MARICOPA COUNTY SHERIFF'S OFFICE

Traffic Stops Quarterly Report 11

2022 Low Stop Volume Deputies

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Traffic Stops Quarterly Report: Low Stop Volume Deputies

June 2023

This study was developed and conducted by the Maricopa County Sheriff's Office (MCSO) Traffic Stop Analysis Unit and Research and Reporting Unit. The developed methodology was approved by the Court Monitoring Team and Parties on April 13, 2022. This report is intended to meet the requirements of Paragraph 65 of the First Order, as Traffic Stop Quarterly Report for Quarter 2, 2023.

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Executive Summary

The Traffic Stop Annual Report (TSAR) examines the systemic or organizational level for potential indicia of bias in traffic stop outcomes and stop length. The TSAR analyzes aggregated traffic stop activity, in contrast with the Traffic Stop Monthly Report (TSMR), which evaluates deputy-level traffic stop patterns. Paragraph 70 of the Melendres Court Order requires that any potential indicia of bias found in TSAR be addressed by the Office. The TSMR seeks to intervene on any potential indicia of bias evidenced in deputy activity, which is one of the ways the Office addresses office-wide disparities.

The TSMR process evaluates deputies using two different approaches dictated by the number of stops the deputy had made in the previous twelve months. Deputies with twenty or more stops (high-volume) are analyzed using a propensity score weighing "comparative" approach. Whereas deputies who had fewer than twenty stops in the previous twelve months (low-volume) are analyzed using a "descriptive" process that utilizes summary statistics for comparison as so few stops are insufficient for the propensity score weighting analysis. Low traffic stop activity by a deputy often leads to insufficient evidence to identify potential patterns of bias, as low stop counts reduce the power of statistical tests using propensity score weighting. As a product of the descriptive analysis in the TSMR, deputies with few stops often flag as a result of only one or two stops. When this occurs, interventions are not typically recommended as there are insufficient data to indicate a pattern of outcomes on which to intervene.

Approximately 41 percent of deputies who made traffic stops in 2022 had fewer than twenty stops, also known as low-volume deputies. This group accounted for 970 traffic stops of the 19,797 traffic stops made by MCSO deputies in 2022. Thus, the low-volume deputies accounted for 4.9 percent of all traffic stop activity during the year.

The research presented in this report examined whether the activity of these low-volume deputies is characteristically different from that of deputies who make twenty or more traffic stops in a year.

Given the lack of statistical power in analyzing individual deputies with infrequent stops, do deputies with fewer than 20 stops in a year collectively show evidence of racial/ethnic disparity on the benchmarks of arrest, citations, search, and stop length? Identifying if, and to what extent there are differences, and in which areas, allows MCSO to determine if action is necessary to address disparities with this group of deputies.

Findings from this research included:

- During 2022, almost 41 percent of deputies who made traffic stops made fewer than 20 stops in the year, accounting for less than 5% of all MCSO traffic stop activity for the year.

- The overall citation rate for low-volume deputies was 35.88 percent, whereas high-volume deputies cited drivers 52.41 percent of the time.

- Low-volume deputies contacted a higher proportion of Hispanic drivers (33.40%) compared to high-volume deputies (23.50%).

- Low-volume deputies had a higher proportion of stops in Districts 1 and 2 compared to other districts.

- Of all low-volume deputies, over half of the stops were conducted by District 2 (34.54%) and District 1 (23.40%) deputies.

- Low-volume deputies had longer stop lengths on average (23.26 minutes) than high-volume deputies (16.11 minutes).

- Low-volume deputies had higher rates of use for all extended stop indicators when compared to high-volume deputies.

- Low-volume deputies cited or warned different categories of violations at a higher rate (non-speed moving violations, equipment violations, license/insurance/registration violations) when compared to high-volume deputies.

- Low-volume deputies had no statistically significant disparities between White and Hispanic drivers and these disparities were not significantly different from high-volume deputies.

- High-volume deputies had statistically significant disparities between White and Hispanic drivers for all five outcomes (stop length, all arrests, booked/custodial arrests, citations, and searches).

- Low-volume deputies had statistically significant differences between White and Black drivers for comparisons of stop length and booked/custodial arrests.

- Differences in disparities between White and Black drivers for low-and high-volume deputies were statistically significant for stop length and booked/custodial arrests.

MCSO intends to brief the deputies at each district on the findings of this study and the TSAR. The fact that low-volume deputies had no statistically significant disparities between White and Hispanic drivers is encouraging and differences between low-volume and high-volume deputies were only significant for stop length and booked/custodial arrests. MCSO will continue to attempt to identify the causes of the disparities at both the deputy level, through its TSMR reviews, various inspections; and at the systemic level, through these quarterly reports. The Office remains vigilant in both its monitoring of deputy behavior and the application of interventions to address these observed disparities.

Introduction

The Traffic Stop Annual Report (TSAR) examines the systemic or organizational level for potential indicia of bias in traffic stop outcomes and stop length. Paragraph 70 of the Melendres Court Order requires that any potential indicia of bias found in TSAR be addressed by the Office. To identify any potential indicia of bias at the deputy-level, the Traffic Stop Monthly Review (TSMR) was developed, which evaluates deputy-level traffic stop patterns. The TSMR process seeks to intervene on any potential indicia of bias evidenced in deputy activity, which is one of the ways the Office addresses office-wide disparities.

The TSMR analysis evaluates deputies using two different approaches dictated by the number of stops the deputy had made in the previous twelve months. Deputies with twenty or more stops are analyzed using a propensity score weighting "comparative" approach. However, deputies who had fewer than twenty stops in the previous twelve months are analyzed using a "descriptive" process that utilizes summary statistics for comparison. Low traffic stop activity by a deputy often leads to insufficient evidence to identify potential patterns as low stop counts reduce the power of statistical tests using propensity score weighting. As a product of the descriptive analysis in the TSMR, deputies with few stops often flag on only one or two stops. When this occurs, interventions are not typically recommended as there are insufficient data to justify intervention for indicia of bias in traffic stop activity.

Approximately 41 percent of deputies who made traffic stops in 2022 had fewer than twenty stops and this group accounted for 970 traffic stops out of the 19,797 traffic stops made by MCSO deputies during 2022. Thus, this group accounted for 4.9 percent of all traffic stop activity during the year. This research examines whether these low-volume deputies' activity is characteristically different from that of deputies who make twenty or more traffic stops in a year.

Given the lack of statistical power in analyzing individual deputies with infrequent stops, does this group collectively show evidence of racial/ethnic disparity on the benchmarks of arrest, citations, search, and stop length? Identifying if, and to what extent, there are differences between low-volume and high-volume stop deputies, will allow MCSO to determine if action is necessary to address disparities with this group of deputies.

Methods

MCSO uses Traffic and Criminal Software (TraCS) and Computer Aided Dispatch (CAD) to capture field data about traffic stops. TraCS and CAD are the data collection, records management, and reporting software for MCSO's public safety professionals. These systems allow deputies to document various aspects of each traffic stop, including the start time, the end time, the perceived race/ethnicity of drivers, and the stop's geolocation. This study includes data collected by MCSO from January 1, 2022, through December 31, 2022. There was a total of 19,797 stops included in this data set.

For this study, we used the same dataset and methods approved for data categorization or cleaning in the 2022 annual traffic stop report (TSAR 8). The outcomes of interest included length of stops, searches, citations (versus warnings and incidental contacts), and arrests. In this report, we include only the baseline model for each benchmark, unless otherwise specified in the approved methodology for this quarterly. These include:

- Average Stop Length – stops with Extended Traffic Stop Indicators (ETSI) removed;

- Arrest Outcome – all arrests;

- Arrest Outcome – booked or custodial arrests only;

- Citation Outcome – cite vs. warned, with approved violation categories used as matching;

- Search Outcome – non-incidental to arrest or tow searches only.

Alternate models are reported in the appendix to align with models used in TSAR 8. We did not conduct any comparative analyses on seizures, the additional benchmark considered in the annual report.[1]

Traffic stop documentation indicates whether a stop included a search of a driver or vehicle and whether that search was incident to arrest or towing. We constructed a variable for analyzing searches that indicates whether a search of a driver or vehicle took place. For this analysis, we restricted our interest to searches indicated as not incident to arrest or tow (i.e., discretionary searches).

We used post-stop perceived race/ethnicity of the driver to classify the driver as Hispanic, Black, White, or Minority (combined group of Asian, Black, Hispanic, or Native American). The analytic team incorporated additional information about the stops for matching, including post-stop perceived sex of the driver, the reported license plate state of the vehicle the driver was operating (classified as in-state or out-of-state), whether stops occurred while the deputy was on special assignment (DUI taskforce, aggressive driving, or click-it-or-ticket), geography, the time of day the stop was made, reasons for extended stops (Extended Traffic Stop Indicators), and the types of violations that were either cited or warned during the stop. Violation categories were derived from

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[1] An analysis of seizures can be found in TSAR 8.

ARS sections and subsections that were entered into citation and/or warning forms issued to drivers at the conclusion of the stop.

- **Speeding violations** were violations associated with exceeding the speed limit (e.g., speeding, criminal speeding, speeding in a school zone, racing, or reckless driving).

- **Non-speed moving violations** included violations for which the vehicle was moving, such as turning, failure to signal when changing lanes, failing to stop, tailgating, or driving too slowly. DUI violations were included in the non-speed moving category.

- **Equipment violations** included any violation where a driver's automobile lacked proper equipment, had non-functioning equipment, or had equipment deemed unsafe. Examples of this category of violation include broken taillights or headlights, cracked windshields, illegally modified vehicles, and opacity on window tint.

- **Driving documentation violations** included any violation associated with licensing (vehicle or driver), insurance, and registration. Examples include driving without a license, driving on a suspended/revoked license, expired registration, failure to possess insurance, or driving without license plates.

- Finally, **other violations** included all violations that could not be identified as one of the above categories. The other violation category included a diverse collection of offenses such as drug violations, seat belt and cell phone violations, parking violations, noise violations, or littering.

To determine whether low-volume deputies' stop activity was characteristically different from that of high-volume deputies, MCSO utilized additional variables to identify low-volume and high-volume deputies. For this research, *low-volume deputies* were identified as making nineteen or fewer stops in 2022, and *high-volume deputies* were identified as deputies who made twenty or more stops in 2022.

Analysis

Analysis occurred in two phases. In phase one, descriptive statistics are provided similar to results presented in the TSAR, but for both high-volume and low-volume deputies for comparison. We include a breakdown of stops by race/ethnicity and the number of stops by District. We also provide tabulations of stop lengths, use of extended stop indicators, stops conducted on special assignments, citation rates, search rates, and arrest rates. This section does not provide inferential comparisons of low-volume and high-volume deputies but is intended to provide the reader with context regarding how these two groups are similar or different in their patterns of traffic stop activity.

In phase two, MCSO used the Stata *diff* package[2] to analyze the average treatment effect for both low- and high-volume deputies, as well as the difference between the treatment (e.g., Hispanic drivers) and comparison group (White drivers) relative to the differences in both high-volume and low-volume deputies (i.e., the difference-in-difference estimate). For example, we estimated the difference in outcomes between Hispanic and White drivers for low-volume deputies and estimated the difference in outcomes for high-volume deputies, then compared the differences by estimating the difference-in-difference between low- and high-volume deputies. This process was repeated using a comparison of Black and White drivers and Minority and White drivers. The *diff* package utilizes propensity score matching to match similar stops and make comparisons among these similarly situated stops. Matching occurred for both high-volume deputies and low-volume deputies and included the variables noted in Table 1.

Table 1: Propensity Score Matching Variables

- Stop Latitude (using splines)
- Stop Longitude (using splines)
- Spline interaction of Stop Latitude and Stop Longitude
- Stop time using splines across a 24-hour day
- Offense categories[3] (citations only)
- Extended stop indicators (Alternative stop length models; excluding Language Barrier)
  - DUI Stop
  - Technical Issue
  - Training Stop
  - Vehicle Tow
  - License Issue
  - Other Delay

- Speed over the speed limit (0 bin for non-speeding stops, 5 mph bins for speeding stops only)
- Interaction of speed offenses with binned speed over the speed limit
- Stop Classification (criminal traffic, versus all other classifications: civil traffic, criminal, petty)
- Stop length only
  - Stop involved a search
  - Stop involved an arrest
- Deputy category[4]
- Driver sex

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[2] Villa, Juan M. 2016. "diff: Simplifying the estimation of difference-in-differences treatment effects." *The Stata Journal 16*(1): 52-71.

[3] Offense categories include warnings or citations for speed, non-speed moving violations, equipment violations, license/insurance/registration violations, and other violations.

[4] Deputy categories are derived from the call sign in use when the deputy initiated a traffic stop. Categories include normal patrol, traffic car, lake patrol, supervisors, off-duty, and other (detectives/investigators).

Not all matching variables were utilized for all comparisons. In the findings section, we identify which variables were used for each base model of the outcome benchmark.[5] Propensity scores used for matching were produced using the same syntax employed in the current TSAR 8 report. This process involved identifying matching variables and utilizing regularization to force the convergence of models that produce propensity scores.[6]

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[5] Alternate models for each outcome, in alignment with the TSAR 8, were also run for low-volume and high-volume deputies, with findings reported in the Appendix.
[6] For a detailed explanation of the process used to generate propensity scores, see TSAR 8.
https://www.mcsobio.org/traffic-stop-data

Descriptive Findings

In this section, we describe the traffic stop activity of MCSO in 2022. We describe the traffic stop counts of deputies who made traffic stops and the racial/ethnic composition of drivers who were stopped, both overall and by district.[7] We partition low-volume and high-volume deputy stops to allow a contextual comparison of the stops made by the two groups.

Office Level

Deputies and Stop Counts

In total, 295 deputies conducted traffic stops in 2022. Of these, 121 (41.02%) conducted 19 or fewer stops, comprising the low-volume deputy group. There were 174 (58.98%) deputies who were considered high-volume deputies, with 20 or more traffic stops conducted in 2022. At the Office-level, 5% of all traffic stops in 2022 were conducted by low-volume deputies. Figures 1 and 2 below provide a comparison of low- and high-volume deputies' number of stops. The majority of low-volume deputies (approximately 61%) made between one and nine stops. In contrast, the majority of high-volume deputies (56%) made between 20 and 59 stops.

Figure 1: Low-Volume Deputy Stop Count
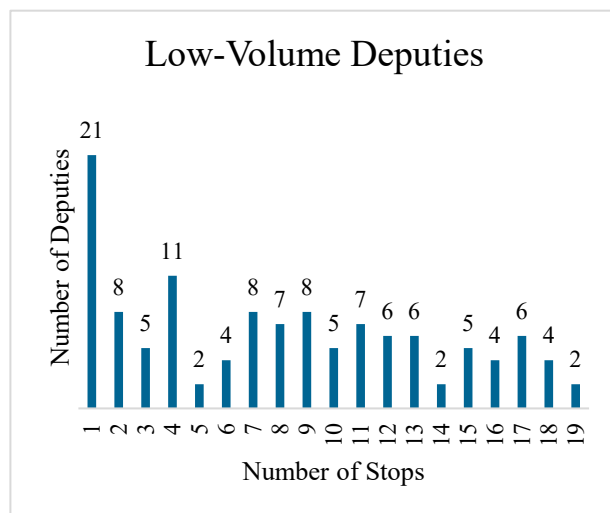
Figure 2: High-Volume Deputy Stop Count

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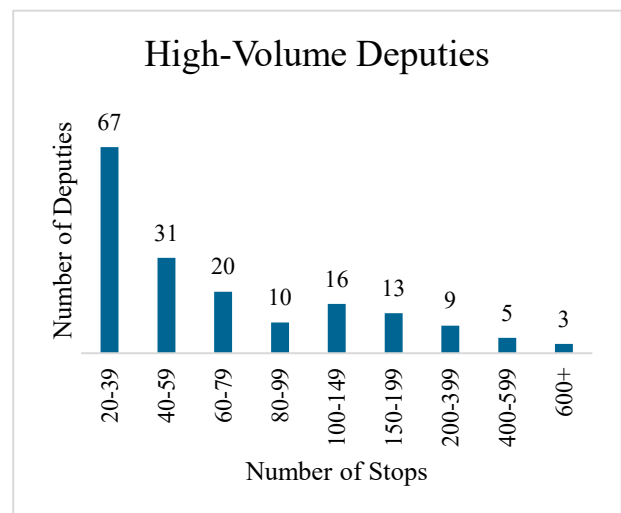
[7] District 6 ceased operations January 11, 2022, as the contract with Queen Creek ended and Queen Creek established their own local police department. Fifteen stops were made by MCSO deputies assigned to District 6 in 2022 (6 made by low-volume deputies and 9 by high-volume deputies). Those stops were included in the totals for District 1 (the neighboring district and location of reassignment) for tabulations presented in this report.

Race/Ethnicity

Deputies record their perceptions of the driver's race/ethnicity in TraCS. Table 2 reports post-stop perceived race/ethnicity of drivers. Post-stop, low-volume deputies perceived 52.78 percent of drivers as White, 33.40 percent as Hispanic, and 9.07 percent as Black. Minority drivers (Black, Asian, Hispanic, and Native American combined) comprised less than half (47.22%) of low-volume deputy stops. In contrast, high-volume deputies perceived 65.35 percent of drivers as White, 23.50 percent as Hispanic, and 7.12 percent as Black. Minority drivers comprised a little over a third (35%) of high-volume deputy stops.

Table 2: Stops by Post-Stop Perceived Driver Race/Ethnicity, Office level

	Low-Volume Deputy Stops		High-Volume Deputy Stops	
Black	88	9.07%	1,341	7.12%
Hispanic	324	33.40%	4,425	23.50%
White	512	52.78%	12,303	65.35%
Minority	458	47.22%	6,524	34.65%

District Level

Deputies and Stop Counts

Table 3 provides a tabulation of stops in districts for which deputies worked when making traffic stops in 2022, and how many deputies in each district were categorized as low- or high-volume. Note that because deputies may have changed districts over the course of the year, the total number of deputies identified in this table exceeds the number of deputies who made traffic stops in 2022. Of all low-volume deputies, over half of the stops were conducted by District 2 (34.54%) and District 1 (23.40%) deputies.

Table 3: Stops and Deputy Count by District, Low-and High-Volume Deputies

	Low-Volume Deputy Stops	Low-Volume Deputy Count	High-Volume Deputy Stops	High-Volume Deputy Count
District 1	233	30	1,578	35
District 2	335	38	3,250	45
District 3	169	26	2,556	38
District 4	109	15	3,548	32
District 5 (Lakes)	91	17	3,583	42
District 7	33	6	4,312	34

Among districts, District 1 had the highest percentage of traffic stop activity by low-volume deputies, as 13 percent of the district's traffic stops were conducted by this subset. In contrast, District 7 had only 1 percent of the district's traffic stops conducted by low-volume deputies.

In all districts, the number of high-volume deputies exceeded that of low-volume deputies. Districts 4, 5, and 7 had the fewest low-volume deputies, while districts 1, 2, and 3 had more similar numbers of both low- and high-volume deputies.

Race/Ethnicity

MCSO also examined the racial/ethnic composition of stops for low- and high-volume deputies at the district level. Table 4 below provides a tabulation of stops by low- and high-volume deputies by race/ethnicity.

District 1 deputies had similar breakdowns between White and minority drivers, with 55-60 percent of stopped drivers identified as White by both low-volume and high-volume deputies. Both low-volume and high-volume deputies identified drivers as Hispanic in approximately a quarter of their stops (27.83% and 26.24%, respectively).

District 2 deputies in both groups had the most minority drivers and the least White drivers stopped among the districts, with low-volume deputies identifying 32.54 percent of drivers as White, compared with high-volume deputies' 38.34 percent. Hispanic drivers represented 53.13 percent of stops by low-volume deputies, contrasted with 46.68 percent of stops among high-volume deputies.

District 3 deputies identified drivers as White in the majority of stops for both low-volume and high-volume deputy groups (57.99% and 61.70%, respectively). Low-volume deputies stopped Hispanic drivers in 28.40 percent of traffic stops in 2022, contrasted with high-volume deputies' identification of Hispanic drivers in 25.74 percent of traffic stops.

District 4 deputies had the highest rate of traffic stops with White drivers for each group, with low-volume deputies identifying drivers as White in 85.32 percent of traffic stops, while high-volume deputies identified drivers as White in 81.31 percent of traffic stops. Drivers were identified as Hispanic in 10.09 percent of low-volume deputies' stops, in contrast with the 12.88 percent of high-volume deputies' stops identified as having a Hispanic driver.

Approximately two-thirds of traffic stops in District 5 were of White drivers for both low-volume and high-volume deputies (63.74% and 66.68%, respectively). Low-volume deputies identified 20.88 percent of stops as having a Hispanic driver, while high-volume deputies identified drivers as Hispanic in 22.89 percent of traffic stops in 2022.

Finally, in District 7, low-volume and high-volume deputies had similar proportions of traffic stops identifying a White driver, with 72.73 percent of low-volume deputy stops and 76.83 percent of high-volume deputy stops. Low-volume and high-volume deputies each identified drivers as Hispanic in 12-13 percent of their traffic stops.

Table 4: Stops by Post-Stop Perceived Driver Race/Ethnicity and District

| District 1	Low-Volume Deputy Stops		High-Volume Deputy Stops	
African American	19	8.26%	192	12.17%
Hispanic	64	27.83%	414	26.24%
White	129	56.09%	893	56.59%
Minority	101	43.91%	685	43.41%
District 2	Low-Volume Deputy Stops		High-Volume Deputy Stops	
African American	38	11.34%	347	10.68%
Hispanic	178	53.13%	1,517	46.68%
White	109	32.54%	1,246	38.34%
Minority	226	67.46%	2,004	61.66%
District 3	Low-Volume Deputy Stops		High-Volume Deputy Stops	
African American	19	11.24%	239	9.35%
Hispanic	48	28.40%	658	25.74%
White	98	57.99%	1,577	61.70%
Minority	71	42.01%	979	38.30%
District 4	Low-Volume Deputy Stops		High-Volume Deputy Stops	
African American	1	0.92%	125	3.52%
Hispanic	11	10.09%	457	12.88%
White	93	85.32%	2,885	81.32%
Minority	16	14.68%	663	18.69%
District 5	Low-Volume Deputy Stops		High-Volume Deputy Stops	
African American	9	9.57%	235	6.56%
Hispanic	19	20.88%	820	22.89%
White	58	63.74%	2,389	66.68%
Minority	35	37.23%	1,194	33.32%
District 7	Low-Volume Deputy Stops		High-Volume Deputy Stops	
African American	2	6.06%	203	4.71%
Hispanic	4	12.12%	559	12.96%
White	24	72.73%	3,313	76.83%
Minority	9	27.27%	999	23.17%

Summary Statistics

Stop Length

Table 5 below provides a summary of average stop lengths for low- and high-volume deputies by race for stops with ETSIs, without ETSIs, and for all stops (regardless of ETSI use). In comparing stops without ETSIs, low-volume deputies have longer average stop lengths for every racial/ethnic group. Like high-volume deputies, average stop lengths for all racial/ethnic groups are higher for non-ETSI stops when compared to stops of White drivers. These patterns persist with stops where an ETSI was used and a comparison of all stops, with one exception. The average stop length for low-volume deputy stops of minority drivers was slightly lower than stops of minority drivers by high-volume deputies. In terms of average stop length, low-volume deputies have longer stops, and longer stops of minority, Hispanic and Black drivers than White drivers.

Table 5: Stop Length for Low- and High-Volume Deputies, by ETSI use and Race/Ethnicity

	Stops without ETSIs		Stops with ETSIs		All Stops	
	Avg. Stop Length (in minutes)	Count	Avg. Stop Length (in minutes)	Count	Avg. Stop Length (in minutes)	Count
Low-Volume Deputies						
Hispanic Drivers	15.521	192	35.864	132	24.994	324
Black Drivers	20.773	66	47.182	22	27.375	88
Minority Drivers	17.917	289	37.456	169	25.127	548
White Drivers	16.060	351	33.671	161	21.598	512
High-Volume Deputies						
Hispanic Drivers	13.929	3,415	40.488	1,010	19.991	4,425
Black Drivers	14.484	1,133	32.726	208	17.313	1,341
Minority Drivers	13.945	5,169	38.737	1,355	19.094	6,524
White Drivers	12.202	10,784	31.043	1,519	14.528	12,303

In Figures 5 and 6 below, we identify the distribution of stop lengths for low- and high-volume deputies. When comparing these two groups, low-volume deputies have a higher proportion of stops with longer stop lengths for every interval above 10-14 minutes. Low-volume deputies also have a lower proportion of stops below 14 minutes when compared to high-volume deputies. As a general comparison, low-volume deputies average 23.26 minutes (*sd* = 35.36) during traffic stops, whereas high-volume deputies average 16.11 minutes (*sd* = 24.19) during their stops.

Figures 5 and 6: Distribution of Stop Length for Low- and High-Volume Deputies

Figure 5: Low-Volume Deputies

Figure 6: High-Volume Deputies
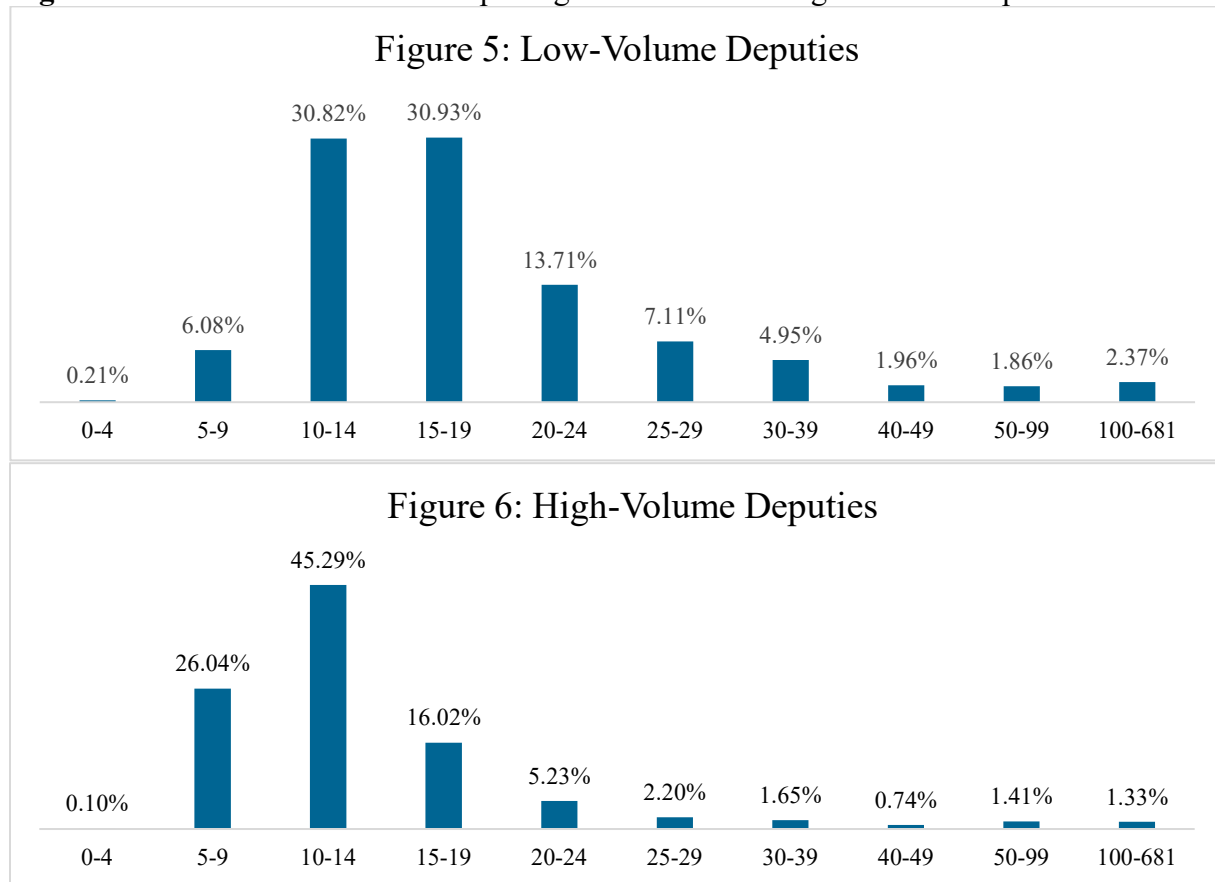
The comparative model for analysis considers only the traffic stops without ETSIs[8]. To clarify the extent of ETSI used during traffic stops, Table 6 below provides a breakdown of the use of Extended Traffic Stop Indicators during stops for low-volume and high-volume deputies. Notably, low-volume deputies use each of these indicators at a higher rate than high-volume deputies. Relative to high-volume deputies, low-volume deputies had a higher proportion of their stops with language issues, licensing issues, and technical issues. Finally, it is notable that low-volume deputies had a much higher rate of training stops. Nine of the low-volume deputies were new hires in the year, completing Academy and going through the Officer-In-Training program before conducting traffic stops on their own. These stops represent the first collection of stops they have made after graduating from the Academy (a total of 116 stops or nearly 12 percent of low-volume deputy traffic stops).

Table 6: Extended Stop Reasons

	Low-Volume Deputies	High-Volume Deputies
DUI Stop	2.06%	1.94%
Language Barrier	3.30%	1.90%
License Issues	24.97%	15.91%
Technical Issues	18.35%	6.32%
Training Stop	13.20%	5.53%
Vehicle Towed	2.37%	1.69%
Other Delay	9.51%	3.66%

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[8] ETSIs are used as both matching and control variables in the alternative models, provided in the appendix.

Stop Outcomes

Arrest Outcome

MCSO classifies arrests in a variety of different ways. Some arrests do not involve detaining drivers (e.g., cite and release arrests for criminal speed), while others involve detaining and processing drivers for particular offenses (custodial cite and release arrests for DUI). We disaggregate different arrest types to identify the types of arrests that were examined in the difference-in-difference modeling. Note that these arrest types are not mutually exclusive, consequently, the total will exceed the number of arrests. Table 7 provides a comparison of low- and high-volume deputies' arrest rates during traffic stops both overall and by race/ethnicity. Low-volume deputies have a lower cite and release arrest rate, a higher booked arrest rate, and a higher warrant arrest rate when compared to high-volume deputies. Additional differences in arrest rates are apparent when comparing low- and high-volume arrest rates by race/ethnicity.

Table 7: Overall Arrests, and Arrests by Race/Ethnicity (Number and percent of stops)

	Low-Volume Deputies	High-Volume Deputies
All Drivers		
Cited and Released Arrests	27 (2.78%)	767 (4.07%)
Booked/Custodial Arrests	18 (1.86%)	207 (1.10%)
Warrant Arrests	8 (0.82%)	113 (0.60%)
All Arrests	41 (4.23%)	878 (4.66%)
Hispanic Drivers		
Cited and Released Arrests	9 (2.78%)	210 (4.75%)
Booked/Custodial Arrests	6 (1.85%)	69 (1.56%)
Warrant Arrests	1 (0.31%)	37 (0.84%)
All Arrests	14 (4.32%)	251 (5.67%)
Black Drivers		
Cited and Released Arrests	4 (4.55%)	53 (3.95%)
Booked/Custodial Arrests	4 (4.55%)	22 (1.64%)
Warrant Arrests	4 (4.55%)	20 (1.49%)
All Arrests	6 (6.82%)	67 (5.00%)
Minority Drivers		
Cited and Released Arrests	13 (2.84%)	289 (4.43%)
Booked/Custodial Arrests	11 (2.40%)	100 (1.53%)
Warrant Arrests	6 (1.31%)	64 (0.98%)
All Arrests	21 (4.59%)	350 (5.36%)
White Drivers		
Cited and Released Arrests	14 (2.73%)	478 (3.89%)
Booked/Custodial Arrests	7 (1.37%)	107 (0.87%)
Warrant Arrests	2 (0.39%)	49 (0.40%)
All Arrests	20 (3.91%)	528 (4.29%)

Low-volume deputies have a lower rate of cite and release arrests, warrant arrests, and all arrests of Hispanic drivers when compared to high-volume deputies. Low-volume deputies have a higher rate of booked/custodial arrests of Hispanic drivers when compared to high-volume deputies.

Low-volume deputies have a higher rate of all arrest types of Black drivers when compared to high-volume deputies.

Low-volume deputies have a lower rate of cite and release arrests and all arrests of minority drivers when compared to high-volume deputies. In contrast, low-volume deputies have a higher arrest rate for booked arrests and warrant arrests of minorities when compared to high-volume deputies. Finally, in comparing arrests of White drivers, low-volume deputies have a lower cite and release arrest rate, a lower warrant arrest rate, and a lower overall arrest rate when compared to high-volume deputies. In contrast, low-volume deputies have a higher booked arrest rate compared to high-volume deputies.

Citation Outcome

Table 8 provides rates for citations and warnings for low- and high-volume deputies. The "other" category in this table includes incidental contact stops, stops that utilized a long form, and field interviews. Low-volume deputies were much less likely to cite drivers than high-volume deputies.

Table 8: Traffic Stop Contact Conclusion

	Low-Volume Deputies	High-Volume Deputies
Citation	36.19%	52.56%
Warning	62.68%	47.03%
Other	1.13%	0.41%

Table 9 provides a comparison of low- and high-volume deputies' overall rates for citing/warning for different categories of offenses. Note that because drivers can be cited or warned for more than one type of offense, percentages will exceed one hundred percent. Table 10 reports stop outcomes (cite v. warn) for low- and high-volume deputies by offense categories. Low-volume deputies were less likely to have stops for speed and other violations, but more likely to have stops involving non-speed moving, equipment, and license/insurance/registration violations. Low-volume deputies have a lower citation rate for all offense categories except for other violations.

Table 9: Offense Categories, Cited or Warned

	Low-Volume Deputies (% of stops)	High-Volume Deputies (% of stops)
Speed	28.97%	55.68%
Non-Speed Moving	38.56%	19.99%
Equipment	11.34%	9.86%
License/insurance/registration	24.95%	19.59%
Other violations	2.16%	2.43%

Table 10: Citation and Warning Rates for Offense Categories

	Low-Volume Deputies (% of stops)		High-Volume Deputies (% of stops)	
	Cite Rate	Warn Rate	Cite Rate	Warn Rate
Speed	46.98%	53.02%	66.64%	33.36%
Non-Speed Moving	27.27%	72.73%	29.49%	70.51%
Equipment	63.22%	36.78%	68.66%	31.34%
License/insurance/registration	2.73%	97.27%	4.79%	95.21%
Other violations	76.19%	23.81%	62.14%	37.86%

Table 11 below compares low- and high-volume deputies by the classification of offense that was cited or warned. Low-volume deputies are slightly less likely to cite/warn for criminal traffic offenses compared to high-volume deputies. In contrast, low-volume deputies are slightly more likely to cite/warn for civil traffic and criminal violations.

Table 11: Offense classification

	Low-Volume Deputies	High-Volume Deputies
Petty	0.00%	0.00%
Criminal Traffic	2.99%	3.48%
Civil Traffic	96.80%	96.35%
Criminal	0.21%	0.16%

Search Outcome

Table 12 below provides a comparison of search activity between low- and high-volume deputies in 2022. Note that only non-incidental searches are analyzed in the TSAR, TSMR, and in this TSQR. Low-volume deputies had a higher overall rate of searches for drivers and vehicles. They also had a higher rate of non-incidental vehicle searches. However, low-volume deputies had a lower rate of non-incidental driver searches than their high-volume counterparts. To put these numbers in perspective, low-volume deputies had eight stops with non-incidental searches, whereas high-volume deputies had non-incidental searches during 90 stops.

Table 12: Searches

	Low-Volume Deputies	High-Volume Deputies
Driver Search	2.37%	1.52%
Vehicle Search	2.27%	1.66%
Search of Driver or Vehicle	3.51%	2.40%
Non-Incidental Driver Search	0.10%	0.19%
Non-Incidental Vehicle Search	0.72%	0.31%
Non-Incidental Driver or Vehicle Search	0.82%	0.48%

In this section, we reported descriptive statistics and a side-by-side comparison of low- and high-volume deputies' stop characteristics. In the next section, we report the results of the propensity score matching difference-in-difference modeling.

Comparative Analysis

In this section, we report the results of the propensity score-matched difference-in-difference analysis of each benchmark. For each analysis, we provide the observed difference in stop outcomes and stop length between (a) high-volume deputy stops of White drivers, compared to Hispanic drivers, Black drivers, and Minority drivers (Hispanic, Black, Native American, and Asian drivers combined), (b) low-volume deputy stops of White drivers, compared to Hispanic drivers, Black drivers, and Minority drivers, and (c) differences in difference (DID) between high-volume deputy stops and low-volume deputy stops for each comparison group. We employ a critical value of p=0.05 for all tests of statistical significance.

The benchmark base models presented include:

- Average Stop Length (excluding stops noted as extended);

- Arrest Outcome (all arrests, comparison condition is non-arrest);

- Arrest Outcome (booked/custodial arrests, comparison condition is not booked/custodial arrests);

- Citation Outcome;

- Search Outcome (non-incidental searches).

We provide a series of different models for different benchmarks as they are reported in TSAR 8 in the Appendix, reflecting consideration of the importance of using some variables as controls or matching variables. While these alternate models are run for the TSAR, the main body of this report is focused only on the approved base model for each benchmark. As such, we will conclude with a summary from the base models of all benchmarks identifying when results were statistically significant, and when they were not, and identify the direction of the observed disparity.

Stop Length

Table 13 represents the base model to identify disparity in average stop length times between White and Hispanic drivers, White and Black drivers, and White and Minority drivers. This excludes all extended stops (where extended traffic stop indicators were used). Matching variables for the propensity score weights included geography (X-coordinates-splined and Y-coordinates-splined and XY interaction-splined), time-splined, category of assignments[9], stop classification (civil v. criminal), plate (in-state v. out-of-state), driver's sex, whether an arrest was made during the stop, and whether a search was conducted during the stop.

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[9] Categories include normal patrol, traffic car, lake patrol, supervisors, off-duty, and other (detectives/investigators).

Table 13: Propensity score matching results for stop length, excluding extended stops

	Difference (in minutes)	t-statistic	Statistically significant?
High-volume: Hispanic vs. White	0.333	1.98	Yes
Low-volume: Hispanic vs. White	1.162	1.57	No
Difference-in-difference	0.829	1.09	No
High-volume: Black vs. White	0.953	4.20	Yes
Low-volume: Black vs. White	3.167	3.29	Yes
Difference-in-difference	2.214	2.24	Yes
High-volume: Minority vs. White	0.434	2.64	Yes
Low-volume: Minority vs. White	1.332	1.86	No
Difference-in-difference	0.898	1.22	No

Based on this analysis, high-volume deputies had statistically significant differences in average stop length times for each group, as compared to White drivers, with longer stop length averages for Hispanic, Black, and overall Minority drivers. Traffic stops of Hispanic drivers by high-volume deputies averaged to be 0.333 minutes (20 seconds) longer than stops of White drivers, 0.953 minutes (almost one minute) longer for Black drivers, and less than half a minute (0.434 minutes) for Minority drivers.

Low-volume deputies did not have statistically significant differences in average stop length between Hispanic and White drivers, nor between Minority and White drivers. Low-volume deputies did have average stop lengths of Black drivers that were about three minutes (3.167 minutes) longer than White drivers, which was a statistically significant difference.

When comparing the difference in stop length averages between low-volume and high-volume deputies, there was not a statistically significant difference in difference for Hispanic or Minority drivers when compared to White drivers. The statistically significant 0.333-minute difference in stop lengths of Hispanic drivers compared to White drivers among high-volume deputies was not significantly different from their low-volume counterparts' 1.162-minute difference in stop lengths of Hispanic drivers compared to White drivers.

When comparing Black and White drivers' stop lengths, this analysis found statistically significant differences for both low- and high-volume deputies as well as a statistically significant difference-in-difference between low- and high-volume deputy stops of Black and White drivers.

Finally, when comparing stops of Minority and White drivers, there was a statistically significant difference in stop lengths (0.434 minutes) for high-volume deputies. However, the difference in stop length for low-volume deputy stops of Minority and White drivers was not statistically

significant. There was no statistically significant difference-in-difference between low- and high-volume deputy stops of Minority and White drivers.

Arrest Outcomes

In the section below we analyze the disparity in arrests for low- and high-volume deputies. Two different modeling processes are used. The first compares all arrest outcomes for all stops. The second compares booked/custodial arrests to all other stops.

All Arrests

In Table 14, below, findings are presented using all arrest types and all stops. Matching variables for the propensity score weights included geography (X-coordinates-splined and Y-coordinates-splined and XY interaction-splined), time-splined, category of assignments, stop classification (civil v. criminal), plate (in-state v. out-of-state), and driver's sex.

Table 14: Propensity score matching results for all arrest types

	Difference (percentage)	t-statistic	Statistically significant?
High-volume: Hispanic vs. White	1.2	3.39	Yes
Low-volume: Hispanic vs. White	<0.1	0.01	No
Difference-in-difference	−1.1	−0.87	No
High-volume: Black vs. White	−0.1	−0.34	No
Low-volume: Black vs. White	1.8	1.21	No
Difference-in-difference	1.9	1.26	No
High-volume: Minority vs. White	0.7	2.35	Yes
Low-volume: Minority vs. White	0.2	0.16	No
Difference-in-difference	−0.6	−0.45	No

Based on the findings presented in Table 14, there was no statistically significant difference between White drivers and Hispanic drivers in arrest outcomes among low-volume deputies. There were also no statistically significant differences in arrest outcomes for Black or Minority drivers when compared to White drivers for low-volume deputies.

High-volume deputies arrested Hispanic drivers 1.2 percent more often than White drivers. This difference was statistically significant. When comparing Minority drivers to White drivers, high-volume deputies arrested Minority drivers 0.7 percent more often than White drivers, which was also a statistically significant difference. However, among arrest rates, there was no statistically significant difference-in-difference between low- and high-volume deputy groups.

Booked/Custodial Arrests v. All Other Stops

In Table 15 below, results are presented that compare the booked and custodial arrests to all other stops for low- and high-volume deputies. Matching variables for the propensity score weights used in this model included geography (X-coordinates-splined and Y-coordinates-splined and XY interaction-splined), time-splined, category of assignments, stop classification (civil v. criminal), plate (in-state v. out-of-state), and driver's sex.

Table 15: Propensity score matching results for booked/custodial arrests

	Difference (percentage)	t-statistic	Statistically significant?
High-volume: Hispanic vs. White	0.5	2.69	Yes
Low-volume: Hispanic vs. White	0.9	1.35	No
Difference-in-difference	0.4	0.60	No
High-volume: Black vs. White	0.4	1.98	Yes
Low-volume: Black vs. White	3.4	4.09	Yes
Difference-in-difference	3.0	3.47	Yes
High-volume: Minority vs. White	0.4	2.44	Yes
Low-volume: Minority vs. White	1.4	2.16	Yes
Difference-in-difference	1.0	1.46	No

Based on these models, there were no statistically significant differences in arrest outcomes for Hispanic drivers by low-volume deputies. There was a statistically significant difference of 0.5 percent arrest rate of Hispanic drivers by high-volume deputies. The difference-in-difference estimate between low-and high-volume deputies was not statistically significant. Both low- and high-volume deputies evidenced statistically significant differences in arrest rates for Black drivers, and the difference-in-difference estimate of 3.0 percent was statistically significant, suggesting that low-volume deputies differ from their high-volume peers. Finally, both low- and high-volume deputies had differences in arrest rates of minority drivers that were statistically significant. There were no statistically significant difference-in-difference between low-volume and high-volume deputies for minority drivers suggesting the two groups were similar.

Citations

Citation stop outcomes for low- and high-volume deputy stops were compared using matching variables for the propensity score weights. These variables included geography (X-coordinates-splined and Y-coordinates-splined and XY interaction-splined), time-splined, category of assignments, stop classification (civil v. criminal), plate (in-state v. out-of-state), and the driver's sex, as well as the additional matching variables of offense categories and speed at which the driver was traveling. Speed was binned in 5-mph increments and speed was set to zero for non-speeding offenses. Offense categories included speed, non-speed moving, equipment, license/insurance/registration, and other violations. Results examining citation outcomes are presented in Table 16 below.

Table 16: Propensity score matching results for citations

	Difference (percentage)	t-statistic	Statistically significant?
High-volume: Hispanic vs. White	2.2	2.79	Yes
Low-volume: Hispanic vs. White	–0.3	–0.09	No
Difference-in-difference	–2.4	–0.82	No
High-volume: Black vs. White	–1.7	1.93	No
Low-volume: Black vs. White	2.0	0.58	No
Difference-in-difference	3.6	1.04	No
High-volume: Minority vs. White	1.3	1.75	No
Low-volume: Minority vs. White	–1.4	–0.52	No
Difference-in-difference	–2.7	–0.95	No

Based on this modeling, there were no statistically significant differences in citation outcomes between the comparison groups for low-volume deputies. There was a statistically significant difference in the citation rate between Hispanic and White drivers for stops made by high-volume deputies, with Hispanic drivers receiving a citation 2.2 percent more often than White drivers. There were no statistically significant difference-in-differences between low-volume and high-volume deputies.

Searches

Table 17 below reports results comparing low- and high-volume deputies on search rates of Hispanic, Black, Minority, and White drivers. Note that this analysis only compares search rates for non-incidental searches. In this model, matching variables for the propensity score weights included geography (X-coordinates-splined and Y-coordinates-splined and XY interaction-splined), time-splined, category of assignments, stop classification (civil v. criminal), plate (in-state v. out-of-state), and driver's sex.

Table 17: Propensity score matching results for Searches

	Difference (percentage)	t-statistic	Statistically significant?
High-volume: Hispanic vs. White	0.6	4.20	Yes
Low-volume: Hispanic vs. White	0.6	1.18	No
Difference-in-difference	<0.1	0.04	No
High-volume: Black vs. White	0.2	1.42	No
Low-volume: Black vs. White	−0.8	−1.57	No
Difference-in-difference	−1.0	−1.87	No
High-volume: Minority vs. White	0.4	3.39	Yes
Low-volume: Minority vs. White	0.1	0.33	No
Difference-in-difference	−0.3	−0.55	No

Based on this modeling, there were no statistically significant differences among any race/ethnicity comparison for low-volume deputy stops. For high-volume deputy stops, we found a statistically significant difference in search rates between Hispanic and White drivers. In this case, Hispanic drivers experienced a non-incidental search 0.6 percent more often than White drivers. The difference-in-difference between low- and high-volume deputies' search rates was not statistically significant for any comparison.

There were no statistically significant differences in search rates observed when comparing Black and White drivers for high-volume deputies. In comparing search rates of Minority and White drivers, we found a statistically significant difference in searches for stops made by high-volume deputies, where Minority drivers experienced a non-incidental search 0.4 percent more often than White drivers. The difference-in-difference between low- and high-volume deputies was not statistically significant.

Summary of Findings

In this section, we provide a summary of findings from the research highlighting both null and statistically significant findings of racial/ethnic comparisons for low- and high-volume deputies and whether the difference in the disparities observed between these two groups (difference-in-difference) are statistically significant.

Low-Volume Deputies

Table 18 below summarizes findings from the analyses above for low-volume deputies. Among low-volume deputies, differences in stop lengths demonstrated longer stop lengths for Black drivers compared to White drivers. This finding was statistically significant. In each of the analyses of the arrest benchmark, booked or arrest outcome differences were not statistically significant.

Findings differed between groups for citation and search benchmarks. In comparisons of citation outcomes, Hispanic and Minority drivers were less likely to receive a citation than White drivers, while Black drivers were more likely to receive a citation. None of these differences were statistically significant. In comparisons of search outcomes, Black drivers were less likely to be subject to search than White drivers, while Hispanic and Minority drivers were more likely. None of these differences were statistically significant either.

Table 18: Propensity score matching findings for low-volume deputies (difference)

	Hispanic	Black	Minority
Stop Length	1.162	3.167*	1.332
Arrests (all arrests)	<0.1%	1.8%	0.2%
Arrests (booked/custodial arrests)	0.9%	3.4%*	1.4%*
Citations	–0.3%	2.0%	–1.4%
Searches	0.6%	–0.8%	0.1%

*p<0.05

High-Volume Deputies

Table 19 below summarizes findings from the analyses above for high-volume deputies. Among high-volume deputies, differences in stop lengths demonstrated longer stop lengths for each group compared to White drivers, and these differences were statistically significant. In the comparison of arrest outcomes for all arrest types, Hispanic and Minority drivers were more likely to be arrested than White drivers, and both of these differences were statistically significant. When limiting arrest outcomes to booked compared to cite and release, Black drivers were significantly more likely to be booked than White drivers. Hispanic and Minority drivers were also more likely to be booked than White drivers compared to cited-and-released, but these differences were not statistically significant.

Findings differed between groups for the citation benchmark as well. In comparisons of citation outcomes, Hispanic and Minority drivers were more likely to receive a citation than White drivers, while Black drivers were less likely to receive a citation. The difference between Hispanic and White drivers in citation outcome was statistically significant. Search outcomes were also statistically significantly more likely for Hispanic drivers and Minority drivers when compared to White drivers. Black drivers were also more likely to be searched by high-volume deputies than White drivers, but this difference was not statistically significant.

Table 19: Propensity score matching findings for high-volume deputies (difference)

	Hispanic	Black	Minority
Stop Length	0.333*	0.953*	0.434*
Arrests (all arrests)	1.2%*	–0.1%	0.7%*
Arrests (booked/custodial arrests)	0.5%*	0.4%*	0.4%*
Citations	2.2%*	–1.7%	1.3%
Searches	0.6%*	0.2%	0.4%*

*p<0.05

Comparison between Low-Volume and High-Volume Deputies

Table 20 summarizes the differences-in-differences between low- and high-volume deputies. Low-volume deputies evidenced longer stop length differences between Black and White drivers when compared to high-volume deputies. For all arrest types, there was no statistically significant difference-in-difference between low- and high-volume deputies. When limited to booked/custodial arrests only, low-volume deputies had a statistically significant difference in disparity when compared to high-volume deputies. For citations, low-volume deputies' difference between Hispanic and Minority drivers was less than the difference evidenced by high-volume deputies, but these differences were not statistically significant. Finally, when comparing difference-in-difference in search outcomes, low-volume deputies' difference between Black and Minority drivers compared to White drivers was less than high-volume deputies but was not statistically significant.

Table 20: Propensity score matching findings for difference-in-difference

	Hispanic	Black	Minority
Stop Length	0.829	2.214*	0.898
Arrests (all arrests)	–1.1%	1.9%	–0.6%
Arrests (booked/custodial arrests)	0.4%	3.0%*	1.0%
Citations	–2.4%	3.6%	–2.7%
Searches	<0.1%	–1.0%	0.3%

*p<0.05

Conclusion and MCSO Response

The analyses conducted for this report found that low-volume deputies, overall, did not evidence disparate outcomes for Hispanic drivers. However, the research did uncover statistically significant differences in stop lengths for Black drivers. MCSO researchers explored potential explanations for this disparity and identified twenty-five percent of the low-volume deputies' stops of black drivers indicated that there were driving documentation issues compared to fourteen percent of their stops of White drivers. Additionally, low-volume deputies had four out of 88 stops of Black drivers whose stop lengths exceeded one hour (4.55% of stops) whereas, only 13 out of 460 stops of White drivers (2.83%) exceeded one hour. Of the stops of Black drivers that exceeded one hour, all were arrested on warrants. In contrast, of the stops of White drivers that exceeded one hour, eight were DUI arrests, two were warrant arrests, two stops involved juveniles and one stop appeared to have an erroneous stop length.[10]

Findings from this research largely reflect the disparity observed in the latest TSAR report (TSAR 8). However, to address the question of whether low-volume deputies differ from their high-volume counterparts, there is little evidence to suggest that the low-volume deputies (a) have disparity in their stop outcomes of White and Hispanic drivers or, (b) have disparity in stop outcomes of citations, and searches of Black drivers. There was evidence to suggest that low-volume deputies did have disparity in stop lengths for Black drivers and had disparity in booked/custodial arrests of Black drivers. Based on these findings the noted possible group-level intervention on low-volume deputies from the proposal would not be the most appropriate course of action. However, MCSO will take the following actions:

- Discuss with the Monitoring Team and Parties possible changes to the arrest variable in calculating propensity scores used for analyzing stop length (Custodial Arrests vs. Non-Custodial Arrests impact stop length differently).

- Propose to the Monitoring Team and Parties an analysis of low-volume deputies as a regular traffic stop quarterly report, conducted annually in conjunction with the TSAR.

- Propose to the Monitoring Team and Parties an analysis of training stops and how they differ in stop length and stop outcomes from non-training stops.

- MCSO will conduct (squad or district) level briefings regarding the results of this research. This may also be used in conjunction with the TSAR results briefings as the results mirror each other.

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[10] MC numbers for these stops are available to the Monitoring Team and Parties upon request.