

The Spatial Distribution Of Arrests For Criminal Domestic Violence In Lexington County, South Carolina

National Institute of Justice

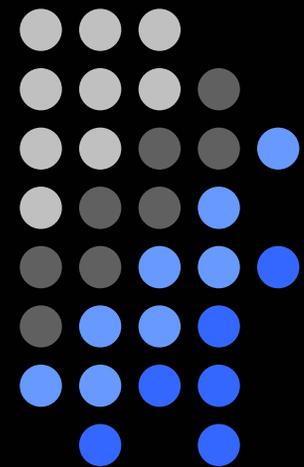
The Ninth

Crime
Mapping
Research
Conference

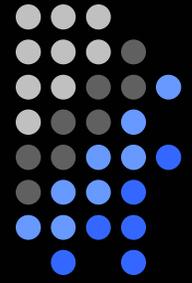
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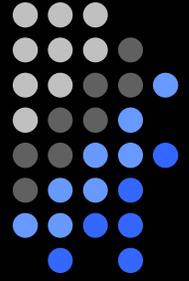
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Abstract

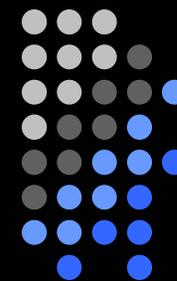
- This study uses Exploratory Spatial Data Analysis (ESDA) and Spatial Regression to examine the geographic location of criminal domestic violence before and after the implementation of a specialized domestic violence court.
- We also identify the neighborhood-level factors (i.e., demographic and socioeconomic) that are associated with the distribution of intimate partner violence across Lexington County neighborhoods.
- Our preliminary findings point to significant clustering of criminal domestic violence arrests across Lexington County both before and after the implementation of the court.
- There is also substantial overlap in the clustering of domestic violence and the clustering of neighborhood-level demographic and socio-economic variables.

Background



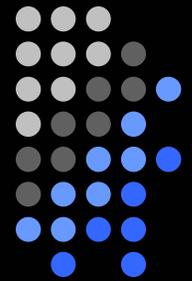
- Very few peer-reviewed studies have examined the spatial patterning of intimate partner violence given the relative dearth of data pertaining to the phenomenon.
- One of the only applicable works to examine spatial distribution of domestic violence relies on the spatial distribution of physical abuse in the state of Georgia.
- The author concludes that rates of physical violence and verbal violence closely follow rates of property crime, in that densely populated urban metropolitan areas show higher rates of domestic violence than do less dense, predominately rural areas (Donnelly, 2000).

Purpose and Goals of the Study



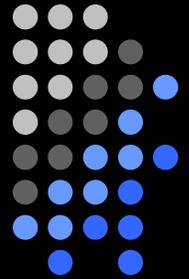
- Use a Geographic Information System (GIS) to:
 - Create maps of the location and distribution of criminal domestic violence.
 - Use Exploratory Spatial Data Analysis (ESDA) to examine the clustering of domestic violence.
 - Analyze and understand the neighborhood characteristics that promote or impede the location of domestic violence arrests.

Theory and Background Literature



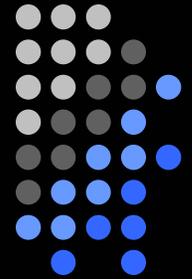
- Some highly influential theories explicitly define social processes in relationship to a geographical place.
- Geographic location and embedded cultural phenomena are not only a backdrop to crime, they are the primary cause or facilitator of it.
- Place-based theories from the Chicago School, for example, generally cast criminal offending in a social-ecological light, with disparate groups competing for scarce resources such as housing and jobs. Competition ultimately resulted in communities failing to achieve a state of self-promoting collective efficacy that led to intergenerational transmission of pro-criminal values.
- Unique to this theoretical approach is the supposition that all social and psychological factors material to criminal activity operate within a spatial framework, suggesting that a variety of crime-related behaviors are linked to geography.

Examining the Location of Arrests: Exploratory Spatial Data Analysis



- Visualize the spatial distribution of domestic violence by means of choropleth quartile maps.
- Examine spatial patterns of the location of arrests.
- Identify clustering of similar values of domestic violence arrests across neighborhoods.
- Identify adjacent neighbors that are similar or dissimilar with respect to domestic violence arrests.

Indicators for Spatial Association



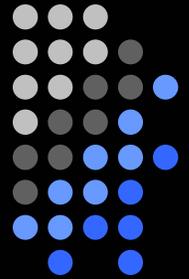
Global Moran's I Statistic (Test of Null Hypothesis, Random)

1. Values in one neighborhood don't depend on values in adjacent neighborhood.
2. Observed spatial pattern is as likely as any other spatial pattern.

Local Indicators of Spatial Association (LISA)

1. Anselin & Bera (1998) refer to spatial autocorrelation as the clustering of similar values in space (i.e., positive autocorrelation) or locations that are surrounded by neighbors with dissimilar values (i.e., negative autocorrelation).
2. The LISA statistic permits an examination of the clustering of neighborhoods with high and/or low levels of criminal domestic violence arrests.

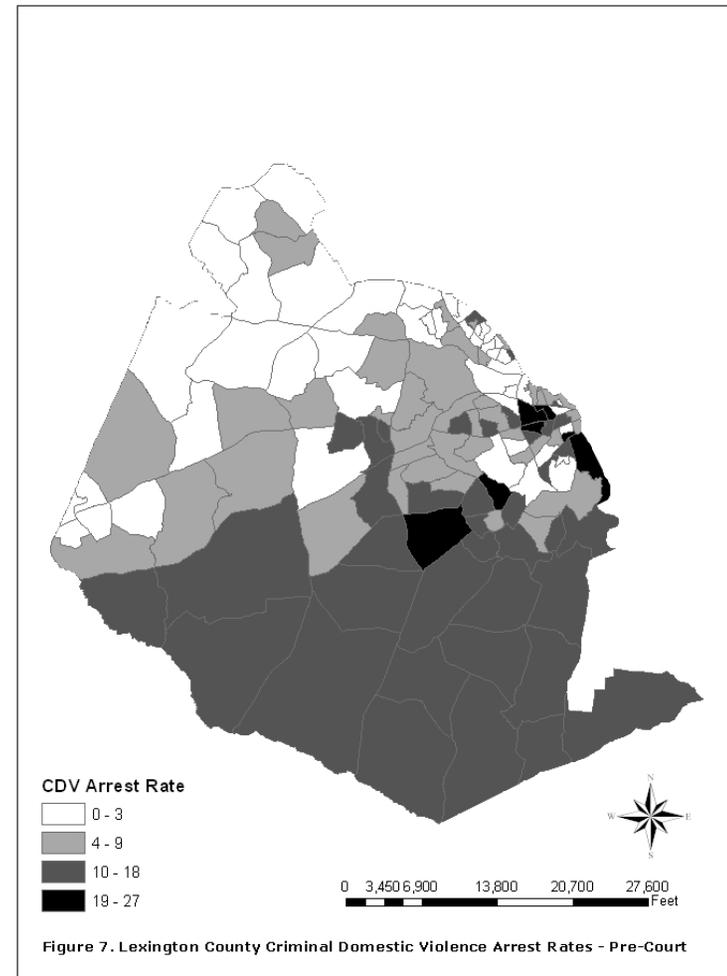
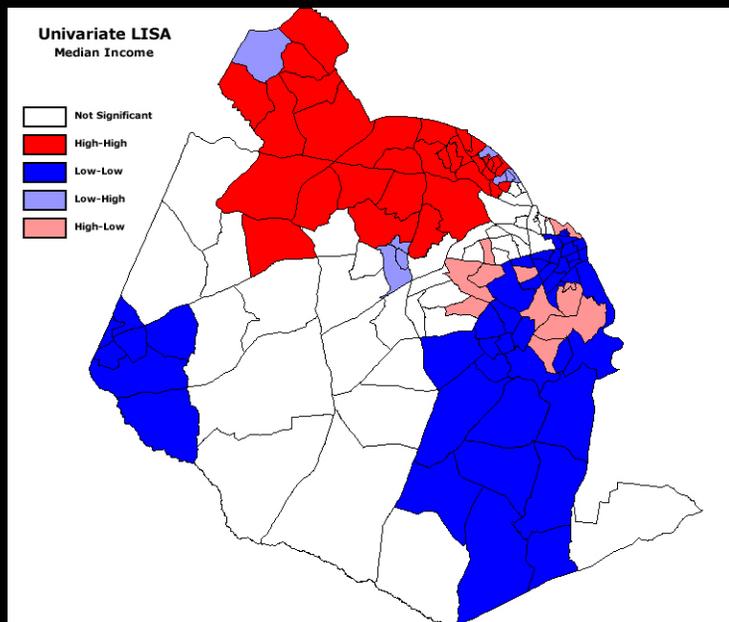
Local Indicators of Spatial Association



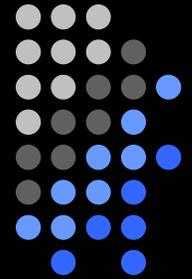
- The color scheme (in the maps that follow) denotes the nature of the relationship between a block group's rate of domestic violence arrests and the rates in adjacent neighborhoods.
 - Block groups that have a *high rate of arrests* and whose neighbors also have *high rates of arrests* are labeled *high arrest rate-high arrest rate*.
 - Block groups that have a *low rate of arrests* and whose neighbors also have *low rates of arrests* are labeled *low arrest rate-low arrest rate*.
 - Block groups that have a *high rate of arrests* and whose neighbors have *low rates of arrests* are labeled *high arrest rate-low arrest rate*.
 - Block groups that have a *low rate of arrests* and whose neighbors have *high rates of arrests* are labeled *low arrest rate-high arrest rate*.

Criminal Domestic Violence Arrests Pre-Court

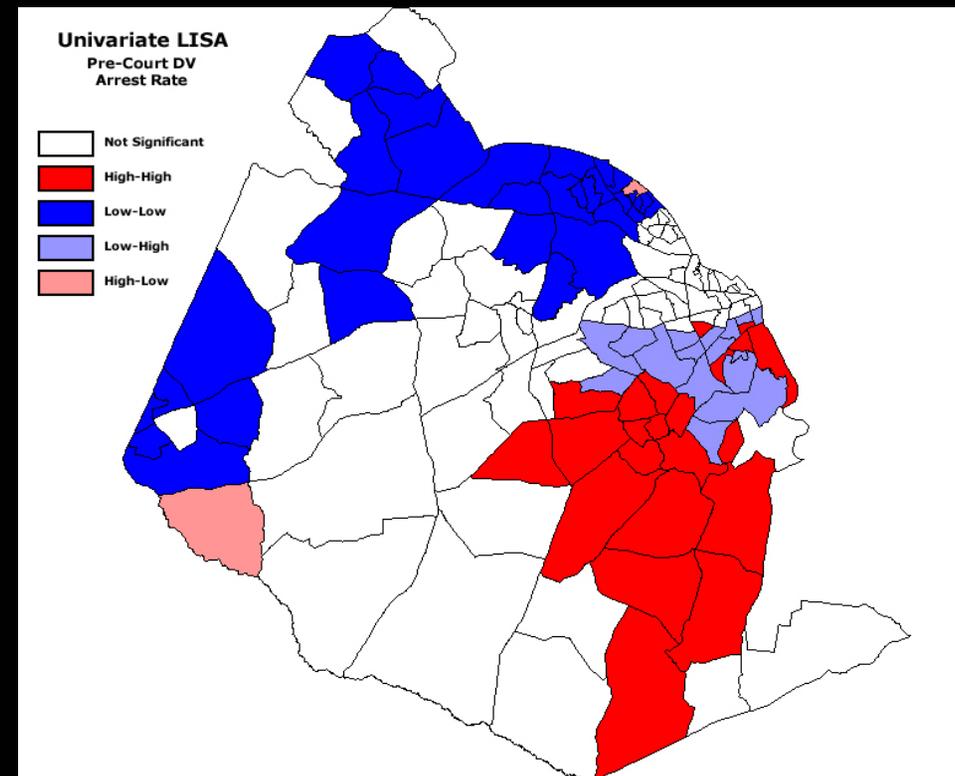
- The quartile map indicates clusters of criminal domestic violence arrests in the southern part of the County, West Columbia, and Cayce.
- These differences in the northern and southern distribution of domestic violence parallel the distribution of income.



Criminal Domestic Violence Arrests Pre-Court

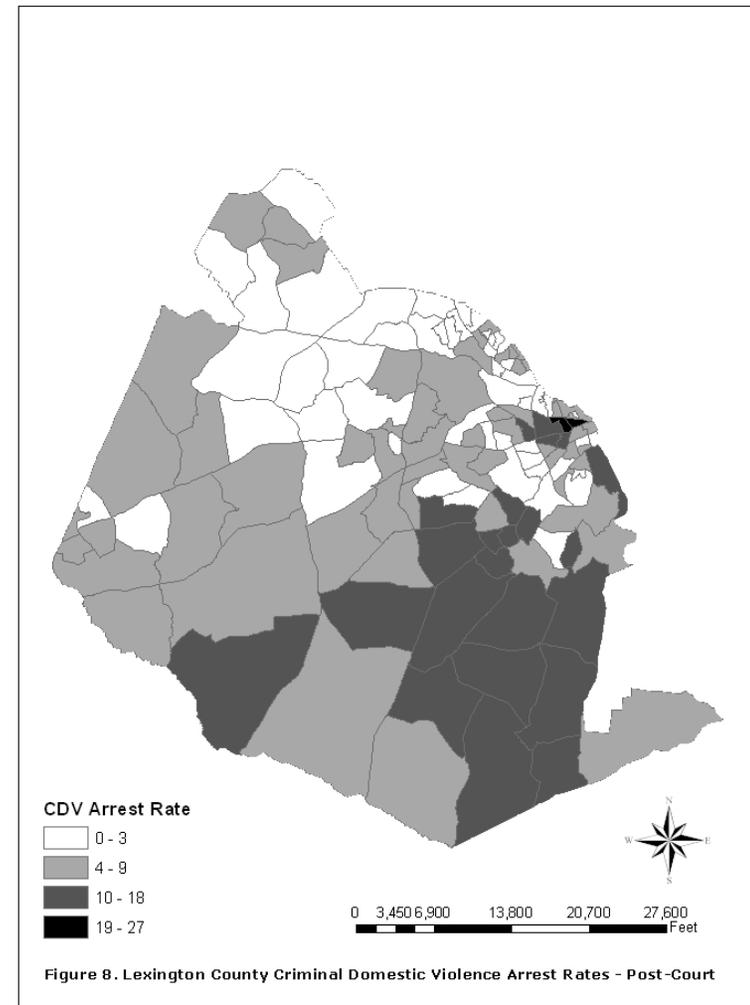
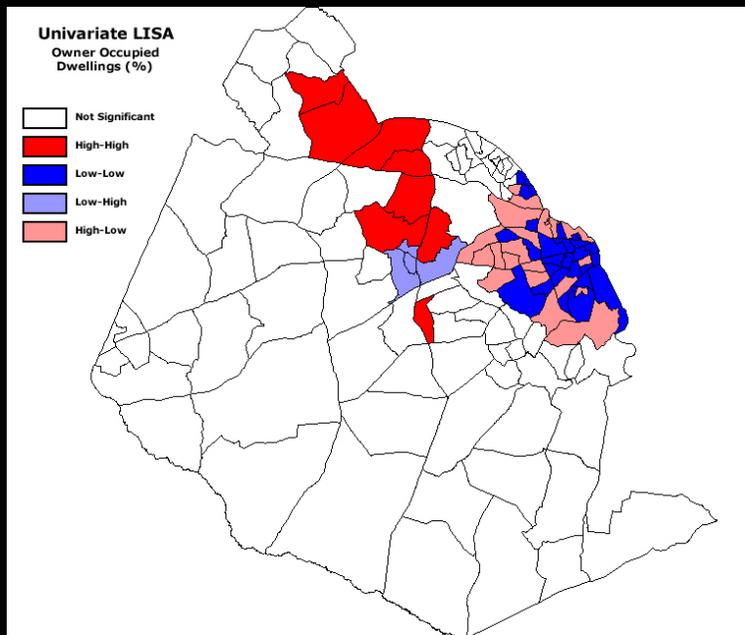


- The LISA statistics identify areas that are “hot spots” for criminal domestic violence.
- In the southern part of Lexington County there are 16 neighborhoods that cluster to form a large area with high levels of domestic violence arrests including Gaston and the Southern part of the City of Lexington.
- There is a second cluster of 8 neighborhoods with a high level of domestic violence arrests in West Columbia.

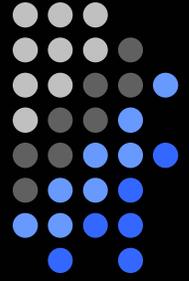


Criminal Domestic Violence Arrests Post-Court

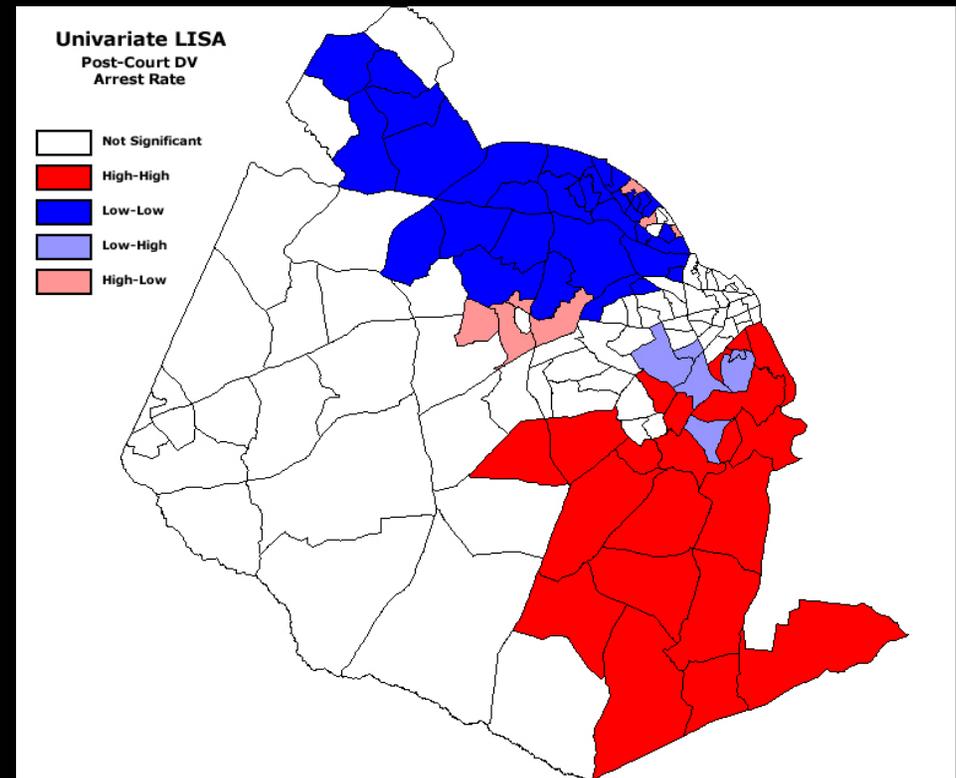
- There are clusters of criminal domestic violence arrests in the southern part of the County and lower rates in the north.
- These differences in the northern and southern distribution of domestic violence parallel the distribution of owner occupied dwellings.



Criminal Domestic Violence Arrests Post-Court



- In the southern part of Lexington County there are 17 neighborhoods that cluster to form a large area with high levels of domestic violence arrests including Gaston and the Southern part of the City of Lexington.
- Unlike before the court, this “hot spot” also borders two communities with significantly low rates of criminal domestic violence arrests.



Beyond ESDA: Assessing Effects in a Multivariate Regression Model

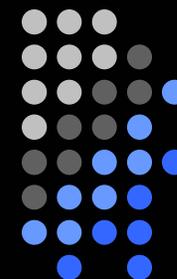
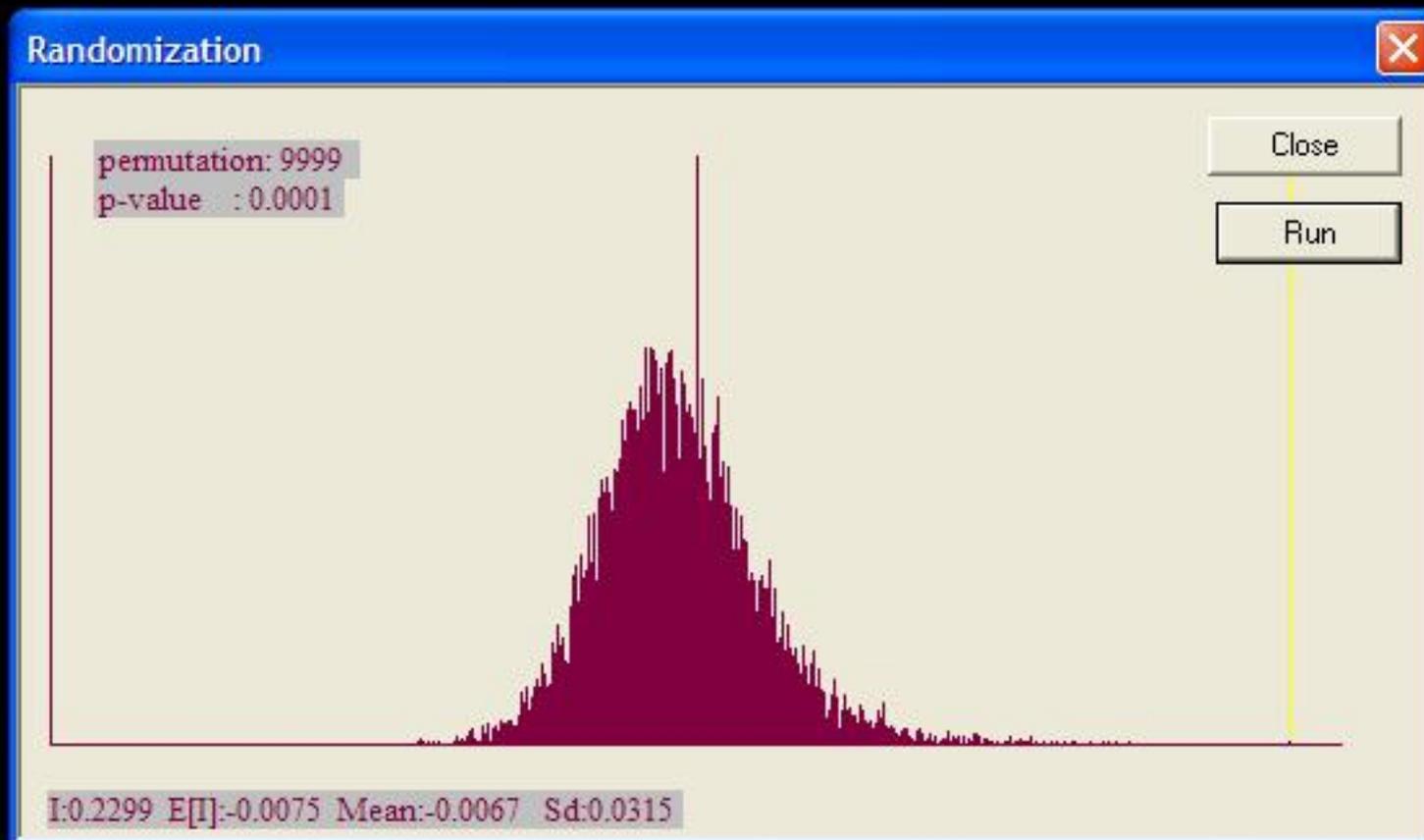
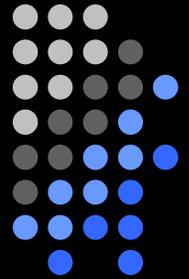


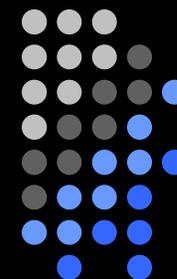
Table 1: Descriptive Statistics for Lexington County Census Block Groups (N = 135)

Factor	Min	Max	Mean	Std. Dev.
Pre-Court DV Arrest Rate	0	27	5.90	5.129
Post-Court DV Arrest Rate	0	34	7.07	6.137
Population per Square Mile (2000)	47.64	11188.49	1269.4127	1494.74326
Percent Female Headed Households	0.00	43.44	11.6161	6.35344
Percent Owner Occupied Dwellings	1.13	97.08	69.3842	19.35512
Median Household Income	15931	95677	45346.04	16186.785
Percent Hispanic	.14	18.25	2.0039	2.24175
Percent Black	.32	62.19	14.6270	14.74434

A peek at *Moran's I*...



Beyond ESDA: Assessing Effects in a Multivariate Regression Model

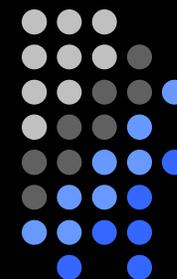


**Table 4: Spatial Error Regression Results:
Rate of Domestic Violence Arrests in Pre-Court Period**

Factor	B	SE	P-value
Constant	10.80109	2.965628	0.0002705
Population per Square Mile (2000)	-0.001220916	0.0003397598	0.0003264**
Percent Female Headed Households	0.2280473	0.07680424	0.0029859**
Percent Owner Occupied Dwellings	-0.02495713	0.03016934	0.4081037
Median Household Income	-0.0009601776	0.00003663513	0.0087693**
Percent Hispanic	0.9775138	0.1787377	0.0000000**
Percent Black	-0.02538952	0.03667223	0.4887259
Lamda (Spatial error correction)	0.6827206	0.1080756	0.0000000**

* = $p < .05$, ** = $p < .01$

Beyond ESDA: Assessing Effects in a Multivariate Regression Model

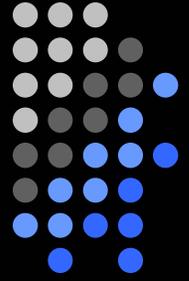


**Table 5: Spatial Error Regression Results:
Rate of Domestic Violence Arrests in Post-Court Period**

Factor	B	SE	P-value
Constant	11.57258	2.38823	0.0000013
Population per Square Mile (2000)	-0.0009484117	0.0002793866	0.0006873**
Percent Female Headed Households	0.1380623	0.06391722	0.0307713*
Percent Owner Occupied Dwellings	-0.04949165	0.02507707	0.0484292*
Median Household Income	-0.00008333595	0.00002974713	0.0050870**
Percent Hispanic	0.7799741	0.1488586	0.0000002**
Percent Black	-0.0152892	0.03034768	0.6144011
Lamda (Spatial error correction)	0.6022389	0.1269304	0.0000021**

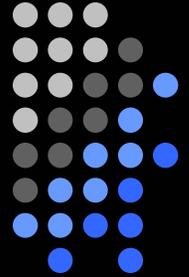
* = $p < .05$, ** = $p < .01$

Multivariate Analysis Interpretation



- Data show significant spatial autocorrelation (*Moran's I* statistic), corrected in spatial regression
- Spatial regression allows for greater confidence in interpreting significance of factors contributing to rates of arrest
- Comparison of pre-court and post-court periods shows similar results:
 - Models are driven by measures of population per square mile, percent female-headed households, median household income, and percent Hispanic
 - Percent owner-occupied dwellings also becomes significant in post-court period

Limitations and Conclusions



- Limitations:
 - Present study does not address specifics of causality
 - Generalizability – is Lexington County, SC unique in any way? Examples of rural vs. urban differences?
- Conclusions:
 - ESDA and multivariate analyses indicate that:
 - Domestic violence arrest rates are reasonably stable in space over time, although they become more concentrated after the CDV court intervention
 - Domestic violence arrest rates are consistently associated with lower population per square mile (e.g., more rural areas) and areas with social disorganization (lower incomes, more renters, family instability, etc.)

Thank you...

Questions or Comments?

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