



Male incarceration rates, spatial access to sexual health care, and sexually transmitted infections: A moderation analysis

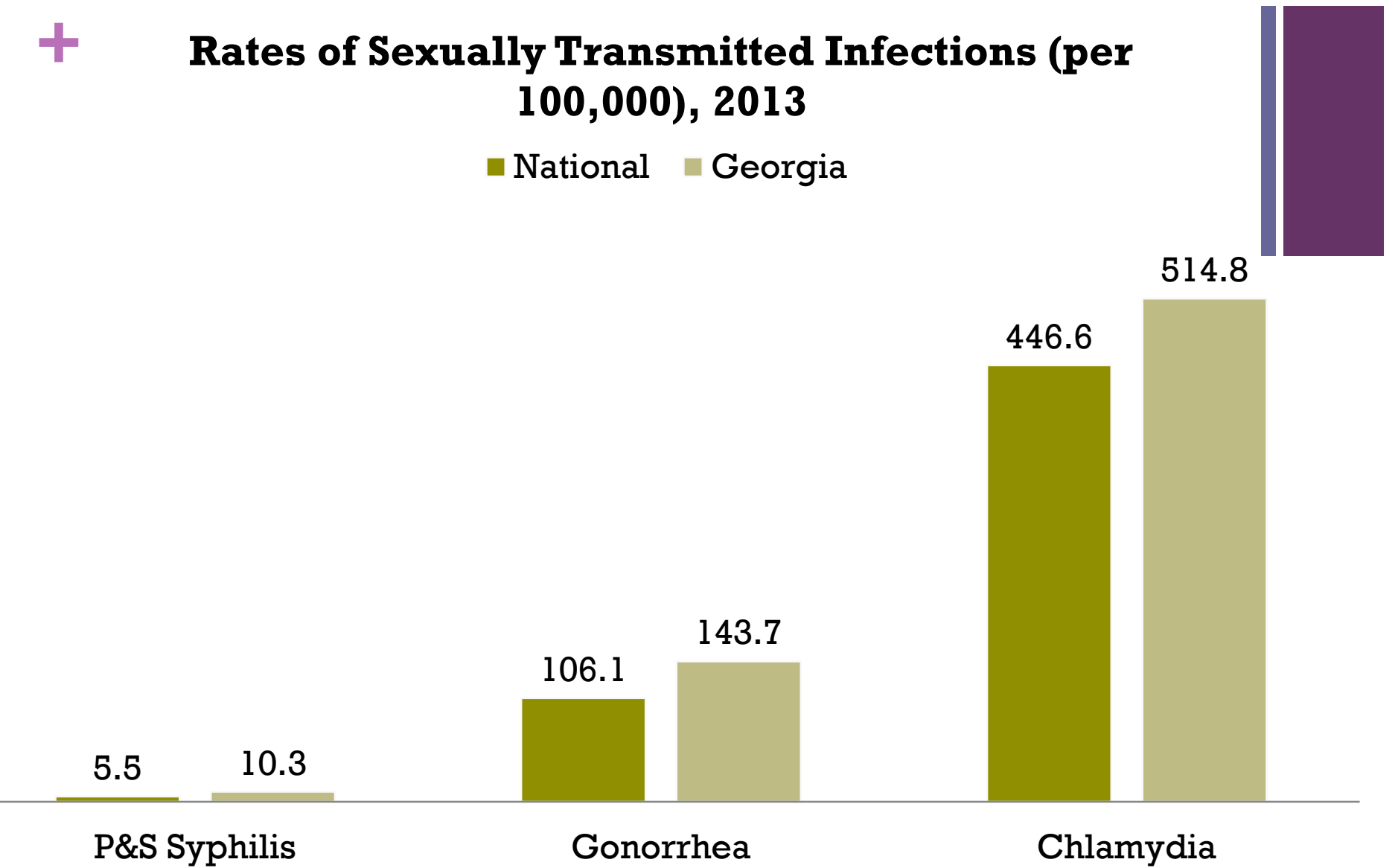
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Rates of Sexually Transmitted Infections (per 100,000), 2013

■ National ■ Georgia



(Source: CDC, 2014)



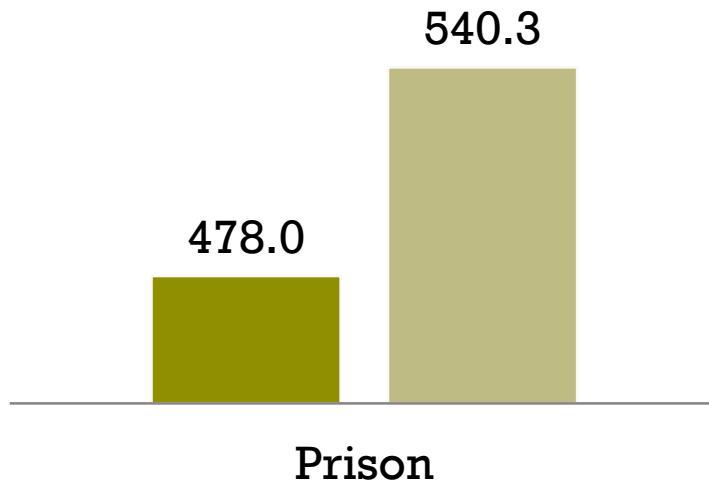
Factors Hypothesized to Shape STI Rates



Incarceration

Rates of Incarceration (per 100,000), 2013

■ National ■ Georgia



Health Care Service Environment

- Testing and Treatment
- Spatial access to health care (e.g. travel time, distance)
 - Shapes health care utilization
 - Determinant of treatment seeking behavior
- Empirical evidence is conflicting

+ Research Aim and Hypothesis



- Aim:

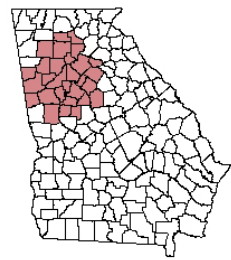
- Explore health care service availability as a moderator of the relationship between male incarceration and STIs, 2010

- Hypothesis:

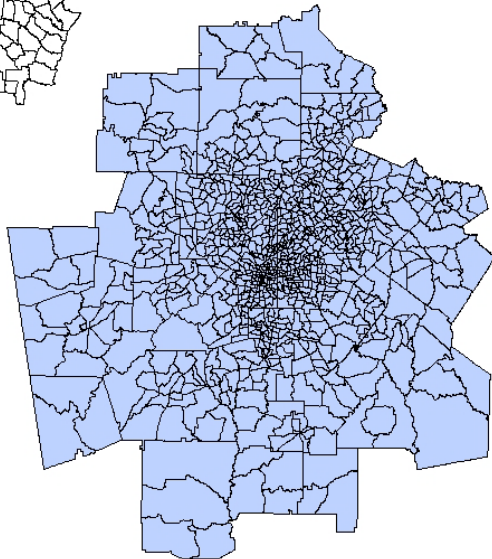
- Greater spatial access to sexual health care will decrease the magnitude of the relationship between rates of male incarceration and rates of STIs.

+ Methods

Sample



Atlanta, GA
(n=946)



Variables

- 2010
- Dependent variable
 - Rate of STIs (Chlamydia, gonorrhea, P&S syphilis)
- Independent variables
 - Rate of male incarceration
 - Spatial access to a sexual healthcare facility
 - Euclidian distance
- Control variables



Methods

Analysis

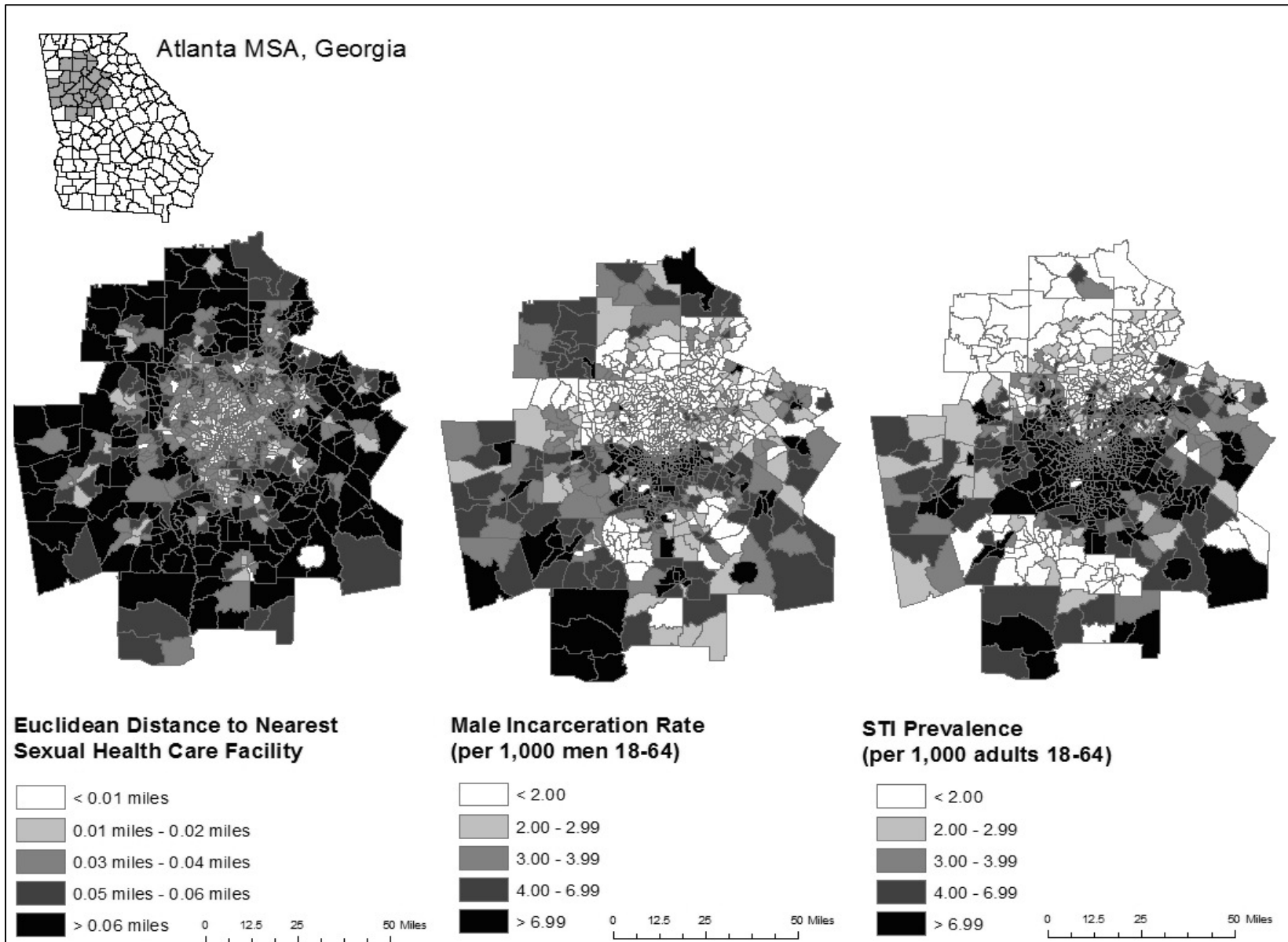
- Univariate & bivariate analyses
- Regression Model
 - Rate of male incarceration + Spatial access to care → prevalence of STIs
- Moderation Models (Baron and Kenny, 1986)
 - Unadjusted moderation model
 - Multivariate moderation model
 - Controlling for covariates ($p < 0.05$)
- Stratified regression
 - Quartiles of spatial access to sexual health facilities
- SAS

+ Results




Table 1. Distributions of census-tract level characteristics in the Atlanta MSA, 2010 (N=946)

Characteristics	Mean (SD)
Male Incarceration Rate	4.63 (5.25)
Euclidean distance (in miles) to nearest sexual health facility	0.42 (0.35)
Rate of newly-diagnosed STIs	11.30 (12.00)

Figure 1. Maps depicting the distance to the nearest sexual health facility, male incarceration rate and prevalence of newly-diagnosed STIs in the Atlanta MSA, 2010 (N=946)



+ Table 2. Base model and moderation model examining the moderation effect of spatial access to sexual health care on tract-level rate of male incarceration and tract-level prevalence of newly-diagnosed STIs in the Atlanta MSA, 2010

	Base Model		Moderation Model	
	B	SE B	B	SE B
Rate of male incarceration 	1.44	0.06***	0.69	0.06***
Euclidean distance to closest sexual health care service (in miles) 	-81.91	9.21***	37.90	11.99**
Rate of male incarceration* Euclidean distance to closest sexual health care service	---	---	-10.63	2.14*** 
R ²	0.53		0.78	
F	435.47**		266.32***	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ Note: Moderation model controlled for % living in poverty, % non-Hispanic Black, median age, % in the armed forces, % married, % whose highest educational attainment is high school and % unemployed.

+ **Table 3.** Regression models exploring rate of male incarceration and tract-level prevalence of newly-diagnosed STIs in the Atlanta MSA, stratified by spatial access to sexual health care and adjusted for covariates, 2010.

	Model Characteristics			
	B	SE B	R ²	F
25% Shortest Distance to Nearest Sexual Health Facility				
Rate of male incarceration	0.49	0.11***	0.73	65.01***
50% Distance to Nearest Sexual Health Facility				
Rate of male incarceration	0.32	0.11**	0.81	95.77***
75% Distance to Nearest Sexual Health Facility				
Rate of male incarceration	0.17	0.16	0.81	100.39***
> 75% Furthest Distance to Nearest Sexual Health Facility				
Rate of male incarceration	0.08	0.10	0.80	84.72***

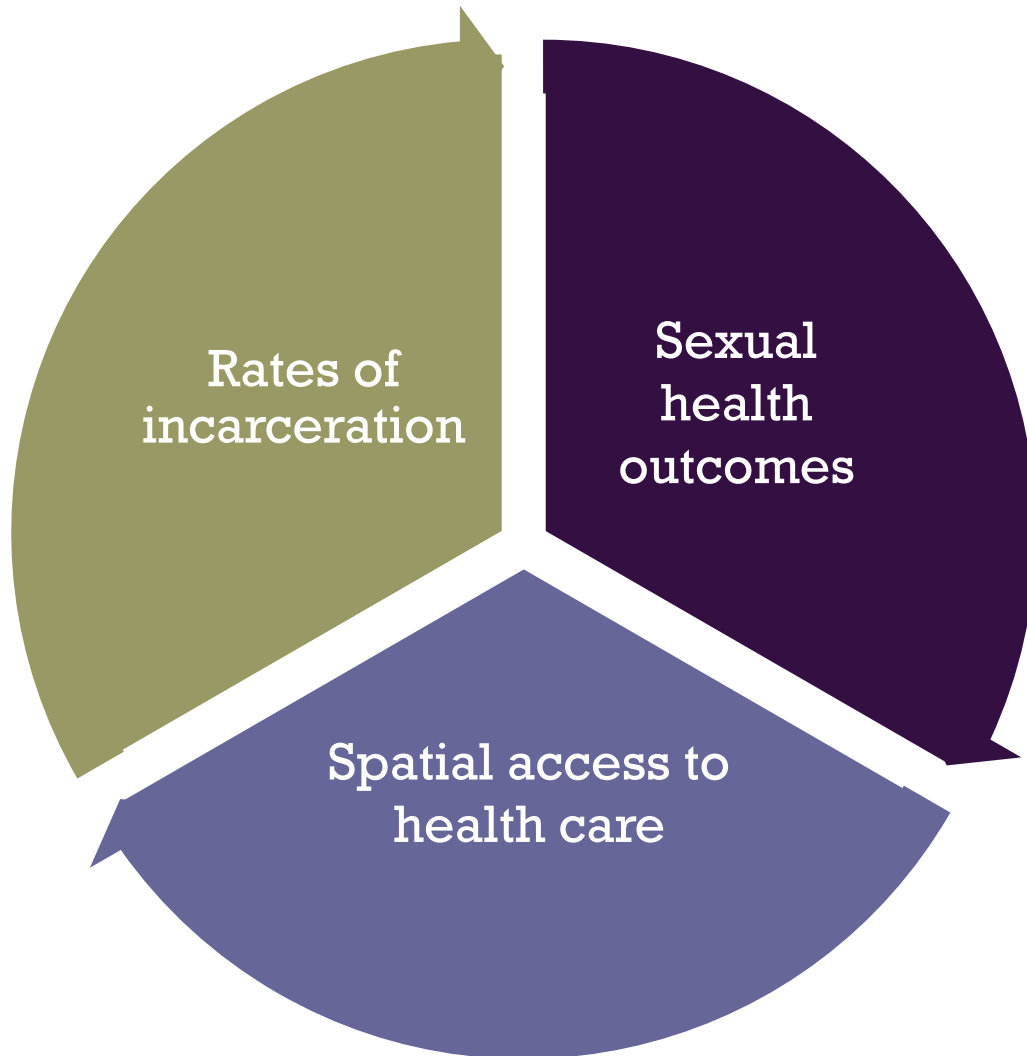
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ Note: Moderation model controlled for % living in poverty, % non-Hispanic Black, median age, % in the armed forces, % married, % whose highest educational attainment is high school and % unemployed.

+ Discussion



- Spatial access to sexual health care is an effect modifier
 - As spatial access worsened, the magnitude of the association *decreased*
- In areas with the best spatial access:
 - Male incarceration predicted a positive increase in prevalence of STIs

+ Discussion



Spatial access to health care

- Effect modifier but not as expected
- Additional “costs” of accessing health care

(ex. Acury et al., 2005; Dorrell et al., 2011; Mosen et al., 1998; Aral et al., 2008; Mercer et al., 2007; Penchansky & Thomas, 1981; Haynes, 2003)

+ Concluding Remarks

Future Research

- Types of health care facilities
- Overwhelming impact of male incarceration
 - Disparities in health care utilization
- Convenience and utilization

Implications for Practice

- Improve accessibility for vulnerable groups
- Health care providers to be informed about the environments in which their patients live

+ Acknowledgements

- NIMH grant “Male incarceration, the health care service environment and sexual health” (F31 MH096630)
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- Laney Graduate School, Emory University
- Center for Digital Scholarship, Emory University



Thank you!

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Extra Slides

+ Methods – Measures

Dependent Variable:

- Prevalence of Chlamydia, gonorrhea, and P&S syphilis
 - Suppressed data (<5 cases)
 - Aggregated
- STI prevalence rate = $(\# \text{ of STIs} / \text{Adult population}) * 1,000$

+ Methods –Measures

Independent Variables

Rate of Male Incarceration

- Rate of male incarceration
 - Individual inmate records
- Geocoded addresses
 - ArcGIS
 - Google Earth Pro
 - N= 25,926
- Male incarceration rate= (# of men incarcerated / adult male population) * 1,000

Spatial Access to Care

- Sexual Health Facility
 - STI testing, treatment and/or vaccination
- Sexual Health Facility Inventory
 - Comprehensive internet search
 - Surveying local health care providers
 - Consulting ACOG
 - Title X funding
- Geocoded
- Spatial access
 - Equity Index
 - Euclidean distance
 - Population-weighted centroid
 - Higher values indicate further distance
- ArcGIS



Quantitative Methods –Measures

Control Variables

- Tract-level
 - % of residents who identified as non-Hispanic Black/ African-American
 - % unemployed
 - % in armed forces
 - Median age
 - % living in poverty
 - % of residents who are married
 - % of residents aged ≥ 25 years whose highest educational attainment is high school

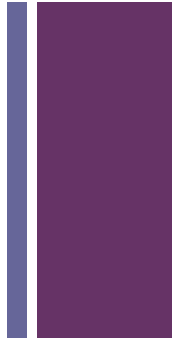
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	Rate of Male Incarceration	Model Characteristics			
	Mean (SD)	B	SE B	R ²	F
25% Shortest Distance to Nearest Sexual Health Facility	6.74 (8.18)				
Rate of male incarceration		0.49	0.11***	0.73	65.01***
50% Distance to Nearest Sexual Health Facility	5.09 (4.81)				
Rate of male incarceration		0.32	0.11**	0.81	95.77***
75% Distance to Nearest Sexual Health Facility	3.77 (3.11)				
Rate of male incarceration		0.17	0.16	0.81	100.39***
> 75% Furthest Distance to Nearest Sexual Health Facility	3.15 (1.98)				
Rate of male incarceration		0.08	0.10	0.80	84.72***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ Note: Moderation model controlled for % living in poverty, % non-Hispanic Black, median age, % in the armed forces, % married, % whose highest educational attainment is high school and % unemployed.



Supplemental Table 2: Sensitivity Analysis



	Model A (set to 0)		Model B (set to 4)	
	B	SE B	B	SE B
Rate of male incarceration	0.70	0.06***	0.71	0.06***
Euclidean distance to closest sexual health care service (in miles)	35.03	10.34***	36.96	10.34**
Rate of male incarceration* Euclidean distance to closest sexual health care service	-10.54	1.94***	-10.72	1.94***
R ²	0.79		0.79	
F	318.98***		309.91***	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ Note: Moderation model controlled for % living in poverty, % non-Hispanic Black, median age, % in the armed forces, % married, % whose highest educational attainment is high school and % unemployed.

+ Limitations



- Census tracts as neighborhood proxy
- Male incarceration address data
- Measure of spatial access
- Health care service inventory

+ Concluding Remarks

Future Research

- Types of health care facilities
- Overwhelming impact of male incarceration
 - Disparities in health care utilization
- Longitudinal analyses
- Convenience and utilization

Implications for Practice

- Location of STI-prevention programs/outreach
- Improve accessibility for vulnerable groups
- Health care providers to be informed about the environments in which their patients live