HIGH CRIME NEIGHBORHOODS AS A DRIVER OF TOXIC STRESS LEADING TO ASTHMA

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INTRODUCTION

Social determinants of health and allostatic load theory suggest social environment can drive asthma diagnoses via the mechanism of toxic stress, the prolonged activation of stress response systems.[1,2] While research has linked neighborhood crime to asthma, multivariate causal modeling has not been used to test toxic stress as the mechanism that links the two.[3]

The current study investigates neighborhood crime as a driver of pediatric asthma diagnoses via toxic stress using structural equation modeling.

METHODS

A retrospective geospatial analysis of health and crime data from 2016–2017 was conducted.

OU-Tulsa General Pediatric Clinic Electronic Medical Record Data:
- Toxic Stress Indicators: diagnoses of conduct, attention deficit, and other anxiety disorders.
- Pediatric Asthma Diagnoses

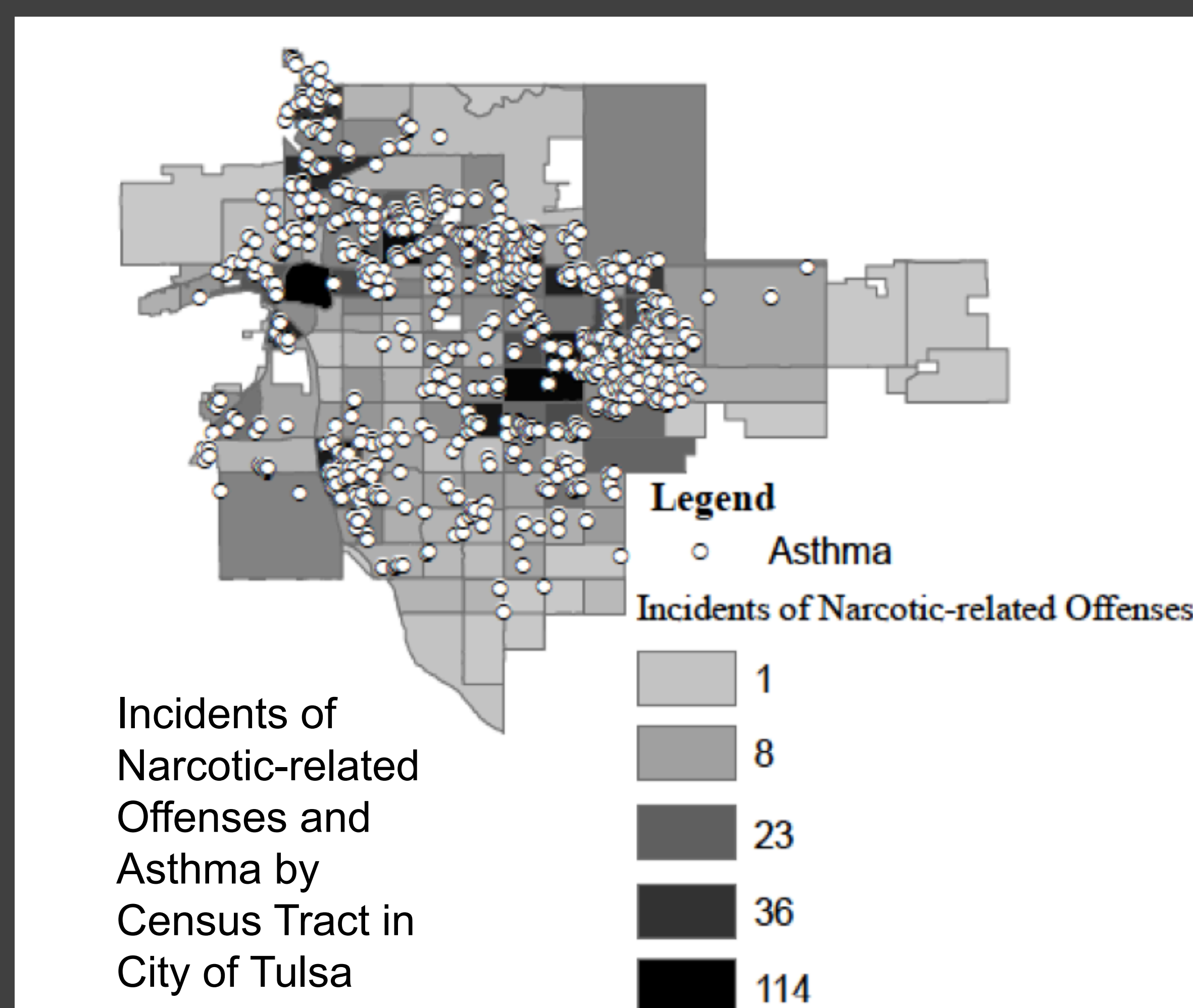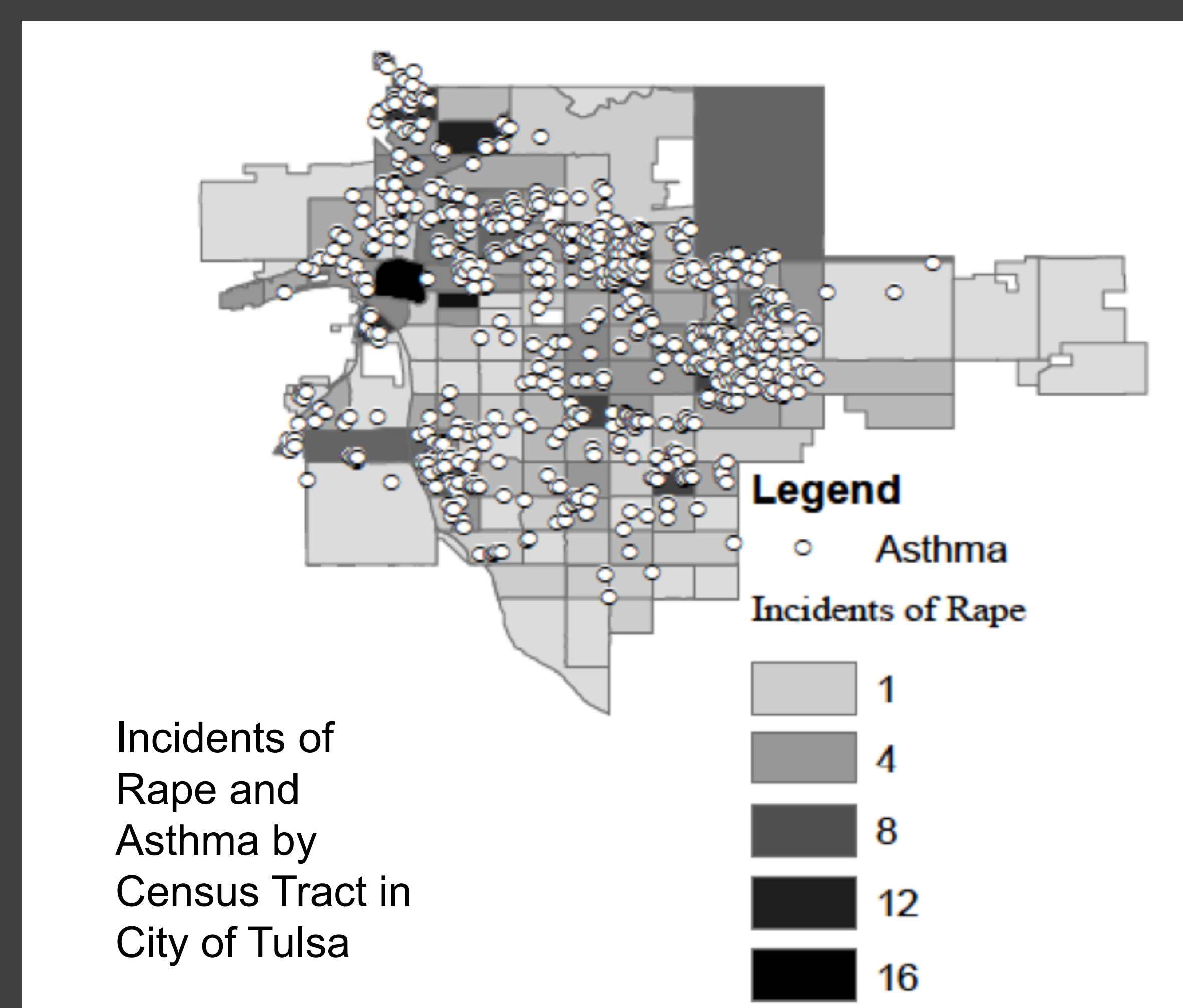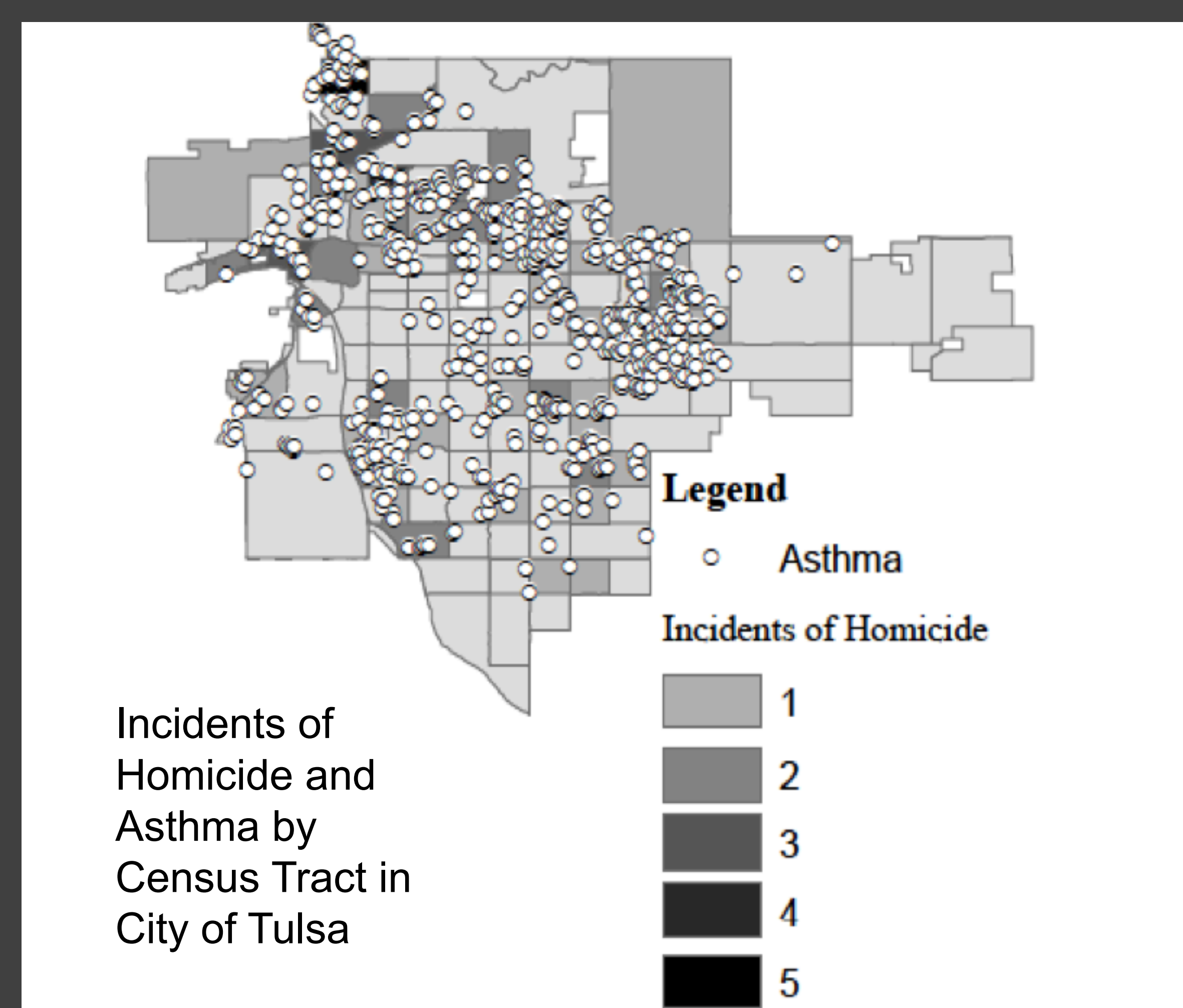**Tulsa Police Department Data:**
- Neighborhood Crime Indicators: homicide, rape, and narcotic-related offenses.

All variables were mapped geospatially using census tract as the unit of analysis.

Structural equation modeling was used to test the causal model.

Data from 2016 was used as a calibration sample while 2017 data was used as a validation sample.

CITY OF TULSA MAPS

Incidents of Homicide and Asthma by Census Tract in City of Tulsa

Legend
○ Asthma
Incidents of Homicide
1
2
3
4
5

Incidents of Rape and Asthma by Census Tract in City of Tulsa

Legend
○ Asthma
Incidents of Rape
1
4
8
12
16

Incidents of Narcotic-related Offenses and Asthma by Census Tract in City of Tulsa

Legend
○ Asthma
Incidents of Narcotic-related Offenses
1
8
23
36
114

RESULTS

A Structural Model of Crime as a Driver of Toxic Stress and Asthma Diagnoses Among OU Pediatric Patients by 2016 Census Tracts (N=134)
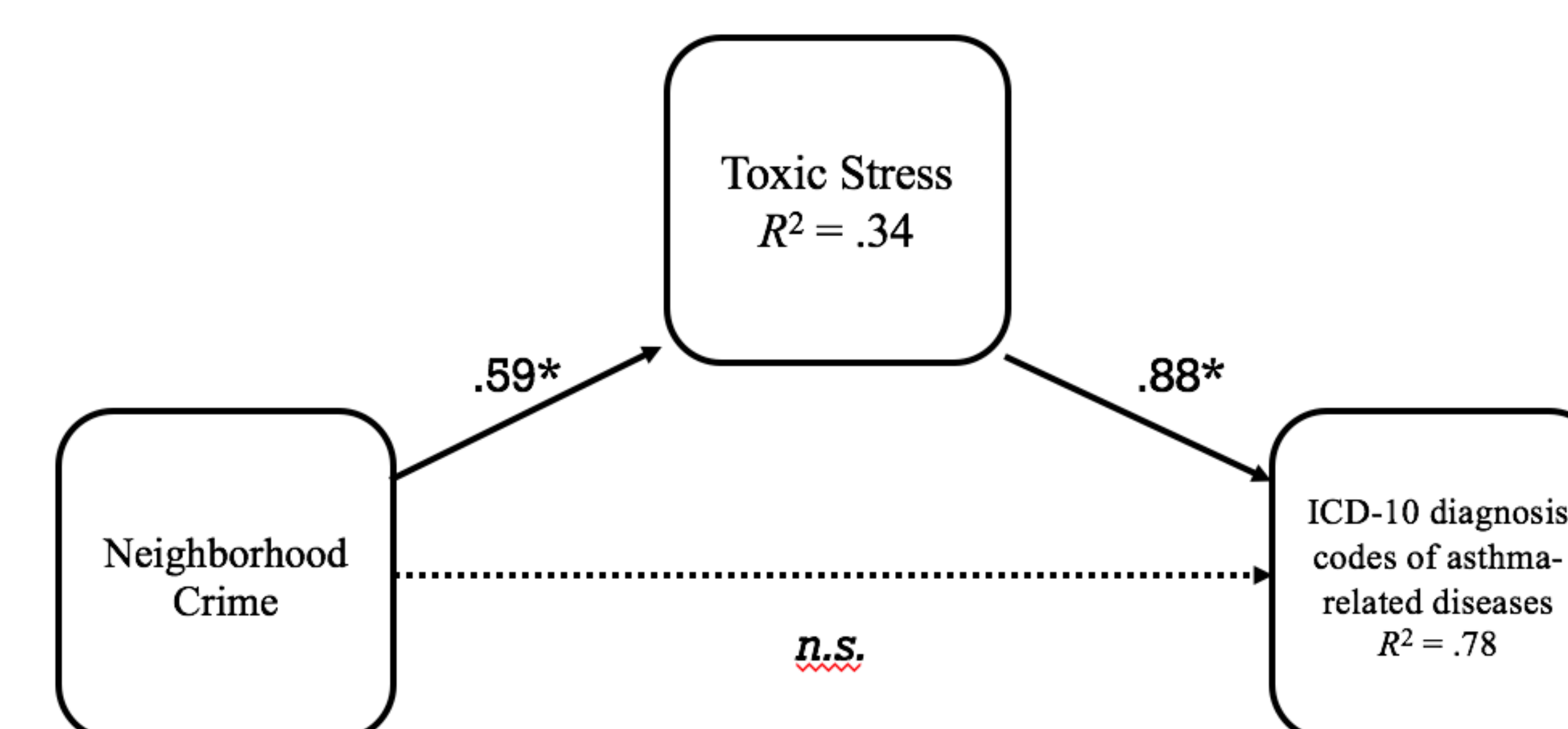
- A full mediation model of high crime neighborhoods (n = 134) as a driver of toxic stress resulting in increased asthma diagnoses fit the 2016 data well (X^2 = 15.6, p =.27; df = 13; RMSEA = .04 [90% CI: .00, .10]; CFI: .99; SRMR = .04).

- The results indicated the model accounted for 78% (R^2 = .78) of the variance in asthma diagnoses.

- The model also provided a good fit to the 2017 data (X^2= 23.6, p<.001; df= 13; RMSEA = .08 [90% CI: .02, .13]; CFI: .96; SRMR=.06).

SUMMARY & CONCLUSION

- The results of the current study have important practice and research implications.

- Physicians interested in alleviating the burden of toxic stress and asthma should explore ways to reduce neighborhood crime at the policy level while also being aware of each of their patient's unique circumstances in relation to where they live.

REFERENCES

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3. Beck, A., Huang, B., Ryan, P., Sandel, M., Chen. C., Kahn, R. (2016). Areas with high rates of police-reported violent crime have higher rates of childhood asthma morbidity. J of Pediatrics, 173 :175-182.