Racial Disparities in Traffic Enforcement

Mike Dolan Fliss
UNC-CH Injury Prevention Research Center

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RACIAL DISPARITIES IN LAW ENFORCEMENT TRAFFIC STOPS:
MEASUREMENT, INTERPRETATION, & INTERVENTION POSSIBILITIES

MIKE DOLAN FLISS, PHD, MPS, MSW
UNC INJURY PREVENTION RESEARCH CENTER
NC DPH INJURY & VIOLENCE PREVENTION BRANCH
TALK GIVEN 2020.11.20 TO:
TRANSPORTATION RESEARCH & EDUCATION CENTER (TREC) AT PORTLAND STATE UNIVERSITY (PSU)
OUTLINE

- **Background:** Traffic Stops & Public Health
- **Aim 1: Measurement**
  - Focus: access, volume, multi-agency driving
- **Aim 2: Intervention**
  - Focus: stop types, crashes, disparities & crime
- **Aim 3: Interpretation**
  - Public Health Critical Race Praxis
- **Associated Studies**
  - Crash record linkage; death by law enforcement linkage
- **Discussion**
  (+References & supplemental analyses / slides)
BACKGROUND
“The primary aim of traffic law enforcement is to reduce traffic accidents, injuries, and deaths through fair, impartial, and reasonable enforcement of traffic laws.”

-South Carolina Traffic Ticket
How do we measure “fair, impartial, and reasonable enforcement?”

How do we attribute driver risk to individual law enforcement agencies (e.g. Clemson, South Carolina Police Department) given driving dynamics?

How primary is the aim of “reducing traffic accidents, injuries, and deaths,” and can this aim be made more central?
ARE TRAFFIC STOPS PUBLIC HEALTH RELATED?

YES
CONVENTIONAL FRAME

- Evidence-based intervention for multiple injury-related outcomes (Goodwin 2015)
  - Motor vehicle and pedestrian crash prevention, seatbelts*, etc.
- Conventionally linked to other injury and health outcomes
  - Public safety, “crime,” etc.
A means of surveillance of disparate treatment by law enforcement at multiple levels. Call for explicit anti-racist praxis by public health (Ford, 2018)

Social epidemiology acknowledgement of “less material” outcomes: loss of public trust, justice-involvement as a negative health outcome, extraction of wealth and bodies from communities

Traffic stops are a direct path to death by police, very much a countable public health outcome. E.g. Walter Scott, Philandro Castile, Sandra Bland
Traffic stops are the most incident interaction with law enforcement in the US, with around 9% pulled over every year.

Supreme court cases in 1968 (Terry v. Ohio) and 1996 (Whren v. United States) provide almost limitless discretion to escalate minor traffic violations into a traffic stop.

Preliminary analyses have suggested widespread disparities in traffic stops and proximate outcomes (search, contraband, citation, etc.) However, stop rates (based on residential populations) are fundamentally flawed!
See Frank Baumgartner’s ongoing work

- Documents disparities in downstream outcomes from a political science/legal point of view – searches, contraband hit rates, written consent, pleading down speeding tickets, etc.

- Ongoing work with community groups / start of project
1. **Measurement (NC):** Create travel-based traffic stop rates for NC law enforcement agencies, describing the direction and extent of change in measures of disparity when accounting for disparate travel factors.

2. **Intervention (Fayetteville):** Evaluate an intervention designed to prevent motor vehicle fatalities and reduce traffic stop disparities.

- **Side aim:** Explore Critical Race Theory (CRT) and Public Health Critical Race Praxis (PHCRP) as tools for reflection & interpretation of traffic stops.
WHY NORTH CAROLINA?

- NC has one of the oldest and most complete traffic stop datasets in the nation (22+ million since 2002)
- Preliminary analyses, published peer-reviewed literature and books suggest stops, searches, contraband hit rates, stop reasons, and arrests are all disproportionate
- Local collaborations ground the analysis in realities and possibility for local action
DATASETS

Primary:
- 2002-2017 NC State Bureau of Investigation (SBI) Traffic Stop Database

Supplemental:
- 2017 National Household Travel Survey (NHTS) (Aim 1 & 2)
- 2000 and 2010 US Census
- Inter-decile American Communities Surveys (ACS)
- Motor vehicle crashes, injuries, fatalities (UNC HSRC) (Aim 2)
- “Crime” – index and violent crime from NC SBI UCR (Aim 2)
Table 1. NC SBI traffic stop dataset (2002-2017) vs. NC population demographics (2010 census). Race-ethnicity categories are mutually exclusive by including all Hispanic identified individuals in own category and all race categories are non-Hispanic.
MEASUREMENT
ACCESS, VOLUME, MULTI-AGENCY DRIVING
RESIDENTIAL-BASED RATES ARE FLAWED

- Standard **rate denominators** ("benchmarks") use resident populations - known to be flawed for driving-based phenomena \(^{12, 26, 36, 102, 113}\).

- Alternatives proposed.
  - Survey data \(^{26, 27}\)
  - Complicated metrics: propensity scores \(^{84}\) or odds ratios metric with "not at fault" accidents
  - RTI STAR & "Veil of Darkness" \(^{43}\) – particularly flawed concept
  - Pro-rate residents into drivers by adjustment factors using % of resident citations \(^{116}\) or inverse distance weighting (IDW) \(^{88}\)
Fridell identifies six factors – But mixes measurement with alternate explanations / disparity confounders.

Will focus on three adjustment factors: (1) access, (2) volume, and (3) multi-agency driving

Let’s take a quick look at the national literature on differences in these factors before moving to NC
PRIOR NATIONAL STUDIES

- **Access**: Nationally, in 2001, 4/5 White non-Hispanic households vs. 1/2 Black and Hispanic households had access to a vehicle (Tal & Handy, 2005).

- **Volume**: Nationally, in 2001, White non-Hispanic households drove ~11,000 miles per year vs ~9,000 for Black and Hispanic households (Tal & Handy, 2005).

- **Multi-agency Driving**: In 2009, daily average travel radius of licensed drivers at or below the poverty level was over 10 miles less in Atlanta and Los Angeles, but 15 miles greater in New York City, compared to drivers making over $100k/year. (Methipara, 2014)

Fig. 5 Daily Travel Radius of Workers who are licensed drivers

![Maps showing travel radius](Data Source: 2009 FHWA NHTS)

- a. Atlanta: $100k+: 37 miles
- At/Below Poverty: 21 miles
- b. Los Angeles: $100k+: 26 miles
- At/Below Poverty: 14 miles
- c. New York City: $100k+: 26 miles
- At/Below Poverty: 43 miles
Figure 1. Simplified example of compounding effect of differences in access to vehicles, volume of driving, and driving in multiple agency jurisdictions.
Combination of 0-3 adjustments creates 7 additional models

Subset to agencies with complete data over study years, populations > 10,000, and 1,000 stops for more stable rates (n=177)
Residential-based models
M1  Residential only model
M2  M1 scaled to total VMT

Driving models: single adjustment
M3  Access only
M4  Volume only
M5  Multi-agency only

Two-factor adjustment models
M6  Access & volume
M7  Access & multi-agency
M8  Volume & multi-agency

Three-factor adjustment model
M9  Access, volume, & multi-agency
### Measures of Survey Representation

<table>
<thead>
<tr>
<th>Race-Ethnicity</th>
<th>Number surveyed</th>
<th>Number represented</th>
<th>Number drivers represented</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian</td>
<td>307</td>
<td>251,577</td>
<td>184,748</td>
</tr>
<tr>
<td>American Indian</td>
<td>156</td>
<td>78,171</td>
<td>57,496</td>
</tr>
<tr>
<td>Black</td>
<td>2,444</td>
<td>2,015,261</td>
<td>1,294,804</td>
</tr>
<tr>
<td>Hispanic</td>
<td>600</td>
<td>828,660</td>
<td>532,834</td>
</tr>
<tr>
<td>Other</td>
<td>522</td>
<td>324,620</td>
<td>199,508</td>
</tr>
<tr>
<td>White non-Hispanic</td>
<td>13,556</td>
<td>5,950,650</td>
<td>4,894,298</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17,585</strong></td>
<td><strong>9,448,939</strong></td>
<td><strong>7,163,689</strong></td>
</tr>
</tbody>
</table>

**Table 2.** Measures of representativeness, access, and driver vehicle miles traveled for North Carolina from 2017 National Household Travel Survey (NHTS). Black households have less access to vehicles, drive less often, and drive fewer total vehicle miles than White non-Hispanic drivers. Starred measures (*) were used as model adjustment factors.
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(Supplemental) Figure 1. Surveyed and modeled percent of ring and total VMT at given unidirectional radius. Summary models for percent within radius (dotted black line, bottom row) were fit by the log of the radius with an inflection point at 25 miles and interaction by race-ethnicity. Hispanic North Carolina drivers drove farther on average, leading to their lower percent VMT distributed in the <1 mile radius band.
### RESULTS

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Total IR (CI)</th>
<th>Total TSRR (CI)</th>
<th>Black n-H TSRR (CI)</th>
<th>Hispanic TSRR (CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Residential-based models</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M1</td>
<td>Residential only model</td>
<td>1.88 (1.59, 2.16)</td>
<td>2.02 (1.86, 2.18)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M2</td>
<td>M1 scaled to total VMT</td>
<td>1.88 (1.59, 2.16)</td>
<td>2.02 (1.86, 2.18)</td>
<td>1.43 (1.32, 1.54)</td>
<td></td>
</tr>
<tr>
<td><strong>Driving models: single adjustment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M3</td>
<td>Access only</td>
<td>1.89 (1.60, 2.18)</td>
<td>2.58 (2.38, 2.78)</td>
<td>1.83 (1.70, 1.97)</td>
<td></td>
</tr>
<tr>
<td>M4</td>
<td>Volume only</td>
<td>1.89 (1.60, 2.17)</td>
<td>2.24 (2.06, 2.41)</td>
<td>1.24 (1.15, 1.34)</td>
<td></td>
</tr>
<tr>
<td>M5</td>
<td>Multi-agency only</td>
<td>8.85 (7.12, 10.59)</td>
<td>1.65 (1.46, 1.83)</td>
<td>1.24 (1.11, 1.36)</td>
<td></td>
</tr>
<tr>
<td><strong>Two-factor adjustment models</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M6</td>
<td>Access &amp; volume</td>
<td>1.90 (1.61, 2.19)</td>
<td>2.86 (2.64, 3.08)</td>
<td>1.59 (1.48, 1.71)</td>
<td></td>
</tr>
<tr>
<td>M7</td>
<td>Access &amp; multi-agency</td>
<td>8.90 (7.15, 10.64)</td>
<td>2.10 (1.87, 2.34)</td>
<td>1.58 (1.43, 1.74)</td>
<td></td>
</tr>
<tr>
<td>M8</td>
<td>Volume &amp; multi-agency</td>
<td>8.90 (7.15, 10.64)</td>
<td>1.82 (1.62, 2.03)</td>
<td>1.08 (.97, 1.18)</td>
<td></td>
</tr>
<tr>
<td><strong>Three-factor adjustment model</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M9</td>
<td>Access, volume, &amp; multi-agency</td>
<td>8.95 (7.19, 10.70)</td>
<td>2.33 (2.07, 2.59)</td>
<td>1.38 (1.24, 1.51)</td>
<td></td>
</tr>
</tbody>
</table>

**Table 3. Simulation model results.** Adjustment of residential-based traffic stop rate ratios for race-ethnicity-specific driving factors suggest residential-based rate ratios meaningfully underestimate the greater extent to which Black non-Hispanic (n-H) and Hispanic drivers are stopped. Incident rate of residential model 1 is / 1,000 people, models 2-9 are per 1,000 VMT. All models are scaled to consistent total VMT.
RESULTS

- **Disparities exist.**
  - All models suggested both groups experience disparate traffic stop rates compared to White non-Hispanic drivers.

- **Driving adjustments can matter**
  - Adjusting for three driving factors simultaneously, agency disparity indices increased 15% on average from 2.02 (1.86, 2.18) to 2.33 (2.07, 2.59) for Black non-Hispanic drivers. TSRRs were largely unchanged moving from 1.43 (1.32, 1.54) to 1.38 (1.24, 1.51) for Hispanic drivers.

- **Disparities may be systematically underestimated.**
  - Results suggest residential-based traffic stop rates may systematically underestimate already consistent disparities when driving factor differences compound.

Agencies should make efforts to base traffic stop rates and disparity measures on travel-informed baselines whenever possible, though may use more simplified driving models in practice.
INTERVENTION

STOP TYPES, CRASHES, DISPARITIES, & CRIME
Not all traffic stops are the same.

Disparities are different by stop type (Baumgartner, 2018, & preliminary analyses).

Discretion is also an opening for intervention.

---

### Raleigh Population, '15

<table>
<thead>
<tr>
<th>Total Population '15</th>
<th>% Black/AA</th>
</tr>
</thead>
<tbody>
<tr>
<td>439,896</td>
<td>29%</td>
</tr>
</tbody>
</table>

### Raleigh Traffic Stops, '02-'13

<table>
<thead>
<tr>
<th>Moving &amp; safety violations</th>
<th>% Black/AA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driving Impaired</td>
<td>26%</td>
</tr>
<tr>
<td>Stop Sign</td>
<td>37%</td>
</tr>
<tr>
<td>Speed Limit</td>
<td>37%</td>
</tr>
<tr>
<td>Safe Movement</td>
<td>41%</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic</td>
<td></td>
</tr>
<tr>
<td>Vehicle Regulatory</td>
<td>49%</td>
</tr>
<tr>
<td>Vehicle Equipment</td>
<td>55%</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Most discretionary</td>
<td></td>
</tr>
<tr>
<td>Seat Belt</td>
<td>46%</td>
</tr>
<tr>
<td>Other Vehicle</td>
<td>49%</td>
</tr>
<tr>
<td>Investigation</td>
<td>54%</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Stops '02-'13</td>
<td>44%</td>
</tr>
</tbody>
</table>

Example: Preliminary analysis done in 2015 focusing on Raleigh PD. Disparities are higher with economic and most discretionary stop types.
Tensions between community groups and police came to head with city council halting searches, chief and second in command left \(^{100}\). FPD under new leadership from 2013 to 2016.


Fayetteville had one of the highest motor vehicle crash rates in the state \(^{31}\).
WHAT WAS DONE?

From 2013-2016:

- Re-prioritized safety-related stop types
- FPD elected to use GPS data for all traffic stops (not standard)
- Targeted specific 3 high crash intersections a week (lots of supplementary analysis to dig into this).
- Intervention was multi-faceted, not just increase % safety stops: organizational culture, staffing, policies, etc.
OUTCOMES OF INTEREST

- Did the **intervention** happen? (% safety stops, etc.)

- Were **crashes** prevented? (fatalities, injuries, etc.)

- Did racial **disparities** decrease? (% Black, TSRR)

- Did **crime*** increase? (Index, violent; “Ferguson Effect.”)
- **Difference-in-Difference (DiD)** generally requires the parallel trend assumption (right), frequently violated.

- **Synthetic control** relaxes this assumption and (theoretically) provides some adjustment for unmeasured confounders by constructing appropriate controls matched on the pre-intervention period (Abadie et al., 2013, 2010, 2011).

- Synthetic control has had some recent calls for use in epidemiology and policy evaluation, (Rehkopf, 2018) including with injury and crime-related outcomes (Kagawa, 2018; Donohue, 2019).

# Pre-Intervention Period Measures

<table>
<thead>
<tr>
<th>Demographic Measures</th>
<th>Traffic Stop Measures</th>
<th>Crash Measures</th>
<th>Crime Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>% Median household income</td>
<td>Average safety stops (%)</td>
<td>Black driver stops (%)</td>
</tr>
<tr>
<td><strong>Intervention City</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fayetteville</td>
<td>203,670</td>
<td>41%    $43,882</td>
<td>13,968</td>
</tr>
<tr>
<td><strong>Control Cities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cary</td>
<td>155,822</td>
<td>8%     $94,617</td>
<td>9,179</td>
</tr>
<tr>
<td>Charlotte</td>
<td>808,834</td>
<td>35%    $55,599</td>
<td>47,177</td>
</tr>
<tr>
<td>Durham</td>
<td>251,761</td>
<td>39%    $52,115</td>
<td>9,329</td>
</tr>
<tr>
<td>Greensboro</td>
<td>282,177</td>
<td>41%    $42,802</td>
<td>21,043</td>
</tr>
<tr>
<td>High Point</td>
<td>108,982</td>
<td>33%    $43,322</td>
<td>9,919</td>
</tr>
<tr>
<td>Raleigh</td>
<td>441,326</td>
<td>28%    $58,641</td>
<td>26,374</td>
</tr>
<tr>
<td>Wilmington</td>
<td>113,724</td>
<td>18%    $43,855</td>
<td>6,674</td>
</tr>
<tr>
<td>Winston-Salem</td>
<td>238,474</td>
<td>34%    $40,898</td>
<td>13,616</td>
</tr>
</tbody>
</table>

Table 1. Pre-intervention period (2002-2012) average annual demographics and measures of traffic stops, motor vehicle crashes, and crime. *Traffic stop rate ratio is White non-Hispanic to Black non-Hispanic drivers adjusted to travel denominators instead of residential denominators. Abbreviations: MHHI = Median household income.
Figure 1. Crash, Crime, and Traffic Stop Metrics pre- and post-intervention period. Fayetteville Police Department is compared to a synthetic control department built by the 8 most similarly urban, high population, North Carolina police departments best matched for the pre-intervention period.
<table>
<thead>
<tr>
<th>Fayetteville Police Department</th>
<th>Synthetic Control</th>
<th>Difference between Fayetteville and Synthetic Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-intervention annual average</td>
<td>Post-intervention annual average</td>
<td>Annual Difference</td>
</tr>
<tr>
<td>Total Safety Stops</td>
<td>13,968</td>
<td>34,930</td>
</tr>
<tr>
<td>% Safety Stops</td>
<td>43.8%</td>
<td>68.1%</td>
</tr>
<tr>
<td>% Regulatory &amp; Equip. Stops</td>
<td>43.5%</td>
<td>27.4%</td>
</tr>
<tr>
<td>% Discretionary</td>
<td>12.7%</td>
<td>4.5%</td>
</tr>
</tbody>
</table>

Traffic Stop Profile

| Measures of Traffic Stop Disparity | | |
| % Black non-Hispanic Stops | 56.8% | 54.7% | 58.8% | -4.1% | -7.0 (-8.9, -5.0) | <0.0001 | 0.250 |
| Black non-Hispanic TSRR | 2.5 | 2.2 | 2.8 | -21.3 (-28.5, -13.3) | <0.0001 | 0.125 |

Motor Vehicle Crash Outcomes

| | | |
| Crashes (all) | 5,298.2 | 5,160.3 | 5,925.3 | -765.0 | -12.9 (-37.5, +21.3) | 0.4439 | 0.125 |
| Crashes (w/ injuries) | 1,886.2 | 1,639.0 | 2,118.3 | -479.3 | -22.6 (-48.5, +16.3) | 0.2763 | 0.125 |

| Traffic Fatalities | 62.3 | 48.8 | 68.0 | -19.3 | -28.3 (-64.1, +43.2) | 0.4146 | 0.125 |

Crime Outcomes

| | | |
| Violent Crimes | 1,223.6 | 1,233.5 | 1,257.3 | -23.8 | -1.9 (-32.8, +43.2) | 0.9218 | >0.99 |
| Violent Crime Rate (/1,000) | 730.5 | 596.9 | 582.4 | +14.5 | +2.5 (-14.0, +22.2) | 0.7815 | 0.750 |
| Index Crimes | 13,367.4 | 11,658.0 | 12,896.4 | -1,238.4 | -9.6 (-24.5, +8.2) | 0.2923 | 0.500 |
| Index Crime Rate (/1,000) | 7,848.1 | 5,637.3 | 5,933.4 | -296.1 | -5.0 (-12.8, +3.5) | 0.2482 | 0.750 |

Table 2. Treatment vs. synthetic control metrics: stop profile, crash outcome, and crime outcome annual averages pre-intervention (2002-2012) and post-intervention (2013-2016). Note confidence intervals are not symmetrical around point estimates because different methods were used to produce each and small numbers further limited convergence.
RESULTS

On average over the intervention period as compared to synthetic controls…

- Fayetteville increased both the number of **safety stops** +121% (95% confidence interval +17%, +318%) and the relative proportion of safety stops (+47%).

- **Traffic crash and injury** outcomes were reduced, including traffic fatalities -28% (-64%, +43%), injurious crashes -23% (-49%, +16%), and total crashes -13% (-48%, +21%).

- **Disparity measures** were reduced, including Black percent of traffic stops -7% (-9%, -5%) and Black vs. White traffic stop rate ratio -21% (-29%, -13%).

- In contrast to the **Ferguson Effect** hypothesis, the relative de-prioritization of investigatory stops was not associated with an increase in non-traffic **crime** outcomes, which were reduced or unchanged, including index crimes -10% (-25%, -8%) and violent crimes -2% (-33%, -43%).

- The re-prioritization of traffic stop types by law enforcement agencies may have positive public health consequences both to motor vehicle injury and racial disparity outcomes while having little impact on non-traffic crime.
SUPPLEMENTAL ANALYSES

- **Aim 1:**
  - Personal driving study

- **Aim 2**
  - Small spatial-area / neighborhood effects
    - Bayesian Maximum Entropy
    - Spatial regression
    - Raster subtraction
  - Alternative intervention effect methods

*(more detail in appendix slides if you’d like)*
INTERPRETATION
CRITICAL RACE THEORY, PUBLIC HEALTH CRITICAL RACE PRAXIS, AND WHITE SUPREMACY CULTURE
Calls for Public Health to adopt explicitly anti-racist stance

Critical Race Theory (CRT) and Public Health Critical Race Praxis (PHCRP) provide a mechanism to do that

Characteristics of White Supremacy Culture provides a community-based model.

Inspired …

- **framing** throughout dissertation
- a multi-level, two-agent **framework** for thinking about traffic stops based on PHCRP.
Critical Race Theory (CRT) ‘defines the set of anti-racist tenets, modes of knowledge production, and strategies a group of legal scholars of color in the 1980s organized into a framework targeting the subtle and systemic ways racism currently operates above and beyond any overly racist expressions’

(Ford & Airhihenbuwa, 2010; Ford & Airhihenbuwa, 2018).

Contrasts with:

- colorblind approaches to racism (e.g. non-intersectional feminism, class critiques)
- Civil rights approaches seeking redress without changing underlying racist structures
PH Implementation of CRT.

Figure. Race consciousness, the four focuses and ten affiliated principles. From Ford & Airhihenbuwa 2010.
PUBLIC HEALTH CRITICAL RACE PRAXIS (PHCRP)

- **Foci (4)**
  1. Contemporary patterns of racial relations
  2. Knowledge production
  3. Conceptualization and measurement
  4. Action

- **Principles (11)**
  1. Race consciousness
  2. Primacy of racialization
  3. Race as a social construct
  4. [Gender as a social construct*]
  5. Ordinariness of racism
  6. Structural determinism
  7. Social construction of knowledge
  8. Critical approaches
  9. Intersectionality
  10. Disciplinary self-critique

*Added in some articles.
Table 2. A comparison of the core elements of six research approaches used to study the health implications of racism

<table>
<thead>
<tr>
<th>Essential Characteristics&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Public Health Critical Race Praxis (PHCRP)</th>
<th>Critical Race Theory (CRT)</th>
<th>Critical Race Empiricism (eCRT)</th>
<th>Racism and Health</th>
<th>Health Disparities/Health Equity</th>
<th>Social Epidemiology</th>
<th>Multiculturalism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on CRT</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No&lt;sup&gt;b&lt;/sup&gt;</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Racism focus</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Yes&lt;sup&gt;b&lt;/sup&gt;</td>
<td>No</td>
</tr>
<tr>
<td>Health focus</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Centered in the margins</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No&lt;sup&gt;b&lt;/sup&gt;</td>
<td>No&lt;sup&gt;b&lt;/sup&gt;</td>
<td>No</td>
<td>Yes&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Empirical</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Accounts for research context</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Ordered process</td>
<td>Yes&lt;sup&gt;d&lt;/sup&gt;</td>
<td>No</td>
<td>No&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

<sup>a</sup> For each research approach, all such studies share certain characteristics. Yes indicates the specified approach requires studies to have the characteristic. No indicates the study characteristic is not essential to the approach.

<sup>b</sup> The approach does not require studies to have this characteristic, though health equity research based on the approach often do.

<sup>c</sup> Optimally, multiculturalism centers the perspectives of diverse persons; however, many projects described as multicultural do not address attendant racial and power hierarchies.

<sup>d</sup> Although PHCRP is a research process, some have drawn on it as an organizing framework only.

- Contrast table from Ford & Airhihenbuwa 2010
**Public Health Critical Race Praxis (PHCRP)**

**Interpretation**

<table>
<thead>
<tr>
<th>Principle*</th>
<th>Affiliated focus*</th>
<th>Definition*</th>
<th>Conventional approach</th>
<th>PHCRP approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Primacy of racialization</td>
<td>Contemporary racialization</td>
<td>The fundamental contribution of racial stratification to societal problems; the central focus of CRT scholarship on explaining racial phenomena</td>
<td>Framing racial disparities as negative collateral byproducts instead of primary consequences of policing. Defensiveness on accusations of racial bias in interpersonal actions or decision making or when challenged by disparities in outcomes (e.g. differences in stop, search, etc. rates).</td>
<td>Acknowledge primacy of racialized policing, especially war on drugs and modern-day treatment of epidemics and poverty. Center histories of White supremacist law setting and the primary effectiveness of racism as an organizing suppression strategy. Contrast conventional frameworks with CRT frameworks for building study designs and interpreting results.</td>
</tr>
</tbody>
</table>

In the spirit of Garcia, Gee, & Jones, 2016 (park features in Latinx neighborhoods), Muhammad, Brooks, & Robinson, 2018 (Flint water contamination), and Gilbert & Ray, 2015 (studies of “justifiable” homicides of Black men).
CHARACTERISTICS OF WHITE SUPREMACY CULTURE

1. Perfectionism
2. Sense of Urgency
3. Defensiveness
4. Quantity over quality
5. Worship of the written word
6. Only one right way
7. Paternalism
8. Either/or thinking
9. Power hoarding
10. Fear of open conflict
11. Individualism
12. I'm the only one
13. Progress is bigger, more
14. Objectivity
15. Right to comfort

(Okun, 2000)
Figure. Conventional and Public Health Critical Race Praxis (PHCRP) nested frameworks for traffic law enforcement stops, divided by law enforcement and resident / driver perspectives. Conventional frameworks prioritize the individual (behaviors and internalized mindsets) and interpersonal levels, and limit interaction to focus on the traffic stop itself as a time and level of interaction. PHCRP emphasizes higher levels dynamics (institutional, cultural), root and historical causes, and collateral consequences.
### PHCRP-informed nexus of traffic stops: Law Enforcement side

<table>
<thead>
<tr>
<th>Cultural</th>
<th>Law Enforcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defensiveness &amp; toxic masculinity; questionable belief in traffic stop efficacy in combating crime; disinterest, irresponsibility to collateral damages; intersectional myths, e.g. Black male bodies; co-construction of race-ethnicity; co-creation of crime rates by enforcement decisions; circle-up mentality promotes cover-ups</td>
<td>Belief in broken-windows &amp; social control policing modalities to combat social disorganization; belief in objective application of and obligation to enforce the law, (e.g. marijuana laws)</td>
</tr>
</tbody>
</table>

| Institutional | |
| Racialized crime prioritization; racialized wars on drugs and poverty; discretionary neighborhood prioritization and patrol; race-blind public health empowerment of policing; little transparency and accountability; evidence of traffic stops crash prevention is weak; co-location of stops and crashes is discretionary | Local policies & procedures that reward finding crime of any kind with promotions, quotas |

| Inter-personal | |
| Implicit bias; documented disrespect and escalation language by officers; disparate search rates after stops "creating" crime disparities | Explicit bias; "meet-a-cop" programs seen as useful solutions to mistrust and disparate outcomes |

| Individual | |
| Internalized white & racialized class superiority; internalized disrespect of POC time, bodies, selves | "Bad apples" frame focuses on individuals, not institutions |

| PHCRP Frame | Conventional Frame |
PRAXIS AS SELF-EVALUATION

Obsession with counts, numbers, and scores aside….

While PHCRP was designed to support study design, and Characteristics of White Supremacy Culture was intended for institutional culture critique, both can also be used (with limitations) as a rubric for self- and study-critique.

Applied them as a self-score rubric in my more detailed discussion.
DISCUSSION

CRITICAL CONSIDERATIONS, STRENGTHS, LIMITATIONS, NEXT STEPS
Why are we talking about this now? Measurement & accountability.

Policing isn’t the only (or most effective, etc.) intervention option.

Fayetteville intervention is far from a panacea. Incremental reductions in disparities may be real, but are small, and not necessarily a pathway to no disparities.

Do all lives matter equally? Negative consequences?
STRENGTHS

- Large, expert, involved team (UNC, critical community coalition & law enforcement input)
- Some* practical applications…though not there yet.
- Some application of useful theory (CRT/PHCRP/WSC), though incomplete.
- A2: Harm reduction approach may be useful (in messaging, lives saved), but has limits.
LIMITATIONS

- A1 method doesn’t scale nationally…yet
- Spatial ascription: unidirectional is imperfect, etc.
- No modeling of state highway patrol, place-specific LEAs (e.g. universities)
- Officer ascription of race-ethnicity, a social construct
- Power, grouping, and small numbers
- Theoretical limitations (PHCRP)
- A2: Synthetic control would benefit from more data, more DAG thinking.
FUTURE RESEARCH & NEXT STEPS

- National methods for small-area estimation of VMT by race-ethnicity (BTS LATCH)
- Interpretation of stop-rate and stop-type variation between agencies, and a model to describe it
- Consider publishing theory work (PHCRP & traffic stops, etc.)
- Describe / visualize multiple measurement points for traffic stop disparities, broadly construed.
- Formally critique RTI STAR
- Sub-agency neighborhood analyses
- Continue to support local organizing and state open policing data initiative (https://opendatapolicing.com/nc/)
AREAS FOR ANTI-RACIST ACTION

- End traffic stops that criminalized (often racialized) poverty.
- Increase accountability infrastructure for agencies.
- Structural changes, e.g. funding police alternatives
- See Black Live Matter: Movement for Black Lives (policy.m4bl.org/) for more.
ASSOCIATED STUDIES

CURRENT WORK
DATA LINKAGE: CRASH-ED-DEATH

- Pilot linkage of 2018 Crash-ED-Death data
- Severity assessments don’t match
- COVID-19 impacts
- Future study opportunities

Death linkage pattern: hierarchical blocked deterministic matching
- Pilot in NC VDRS, replicating linkage now with National VDRS
- Early results: Traffic related deaths make up sizable chunk of deaths by police, even if not considered “legal intervention”
THANK YOU!

QUESTIONS & DISCUSSION

MIKE DOLAN FLISS
MIKE.DOLAN.FLISS@UNC.EDU
REFERENCES


REFERENCES


REFERENCES


82. RICHARD DELGADO JS. *CRITICAL RACE THEORY*. Place of publication not identified: DEV Publishers & DISTRIBU; 2016.


102. US Department of Justice, Civil Rights Division. Investigation of the Ferguson Police Department.; 2015.


Figure 5. A census of the author’s trips as the driver in his sole vehicle during 2017 (N=1,336). Most of these trips were centered around his residence in Chapel Hill, NC and work activity spaces, but also includes VMT in over 20 county sheriff department and dozens of municipal police department jurisdictions in NC. He contributed very different quantities of vehicle miles traveled by race-ethnicity (White non-Hispanic) status to each of these idealized jurisdiction’s stop rate denominators.
Figure. Author’s exact driving VMT distribution function over two years compared to NHTS average White non-Hispanic drivers.
Figure: Author’s VMT distributed into 28 North Carolina counties instead of residential apportioning into a single county.
Figure 13. Decision-tree-like structure of policy decision evaluation. Example tree from Raleigh, NC, 2015, though each agency was modeled using their own prior data. This represents Model A1, using existing safety-stop demographic balance instead of adjusting for any alternatives.
### Fayetteville PD Stop Purpose Policy Scenarios, 2013-2017

<table>
<thead>
<tr>
<th>Status Quo (3)</th>
<th>% Drivers of Total Stops that are</th>
<th># of Drivers Stopped that are</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>W N-H</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>34%</td>
<td>57%</td>
</tr>
</tbody>
</table>

#### Alternative Scenarios

<table>
<thead>
<tr>
<th>Scenario</th>
<th>% Drivers of Total Stops that are</th>
<th># of Drivers Stopped that are</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>W N-H</td>
<td>B</td>
</tr>
<tr>
<td>A1: Fayetteville Reprioritization</td>
<td>36%</td>
<td>54%</td>
</tr>
<tr>
<td>Difference vs. Status Quo Policy</td>
<td>+1.8%</td>
<td>-2.7%</td>
</tr>
<tr>
<td>A2: A1 w/ demo balance (*)</td>
<td>38%</td>
<td>48%</td>
</tr>
<tr>
<td>Difference vs. Status Quo Policy</td>
<td>+3.9%</td>
<td>-8.5%</td>
</tr>
<tr>
<td>A3: A2 w/ commuting adjustment</td>
<td>45%</td>
<td>43%</td>
</tr>
<tr>
<td>Difference vs. Status Quo Policy</td>
<td>+10.8%</td>
<td>-14.3%</td>
</tr>
</tbody>
</table>

A1 represents the Fayetteville (real) policy choice and its projection to 2017 of going, over the course of three years (2013-2015) to 80% safety stops, 15% economic stops and 5% subjective stops (from 42%, 46%, 11% respectively). A2 represents a (theoretical) shift in the demographics of safety stops only to Fayetteville’s residential demographics from 2013 to 2015, given Fayetteville’s population of 42% White non-Hispanic, 42% Black, and 10% Hispanic. Model A3 represents a (theoretical) shift in safety stop to mirrors Fayetteville’s estimated driving population, accounting for large differences in household vehicle access, estimating Fayetteville drivers as 53% White non-Hispanic, 33% Black, and 8% Hispanic.
### 50 Largest City PD and County Sheriff Stop Purpose Policy Scenarios, 2013-2017

<table>
<thead>
<tr>
<th>Scenario</th>
<th>% Drivers of Total Stops that are</th>
<th># of Drivers Stopped that are</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>W N-H</td>
<td>B</td>
</tr>
<tr>
<td><strong>Status Quo (3)</strong></td>
<td>46%</td>
<td>43%</td>
</tr>
<tr>
<td><strong>Alternative Scenarios</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1: Fayetteville Repriotiziation</td>
<td>48%</td>
<td>40%</td>
</tr>
<tr>
<td>Difference vs. Status Quo Policy</td>
<td>+2.6%</td>
<td>-3.0%</td>
</tr>
<tr>
<td>A2: A1 w/ demo balance (*)</td>
<td>50%</td>
<td>36%</td>
</tr>
<tr>
<td>Difference vs. Status Quo Policy</td>
<td>+4.3%</td>
<td>-7.3%</td>
</tr>
<tr>
<td>A3: A2 w/ commuting adjustment</td>
<td>56%</td>
<td>32%</td>
</tr>
<tr>
<td>Difference vs. Status Quo Policy</td>
<td>+9.9%</td>
<td>-11.4%</td>
</tr>
</tbody>
</table>
Figure 14. Neighborhood-specific percent income related stops and % black population. Preliminary analysis suggests higher percent Black communities seem to be largely the same ones where a high percent of regulatory stops occur. Each 5% increase in neighborhood percent black corresponds to an additional 1% increase in the percent of people pulled over for regulatory reasons (above right).
Figure. Four block-group changes in Fayetteville Police Department stop prioritization, 2013 to 2015. Bottom: Mall: #2 stop increase (+1000/y), #1 injuries. 3x the injuries of everywhere else.

Top two: All American Expressway and Rt. 24 at Santa Fe/Shaw Rd. #1 stop increase, #7 injury and #3 stop increase, #24 injury.

Right: #1 stop decrease, #66 injury. 80% B/AA. Note areal vs. street placement.
Figure. Fayetteville block-group residuals and beta coefficients used a crude linear model, spatial lag model, and explored using geographically weighted regression.
Consideration of stops by type, crashes, violent / injurious incidents (“crimes”), could be used to direct / evaluate policing patrols
Figure 17. Police stops for moving violations (A), traffic crashes (B), raster subtraction of A and B (C), reported incidents (D), and injury severity weighted incidents (E).
SUPPLEMENTAL: SMALL-AREA SPATIAL ANALYSIS

- Bayesian Maximum Entropy (BME) framework provides a way to quantify spatial and temporal autocorrelation.

- Covariance parameters provide a method of quantifying patrol discretion and application of enforcement priorities
Returning to the table of model results for this ¼ mile, month grid method, we see that different types of traffic stops have different covariance structures. Comparing safety stops to economic stops, roughly 2/3 of the covariance is described by a short-distance (0.5 and 0.1 miles), long-time (100 and 250 months) structure and 1/3 of the covariance described by a longer-distance (15 and 2 miles) and short-time (3 and 1.5 months) structure. This corresponds to safety stops being more similar in both the short and long-term than economic stops, perhaps representing that traffic stops targeting larger areas. However, economic stops were more stable over a longer period of time, representing little long-term change in the distribution of those stops compared to the safety stops, an expected finding as the 2013-2016 intervention by FPD was to concentrate stops in higher crash areas, effectively changing the distribution across Fayetteville over the study period. Economic stops had the shortest long-term temporal range of 1.5 months, representing that the distribution of economic stops could change almost entirely month to month, suggesting their subjectivity and use for short-term neighborhood-level intents or department ticket / funding initiatives.

The pretextual stop covariance structure was similar to safety stops in the spatial component, in that 2/3 of the covariance was described by a short-term (0.5 miles) component and 1/3 by a longer-term component (though pretextual stops spatial lag was 40 miles, suggesting its flatter spatial surface than safety stops. The time covariance structure was different, however, with the 2/3 of the pretextual covariance distributed in the short term (2 months) instead of long-term like safety and economic. This reversal may represent their subjective nature, as 95% of the larger (66%) covariance component is lost over just 2 months instead of 100-250 months in the case of safety and economic stops. Their overall sill variance was also low, at 0.29 compared to 1.29 and 0.71 for safety and economic stops, again quantifying their subjectivity.
### SYNTHETIC CONTROL WEIGHTS TABLE

<table>
<thead>
<tr>
<th>Traffic Stop Profile</th>
<th>Cary</th>
<th>Charlotte</th>
<th>Durham</th>
<th>Greensboro</th>
<th>High Point</th>
<th>Raleigh</th>
<th>Wilmington</th>
<th>Winston-Salem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Safety Stops</td>
<td>-</td>
<td>4</td>
<td>75</td>
<td>-</td>
<td>-</td>
<td>21</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>% Safety Stops</td>
<td>-</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>93</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>% Regulatory &amp; Equip. Stops</td>
<td>-</td>
<td>17</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>65</td>
<td>-</td>
<td>18</td>
</tr>
<tr>
<td>% Discretionary</td>
<td>31</td>
<td>58</td>
<td>-</td>
<td>7</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

#### Measures of Traffic Stop Disparity

| % Black non-Hispanic Stops          | -    | -         | 100    | -          | -         | -       | -          | -             |
| Black non-Hispanic TSRR             | 2    | 59        | 12     | -          | 0         | -       | 27         | -             |

#### Motor Vehicle Crash Outcomes

| Crashes (all)                        | 40   | -         | -      | -          | 13        | -       | 46         |               |
| Crashes (w/ injuries)                | 34   | -         | -      | -          | 31        | -       | 35         |               |
| Traffic Fatalities                   | 26   | 31        | -      | -          | 43        | -       | -          |               |

#### Crime Outcomes

| Violent Crimes                       | 29   | -         | -      | -          | 3         | -       | 67         |               |
| Violent Crime Rate (/1,000)          | 14   | 49        | -      | -          | 11        | -       | 26         |               |
| Index Crimes                         | 14   | -         | -      | -          | -         | -       | 86         |               |
| Index Crime Rate (/1,000)            | -    | 15        | -      | -          | -         | -       | 17         | 68            |

**Supplementary Table 1.** Synthetic control weight vectors independently modeled for each measure. Synthetic controls were programmatically determined by maximizing the match on pre-intervention trends for each measure, producing weight vectors of between one and five (mean 3.0) other NC city police departments linearly combined to model post-intervention counterfactual trends.
City and county jurisdictions and population adjustment near Orange County, NC. City police departments with few county sheriff patrols emphasis may be (left) entirely encapsulated within the county (e.g. Hillsborough, Carrboro) or may cross county boundaries (e.g. Chapel Hill, Mebane). The rural portion of the sheriff jurisdiction’s population may differ in both number and demographic distribution when compared to the overall county distributions (right).

<table>
<thead>
<tr>
<th>Source: 2010 US Census, Orange County, NC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td>White nH</td>
</tr>
<tr>
<td>Black</td>
</tr>
<tr>
<td>Hispanic</td>
</tr>
<tr>
<td>Principle</td>
</tr>
<tr>
<td>---------------------------------</td>
</tr>
<tr>
<td>1. Race consciousness</td>
</tr>
<tr>
<td>2. Primacy of racialization</td>
</tr>
<tr>
<td>3. Race as a social construct</td>
</tr>
<tr>
<td>Principle</td>
</tr>
<tr>
<td>----------------------------------</td>
</tr>
<tr>
<td>4. Gender as a social construct</td>
</tr>
<tr>
<td>5. Ordinariness of racism</td>
</tr>
<tr>
<td>Principle</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>6. Structural determinism</td>
</tr>
<tr>
<td>7. Social construction of knowledge</td>
</tr>
<tr>
<td>8. Critical approaches</td>
</tr>
<tr>
<td>Principle</td>
</tr>
<tr>
<td>----------------------------</td>
</tr>
<tr>
<td>9. Intersectionality</td>
</tr>
<tr>
<td>10. Disciplinary self-critique</td>
</tr>
<tr>
<td>11. Voice</td>
</tr>
</tbody>
</table>
CODING CONSIDERATIONS

- R packages
  - Tidyverse – tibbles, dplyr chains
  - Sf – modern simple features spatial constructs
  - Tidycensus – efficient census/ACS pulls
  - Rvest – web scraping data
  - purrr / furrr – 10x faster
  - Microsynth – Powerful synthetic control package