identified in CP1 does not imply that countries with lower levels of income or human development necessarily exhibit higher homicide rates. The loadings represent patterns of covariation observed in the sample rather than deterministic relationships. Furthermore, IHDI expresses human development adjusted for the inequalities considered by the index and should not be interpreted as an isolated measure of social inequality. The distribution of country-year observations in the factorial plane, presented in Figure 2, shows how this differentiation is expressed in the positions occupied by countries. Japan, South Korea, Estonia, Lithuania, Latvia, Montenegro, Uruguay, and the Bahamas remained on the right-hand side of CP1 throughout 2017–2023. Their positions indicate a stronger association with the configuration characterized by comparatively higher levels of income and IHDI and lower adolescent fertility and homicide rates.

Figure 2

Position of country-year observations in the Principal Component Analysis factorial plane



Source: Author's elaboration based on the research data. **Note:** CP1 corresponds to the horizontal dimension and CP2 to the vertical dimension. Each point represents a country-year observation. Cases selected according to the contribution criterion established in the methodological procedures are identified in the plane.

Conversely, Honduras, Mexico, El Salvador, Colombia, Guatemala, Brazil, Ecuador, Paraguay, South Africa, Pakistan, and India remained on the left-hand side of CP1 throughout the period analyzed. Their positions were more closely associated with the configuration characterized by higher adolescent fertility and homicide rates and lower levels of income and IHDI. Nevertheless, remaining on the same side of the axis does not imply that these countries exhibit identical characteristics, since their individual coordinates and positions on CP2 also differ.

The temporal analysis revealed that remaining within the positive or negative pole does not necessarily correspond to positional stability. Between 2017 and 2023, countries experienced changes in their coordinates even when they remained on the same side of the component. This indicates that the combinations of properties considered in the PCA changed over time, although these changes were not always sufficient to alter the sign of the

coordinates. Costa Rica, Mongolia, Moldova, and Panama exhibited shifts that crossed the origin of CP1. Costa Rica and Mongolia moved from the left-hand side in 2017 to the right-hand side in 2018, remaining within the positive pole in subsequent years. Moldova followed a similar movement in 2021, while Panama crossed the origin in 2022.

These movements indicate changes in the relative positions occupied by countries along the main dimension of differentiation. However, moving from one side to the other does not automatically imply a change in homicide magnitude or a transition between fixed categories of countries. Because the coordinates result from the combination of the six active properties, similar shifts may arise from different changes in INCOME, IHDI, FERTILITY, URBAN, INCARC, and HOMIC.

CP1 therefore reveals two relevant findings. First, lethal violence participates in a multidimensional configuration characterized primarily by the opposition between human development and income, on the one hand, and adolescent fertility and homicide, on the other. Second, countries associated with the same direction of the component may occupy different positions and follow distinct trajectories. These results reinforce the importance of distinguishing homicide magnitude from the relative positions occupied by countries within the constructed space.

4.4 SECOND COMPONENT: URBANIZATION, INCARCERATION, AND A DISTINCT CONFIGURATION OF VIOLENT CRIME

CP2, represented by the vertical axis of the factorial plane, explains 25.53% of the total variance and constitutes a second dimension of differentiation among country-year observations. Its structure is characterized primarily by negative loadings for URBAN (−0.777), INCARC (−0.716), and HOMIC (−0.513). FERTILITY (−0.288), INCOME (−0.188), and IHDI (−0.185) also present negative loadings, although with comparatively smaller magnitudes. The contribution structure confirms the predominance of urbanization, incarceration, and homicide. URBAN accounts for 39.45% of the construction of CP2, followed by INCARC (33.42%) and HOMIC (17.19%). Together, these three properties account for approximately 90.07% of the component's contribution, whereas FERTILITY (5.41%), INCOME (2.30%), and IHDI (2.23%) make smaller contributions.

This result reveals an important distinction between the two components. Whereas CP1 is primarily structured by the opposition between human development and income, on the one hand, and adolescent fertility and homicide, on the other, CP2 differentiates country-year observations mainly through the joint variation of urbanization, incarceration, and homicide. Lethal violence therefore participates in both dimensions, although its statistical relationships with the remaining properties differ.

The prominence of urbanization in CP2 deserves particular attention. Although URBAN presents the strongest contribution to this component, its bivariate correlation with HOMIC was weak (r = 0.106). Consequently, the relevance of urbanization within the multivariate structure should not be interpreted as evidence that urbanization independently produces higher levels of lethal violence. Rather, urbanization contributes to differentiating country-year observations through its joint relationships with the other properties considered. This interpretation is consistent with sociological approaches that emphasize social organization, community relationships, and informal social control in understanding the territorial distribution of crime (Shaw and McKay 1942; Sampson and Groves 1989; Sampson et al. 1997). Nevertheless, these mechanisms were not directly measured in the present study. Accordingly, the statistical configuration identified in CP2 does not constitute empirical confirmation of social disorganization or collective efficacy mechanisms.

Incarceration also exhibits a distinct pattern across the components. While its loading on CP1 was relatively small (−0.198), its association with CP2 was substantially stronger (−0.716). However, incarceration rates cannot be interpreted as direct measures of state capacity, institutional effectiveness, or criminal activity. Similar incarceration rates may emerge from different criminal justice policies, enforcement practices, sentencing arrangements, and institutional contexts.

The distribution of countries in the factorial plane illustrates how this second dimension is expressed in national positions. Brazil, Colombia, Uruguay, Panama, Costa Rica, Mongolia, the Bahamas, Honduras, El Salvador, and Mexico remained on the negative side of CP2 throughout 2017–2023. Japan, India, Pakistan, South Africa, Moldova, Montenegro, Latvia, Lithuania, Estonia, and Guatemala remained on its positive side.

Ecuador, Paraguay, and South Korea exhibited changes in the signs of their CP2 coordinates. Ecuador moved from the positive to the negative pole in 2022, followed by

Paraguay in 2023. South Korea also crossed the origin in 2023, moving from a slightly positive coordinate to a slightly negative one. Because South Korea's coordinates were very close to zero, this movement should be interpreted cautiously rather than as evidence of a substantial change in its national configuration.

These shifts indicate changes in the relative combinations of properties represented by CP2 but do not establish which social, institutional, or criminal processes produced them. Countries may remain on the same side of the component while changing their coordinates, just as similar movements may result from different changes in the underlying indicators. Taken together, the two components demonstrate that countries cannot be adequately characterized through homicide rates alone. Similar levels of lethal violence may coexist with distinct combinations of socioeconomic, demographic, urban, and criminal justice properties, resulting in different positions within the constructed multidimensional space.

From the perspective of the Relational Space of Violent Crime, these findings contribute to distinguishing the magnitude of lethal violence from the configurations within which it is situated. However, the PCA does not directly identify processes of socialization, criminal learning, collective efficacy, institutional action, or participation in criminal networks. These remain relevant mechanisms for subsequent theoretical development and empirical investigation.

4.5 ORGANIZED CRIME ACTORS AS COMPLEMENTARY INFORMATION

The inclusion of *indicators of mafia-style groups and criminal networks makes* it possible to complement the positions constructed by the main PCA with information concerning the configuration of organized crime actors. As established in the methodology, these indicators did not participate in the construction of the main relational space and were incorporated exclusively into the complementary analysis. Table 2 presents their values for the 23 countries included in both the main PCA and the *Global Organized Crime Index 2025*.

Table 2

Indicators of mafia-style groups and criminal networks for the countries included in the complementary analysis, 2025

Country	Mafia-style groups	Criminal networks	Country	Mafia-style groups	Criminal networks
Honduras	8.5	8.0	South Africa	8.0	8.0
Mexico	9.0	9.0	Mongolia	1.0	5.5
Bahamas	4.5	6.0	Pakistan	6.5	8.0
El Salvador	6.0	7.0	India	3.0	7.0
Colombia	9.5	9.0	South Korea	5.5	7.0
Guatemala	8.0	8.0	Japan	5.5	6.0
Brazil	8.0	8.5	Moldova	5.0	7.0
Ecuador	8.5	8.5	Lithuania	3.5	6.0
Costa Rica	8.0	7.0	Latvia	4.0	6.0
Panama	7.5	7.5	Montenegro	7.5	7.0
Uruguay	2.5	6.5	Estonia	3.0	5.5
Paraguay	7.5	7.5			

Source: Author's elaboration based on data from the *Global Organized Crime Index 2025*, Global Initiative Against Transnational Organized Crime (GI-TOC). **Note:** *Mafia-style groups* and *Criminal networks* correspond to criminal actor indicators from the *Global Organized Crime Index 2025*. The table presents the 23 countries for which data were available in both the index and the main PCA.

The distribution of these indicators reveals differences in the configuration of organized crime actors across the countries analyzed. While some countries exhibit comparatively high scores for both mafia-style groups and criminal networks, others combine lower scores for one category with higher scores for the other. Uruguay, for example, presents a relatively low score for mafia-style groups (2.5) alongside a higher score for criminal networks (6.5). Mongolia exhibits a similar differentiation, with scores of 1.0 and 5.5, respectively. These differences indicate that the two categories, although related, do not represent identical configurations of organized crime actors.

To examine how these indicators relate to the positions occupied by countries in the main PCA, the coordinates of each country on CP1 and CP2 were averaged across the seven observations corresponding to 2017–2023. Pearson correlations were then calculated between these mean coordinates and the organized crime actor indicators (Table 3).

Table 3

Correlations between mean positions on the principal components and organized crime actor indicators

Variables	1	2	3	4
1. CP1	1			
2. CP2	-0.004	1		
3. Mafia-style groups	−0.506*	-0.253	1	
4. Criminal networks	−0.668***	-0.099	0.860***	1

Source: Author's elaboration based on the PCA results and data from the Global Organized Crime Index 2025 (GI-TOC). **Note:** Pearson correlation coefficients for 23 countries. CP1 and CP2 correspond to countries' mean coordinates between 2017 and 2023. p < 0.05; *** p < 0.001.

The results indicate that the organized crime actor indicators are more strongly associated with CP1 than with CP2. Mafia-style groups exhibit a negative correlation with mean CP1 (r = −0.506*; p* = 0.014), as do criminal networks (r = −0.668; p < 0.001). Considering the orientation of the first component, higher scores for these indicators tend to be associated with countries positioned toward the negative pole of CP1, characterized by comparatively higher homicide and adolescent fertility rates and lower levels of income and inequality-adjusted human development.

These associations should not be interpreted as evidence that socioeconomic disadvantage necessarily produces organized crime or that the presence of organized crime actors independently determines homicide rates. Rather, they indicate that, within the countries examined, the indicators of organized crime actors covary with a multidimensional configuration involving socioeconomic, demographic, and violent-crime properties.

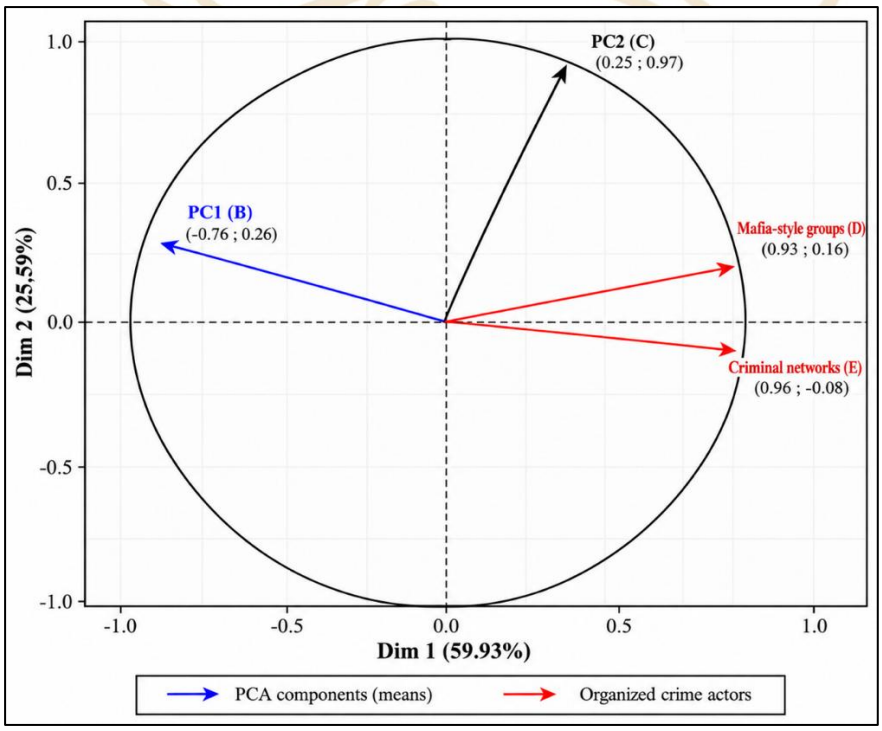
For CP2, the correlations with mafia-style groups (*r = −0.253; p = 0.245*) and criminal networks (*r = −0.099; p = 0.655*) were not statistically significant. Therefore, the complementary indicators do not exhibit statistically supported linear associations with the second dimension, which is structured predominantly by urbanization, incarceration, and homicide. The two organized crime actor indicators, in turn, were strongly and positively correlated (*r = 0.860; p < 0.001*). Although this relationship indicates substantial covariation, the indicators were retained separately because they represent conceptually distinct categories of criminal actors. Their joint consideration makes it possible to examine similarities and differences in the configurations of organized crime across countries.

To investigate these relationships within a common multidimensional representation, a complementary PCA was conducted using four properties: mean CP1, mean CP2, mafia-style groups, and criminal networks. The first two components jointly explained 85.52% of the total variance, with approximately 59.92% accounted for by the first component and 25.59% by the second.

The first component of the complementary PCA establishes an opposition between mean CP1 and the two organized crime actor indicators. As illustrated in Figure 3, mean CP1 presents a loading of approximately −0.783, whereas mafia-style groups (0.910) and criminal networks (0.950) are associated with the opposite pole. Mean CP2 presents a comparatively smaller loading on this dimension (−0.229). The proximity between the two organized crime indicators is consistent with their strong positive correlation.

Figure 3

Representation of variables in the complementary analysis of mean positions and organized crime actors



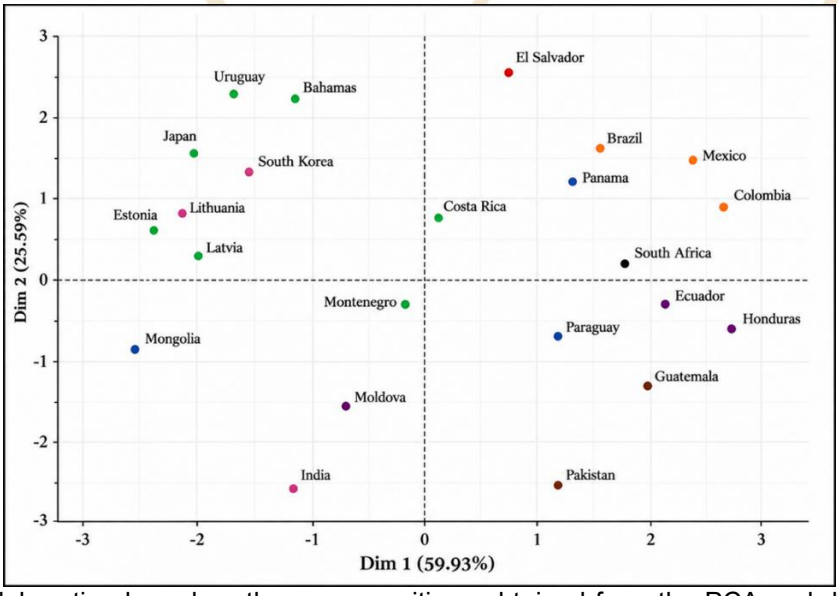
Source: Author's elaboration based on the mean positions obtained from the PCA and data from the *Global Organized Crime Index 2025*. **Note:** CP1 and CP2 correspond to countries' mean coordinates on the first and second components of the main PCA, respectively, for the period from 2017 to 2023. *Mafia-style groups* and *Criminal networks* correspond to criminal actor indicators from the *Global Organized Crime Index 2025*. The analysis includes 23 countries. The first two dimensions jointly account for 85.52% of the variance.

The opposition represented by the first complementary component indicates that countries with higher scores for mafia-style groups and criminal networks tend to be associated with the negative direction of the original CP1. This result extends the descriptive characterization of the main relational space by incorporating information about organized crime actors without modifying the positions originally constructed from the six active properties. The second component of the complementary PCA provides additional differentiation. It is predominantly associated with mean CP2, which presents a loading of approximately −0.952, while mean CP1 (0.303), mafia-style groups (0.123), and criminal networks (−0.098) exhibit smaller loadings. This structure indicates that the second dimension mainly preserves differentiation associated with countries' positions on the original CP2 rather than representing a separate dimension of organized crime actor presence.

Figure 4 presents the distribution of the 23 countries within the complementary factorial plane. Unlike the main PCA, in which each observation represents a country-year, the complementary analysis considers one observation per country, combining its mean position during 2017–2023 with the organized crime actor indicators for 2025.

Figure 4

Country positions in the complementary analysis of mean positions and organized crime actors



Source: Author's elaboration based on the mean positions obtained from the PCA and data from the *Global Organized Crime Index 2025*. **Note:** Each point represents one country. The first two dimensions jointly account for 85.52% of the variance.

The distribution of countries in the complementary factorial plane indicates that higher scores for mafia-style groups and criminal networks tend to be associated with positions toward the negative pole of the original CP1. However, countries with similar scores for organized crime actors may occupy different positions along the second component, reflecting distinct combinations of the properties considered.

Overall, the complementary analysis indicates that similarities in homicide rates or organized crime actor indicators do not necessarily correspond to equivalent positions within the multidimensional space. Although the organized crime indicators were significantly associated with CP1, no statistically significant associations were identified with CP2. These findings should be interpreted as exploratory, particularly because the main PCA covers 2017–2023, whereas the organized crime indicators refer to 2025.

5 CONCLUDING REMARKS

The results indicate that countries with similar homicide rates may occupy different positions when socioeconomic, demographic, territorial, and criminal properties are considered jointly. PCA revealed distinct configurations involving relationships among income, inequality-adjusted human development, adolescent fertility, and homicide, as well as among urbanization, incarceration, and lethal violence. These relationships indicate that homicide is not embedded in a single pattern of differentiation across countries, but rather in distinct multidimensional configurations.

Furthermore, the shifts observed between 2017 and 2023 indicate that countries' relative positions may change over time, reflecting changes in the combination of the properties analyzed. Thus, changes in socioeconomic and demographic conditions, violent crime, and incarceration may be associated with different configurations and positions within the constructed space, without countries initially occupying similar positions necessarily following similar trajectories.

The complementary analysis identified that countries with higher indicators of organized crime presence tend to occupy positions associated with higher homicide rates and particular socioeconomic and demographic conditions. This finding suggests that the presence of such organizations may constitute a relevant element for understanding different

national configurations of violent crime. However, given that the organized crime indicators refer to 2025, these associations should be interpreted as exploratory.

The main contribution of the study lies in the analytical distinction between ***magnitude, configuration, position, and shift.*** By considering these elements jointly, the research extends international comparisons of lethal violence beyond the identification of differences in homicide rates, making it possible to understand how similar magnitudes may coexist with distinct configurations and how countries' relative positions may change over time. From this perspective, violent crime is examined not only through the intensity of its manifestations but also through the relationships among the properties that characterize different national contexts.

These findings contribute to the development of the **RSVC** as an analytical proposal aimed at understanding violent crime through the relationships among properties, positions, and their transformations. From this perspective, similar socioeconomic conditions do not necessarily imply equivalent levels of violence or similar trajectories. Nevertheless, the statistical space constructed in this study does not encompass the full range of social relationships involved in the production and reproduction of violent crime. Processes of socialization, criminal learning, collective efficacy, institutional action, and individual agency constitute relevant dimensions for the development of the RSVC, although they were not directly measured in this investigation.

Finally, the findings should be interpreted in light of the study's limitations. The analysis covered 23 countries over the period 2017–2023, and the national scale may conceal important internal territorial and social differences. PCA made it possible to identify patterns of association and relative positions, but not to establish causal relationships among the properties analyzed. Future research may expand the number of countries and indicators, examine different territorial scales, and investigate the social, institutional, and criminal processes associated with the formation, persistence, and transformation of positions within the Relational Space of Violent Crime.

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