Traffic Stop Data Analysis Study: Year 3 Final Report

Prepared for the Arizona Department of Public Safety

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OVERVIEW

In January 2003, the Arizona Department of Public Safety (DPS) began voluntarily collecting data regarding traffic and pedestrian stops. In 2006, as part of a settlement agreement in a class-action lawsuit, DPS officials agreed to conduct a comprehensive evaluation of stop data being collected by DPS Officers with an outside research team. The DPS contracted with Dr. Robin Engel and the University of Cincinnati Policing Institute (UCPI) to conduct this analysis over a three year period. In November 2007, the UCPI research team released its first of several reports, *Traffic Stop Data Analysis Study: Year 1 Final Report,* based on statistical analyses of traffic stops conducted from January 1 – December 31, 2006. This was followed in November 2008 by the *Traffic Stop Data Analysis Study: Year 2 Final Report,* based on data from traffic stops conducted from January 1 – December 31, 2007. Both reports summarized the current status of the data collection effort, provided descriptive statistics of the initial stop and stop outcomes, utilized multivariate analysis of post-stop outcomes, and specifically examined search and seizure rates (see Engel, Tillyer, Cherkauskas, & Frank, 2007; Engel, Cherkauskas, & Smith, 2008a).

This report documents the findings from statistical analyses of data collected during all officer-initiated traffic stops conducted by the Arizona Department of Public Safety from January 1, 2008 through December 31, 2008, which represent the third year of data analysis for the *Traffic Stop Data Analysis Study*. This report differs slightly from previous reports based on revisions to the data collection system the DPS has instituted as a result of the findings and recommendations produced by the UCPI research team. Previous assessments by the UCPI research team called into question the validity and reliability of DPS traffic stop data. As a result, the DPS began collecting traffic stop data via a new electronic system known as TraCS in October 2008. The new TraCS system includes an expanded number of data fields that the DPS voluntarily added to the data collection effort to allow for a better understanding of the racial/ethnic disparities in traffic stop outcomes that were reported in the first two years of data analyses. Because the new TraCS data collection system was not implemented until October 2008, this report is based on the statistical analyses of data collected during all traffic stops in 2008 with both the former KOTS scannable data forms and the new electronic KOTS forms. It includes, where appropriate, a direct comparison of the data collected via the KOTS system with the three months of data collected with the redesigned and expanded TraCS electronic data collection system.

This Executive Summary provides a review of the 2008 data audit, a brief description of the data collected, the analyses conducted, and the major findings included within this report. The findings from this report can be generally examined as three separate, but related issues: 1) the initial stopping decision, 2) post-stop outcomes received by motorists (e.g., warnings, repair orders, citations, arrests, and searches), and 3) specific examinations of searches and seizures. Following the review of findings in these sections of the report, the UCPI research team's recommendations (related to data collection, supervisory oversight, and further understanding of racial/ethnic disparities) for consideration by DPS administrators are summarized.

As noted throughout this report, it is impossible with these data to determine the motivating factors behind traffic stops conducted by individual DPS officers. Rather, this data collection effort and subsequent data analyses can only examine patterns and trends in traffic stops and post-stop outcomes to determine if racial disparities exist after considering a host of additional legal and extralegal factors that might influence officer decision making. While it cannot be determined if DPS officers are engaging in the behavior commonly referred to as "racial profiling," analyses can demonstrate if patterns of racial disparities exist in stop and post-stop outcomes that warrant further scrutiny.

DATA AUDIT

Data "auditing" is an important oversight mechanism to maintain data quality. Improving data accuracy ensures that recommendations regarding policy and training changes are made based on the highest quality data possible. The audit of 2008 traffic stop data represents the third data audit conducted by the UCPI. Although the methodology of the Year 3 data audit remains the same as those conducted for 2006 and 2007 data, the substance of this audit differs slightly because it compares the efficacy of the two data collection systems in place during the 2008 data collection year: KOTS (former scan-based paper form) and TraCS (current electronic data collection method instituted department-wide in October 2008).

To assess the validity of the 2008 stop data collected by DPS officers, the UC research team conducted a two-phase data audit. Phase 1 assessed the missing data and logical inconsistencies within the data for all traffic stops conducted by DPS officers in 2008. An overall error rate was created based on the rate of missing data (i.e., no information entered by the officer) and logical inconsistencies within the data (i.e., fields with missing and/or incorrect entries that contradict other fields). The overall error rate calculated for Phase 1 of the data audit is 7.8%. When the error rates for both the KOTS and TraCS data collection systems are compared, however, it is clear that the transition to improved data accuracy is already underway. Specifically, the error rate for stop data collected via TraCS in the last three months of 2008 is only 2.1%, compared to 9.8% for KOTS. The TraCS error rate is well under the PERF-recommended threshold (10% or less missing data) and nearly reaches the research team's ideal goal of 2% or less for missing/invalid data. It is obvious that instituting an electronic data collection system and its accompanying training have dramatically improved the accuracy and consistency with which stop data are being collected across the department.

Phase 2 of the data audit examines the data accuracy by comparing the content of the electronic data to other independent sources of information and addressing the question of whether all stops recorded in external sources of information are represented in the electronic data. This type of audit determines the extent to which officers are completing data collection forms for all stops. Discussions with DPS personnel determined that the most appropriate comparison data for comparison purposes were officers' activity logs.

The results of this phase of the data audit indicate that the overall percent error between the two datasets at the department level is -0.3%. The Police Executive Research Forum (Fridell, 2004, 54) suggests that "correspondence of 90 percent or more between the two

sources of information is quite acceptable." Using this standard, the results of this audit are positive. All 20 of the districts/shifts fall within the parameter of 10% error in either dataset, with 15 of the districts/shifts demonstrating a difference of 2% or less.

In addition to the availability of the activity log data, additional comparison data for assessing internal consistency are available regarding specific violations associated with stop outcomes. For the KOTS data collection system, violation data are available for contacts in which a citation or warning was issued. Unfortunately, these comparisons suggested multiple errors in one or both data sources, where, in some cases, a citation or warning in the violation file was not accompanied by information in the stop data and, in other cases, citations and warnings in the original stop data did not have corresponding violation information in the violation data file. Violation comparison data also are available for the TraCS data collection system. For each traffic stop, DPS officers also recorded the specific violations resulting in either: 1) a citation and/or arrest, or 2) a repair order, warning, or DVER. Similar, though far less frequent, discrepancies were discovered in the TraCS electronic stop data as well.

The results of this data audit indicate that the electronic capture of traffic stop data is a dramatic improvement over the use of scannable forms for validity, accuracy and consistency. The UCPI research team recommends further refinement of the TraCS electronic data capture as well as continued supervisory oversight of data quality and compliance with the data collection protocol and is optimistic that the data quality will continue to be enhanced.

THE INITIAL STOP

From January 1, 2008 – December 31, 2008, there were 539,344 valid member-initiated traffic stops recorded by DPS officers. Department-wide, approximately 61.9% of the drivers stopped were White, while 25.2% were Hispanic, 4.9% Black, 4.8% Native American, and 3.3% Other (Asian, Middle Eastern, other or unknown). The rate of stops for particular racial and ethnic groups varied dramatically across divisions, bureaus, and districts/shifts. Some variation, however, is to be expected given residential patterns related to race/ethnicity, along with racial/ethnic differences in travel patterns on interstates, highways, and major thoroughfares. The percentages of drivers stopped within particular racial/ethnic categories are consistent with those identified in the *Year 1* and *Year 2 Reports*.

Ultimately, a group's representation in traffic stops is only meaningful when compared to the same group's "expected" representation in traffic stops, based on external data such as a group's census population. Unfortunately, all available external benchmarks are flawed, which limits the level of confidence in the results of these comparisons. Internal benchmarking – which compares the racial/ethnic breakdown of traffic stops across officers assigned to the same, assignments, shifts, and districts – is also difficult with these data because of the small numbers of officers that have such similarities. In addition, data quality issues with previous years of DPS traffic stop data led the UCPI research team to conclude that internal comparisons through trend analysis would not be advisable either. Therefore, no department-wide conclusions can be drawn as to whether racial/ethnic disparities in stopping

behavior exist. Instead, this report focuses on whether racial/ethnic disparities are evident in post-stop outcomes.

POST-STOP OUTCOMES

Warnings and citations were the most frequent stop outcomes for drivers in 2008 (42.0% and 41.4%, respectively). In addition, 18.6% were issued repair orders. Occurring rarely were the most serious stop outcomes – specifically, arrests (1.8% of drivers stopped), warrant arrests (0.5%), and searches of the drivers, occupants, or vehicles (5.4% of the stops). Slightly more than 5% of drivers were issued DVERs. Stops resulting in field interviews and tribal orders were statistically infrequent events across the department, and were not examined in detail within this report.

Analyses of post-stop outcomes are an important consideration of any data collection effort because the potential exists for differential treatment based on the drivers' characteristics *after* the initial stop has been made. Bivariate and multivariate analyses of post-stop outcomes examined racial/ethnic differences in warnings, repair orders, citations, arrests, searches and, seizures of contraband.

Bivariate Analyses:

Initially, bivariate analyses (examining only race/ethnicity and specific post-stop outcomes) demonstrated that, across the department, post-stop outcomes differed across racial/ethnic groups. At the department level, statistically significant racial/ethnic differences were evident for the most severe outcome received. Specifically, Hispanics were significantly less likely than other racial/ethnic groups to have a warning be the most severe outcome received. Hispanics and Native Americans were significantly more likely than Whites and Blacks to have repair orders or DVERs as the most severe outcome received. Hispanics and Blacks were significantly more likely than Whites and Native Americans to have a citation as the most severe outcome received. Finally, for the most severe outcome—arrest—Hispanics, Native Americans, and Blacks were all significantly more likely than Whites to have arrest as the most serious outcome received.

In addition, racial/ethnic differences were found across all outcomes (regardless of the most severe). Measures include whether or not any outcome was received, regardless of its severity compared to other outcomes during the same stop. At the department level, Hispanic drivers were the least likely to be issued warnings, Native Americans were the most likely to be issued repair orders, Hispanics and Blacks received the highest percentages of citations, and Hispanic, Native American and Black drivers were all significantly more likely than White drivers to be arrested and searched.

It is important to reiterate, however, that these relationships are bivariate in nature and thus do not statistically control for other relevant legal and extralegal factors that might influence officer decision-making. Therefore, this information *cannot* determine whether or not differences in outcomes across racial/ethnic and gender groups are due to officer bias.

Multivariate Analyses:

It is plausible that racial/ethnic and gender differences in post-stop outcomes exist due to legal and extralegal reasons other than drivers' race/ethnicity. To explore these possibilities, more advanced statistical analyses that control for other legally relevant variables are presented below. Unlike a bivariate model, which simply assesses the relationship between two variables, a multivariate model examines many variables simultaneously, and provides an understanding of the independent effect of drivers' race/ethnicity in relation to these post-stop outcomes after taking into account other legal and extralegal factors known to influence officer decision making. Separate multivariate models estimated for the final three months of 2008 data allowed for an initial examination of stop outcomes factoring in the influence of the additional variables collected in the TraCS data collection system.

Results from the multivariate analyses demonstrated that, even after controlling for other explanatory factors (e.g., other driver characteristics, vehicle characteristics, stop characteristics, and legal variables), racial/ethnic disparities exist for warnings, repair orders, citations, arrests, and searches. The substantive importance of these race/ethnicity effects, however, varies by stop outcome.

- **Warnings**
  - The strongest predictors of whether or not drivers receive warnings were legal variables, including: whether multiple pre-stop indicators of possible criminal activity were observed, the types of pre-stop traffic violations observed, and the legal reasons for the stop.
  - Hispanic, Black, and drivers of other race/ethnicity were significantly *less* likely compared to Whites to receive warnings, but these relationships are substantively weak (odds ratios ranging from 1.1 to 1.3).

- **Repair Orders**
  - The strength of the models predicting repair orders is driven primarily by the reason for stop and type of pre-stop traffic violations observed (e.g., primary reason for stop was equipment violation or driver observed for a pre-stop equipment violation).
  - Hispanic and Black drivers were significantly *less* likely compared to Whites to be issued repair orders, but again, these relationships are substantively unimportant (odds ratios ranging from 1.1 to 1.4). Native American driver were approximately two times significantly *more* likely to be issued repair orders compared to Whites.

- **Citations**
  - The models predicting the likelihood of *any* citation are largely driven by legal variables (e.g., reason for stop, number of pre-stop violations, seizure of evidence, and vehicle impound). The strength of the race/ethnicity variables indicate that these are *not* substantively strong predictors of the odds of receiving *any* citation.
  - Bivariate analyses indicated that Hispanics, Blacks and Native Americans were significantly more likely than Whites to be issued multiple citations.

- Therefore, a multinomial logistic regression analysis compared the probability of receiving one, two, and three or more citations compared to none. Across these models, the strongest predictors of the number of citations issued to drivers were also legal variables.
- The impact of drivers' race/ethnicity increased as the number of citations increased. For example, Hispanic and Black drivers were each only 1.1 times more likely than White motorists to receive one citation (substantively insignificant differences), but 1.8 times more likely to receive three or more citations compared to none.
  - Statistical models that *exclude* the additional explanatory variables available in the TraCS system suggest that Hispanic and Black drivers were 3.1 and 2.2 times more likely to receive three citations compared to White drivers. This comparison demonstrates that as racial profiling data collection efforts capture more relevant legal and extralegal information like those included in the TraCS system, the reported impact of race/ethnicity decreases substantially.

- **Arrests**
  - The strongest factor associated with arrest is, not surprisingly, the discovery of contraband – drivers with contraband were over 21 times *more* likely to be arrested compared to drivers without contraband. Vehicle impound, reason for the stop, and the presence of multiple pre-stop indicators of possible criminal activity were also strong predictors of the likelihood of arrest.
  - Despite the strength of these legal variables and driver demeanor, Native American and Black drivers were still 3.2 and 1.9 times *more* likely than Whites to be arrested, respectively. Once the additional variables recorded in TraCS are considered in the multivariate model, the effect of being Hispanic on the likelihood of arrest diminishes entirely. That is, Hispanics were equally likely to be arrested when compared to Whites.
  - Examining a model that predicts discretionary arrests only (non-warrant, non-DUI), the effect of the Native American race variable on the likelihood of being arrested is somewhat diminished, although it remains a substantively important predictor.

- **Searches**
  - Although the search models are weak in predictive power, a number of legal variables show statistically significant and substantively important effects on the likelihood of being searched, particularly the observation of two or more indicators of criminal activity prior to the stop.
  - Nevertheless, Hispanic, Native American, and Black drivers were 2.4, 2.5, and 2.3 times *more* likely to be searched compared to Whites after controlling for other legal and extra legal variables.
    - The strength of the Hispanic and Black race/ethnicity variables is somewhat diminished by the inclusion of the additional variables recorded in TraCS.
  - Uncooperative or combative drivers were 6.3 times more likely to be searched, and undocumented aliens or those traveling with UDAs were 3.6 times more likely to be searched, when compared to cooperative drivers and legal residents.

- When a model predicting discretionary searches (e.g., non-mandatory, non-consent) only is examined, substantial differences are evident in the effects of the race/ethnicity variables: 1) Native American is no longer significant, 2) Hispanic decreases from 2.4 times more likely to be subject to any search to 1.4 times more likely to be searched based on discretionary reasons, and 3) while Blacks are 2.3 times more likely than Whites to be subjected to any search, they are 3.1 times more likely to be searched based on discretionary reasons.
  - These findings suggest that there are racial/ethnic differences in the types of searches.

- **Seizures**
  - The multivariate models separately predicting seizures and the discovery of contraband *or* the discovery of undocumented aliens explain a minimal amount of variance. The strongest predictor of both outcomes is the presence of multiple pre-stop indicators of possible criminal activity.
  - Hispanic drivers and drivers of Other races were both 1.8 times less likely to be discovered with contraband when compared to White drivers, but Hispanics were 1.9 times *more* likely than White drivers to be found with contraband or UDAs.
  - The small amount of variance explained indicates there are multiple factors that explain the discovery of contraband and/or undocumented aliens that are not included in these models.

In summary, racial and ethnic disparities in traffic stop outcomes were found even after taking into consideration other legal and extra-legal factors known to influence police decision making during traffic stops. The substantive importance of these findings is greatest for stops resulting in arrests and searches, and less so for stops resulting in warnings, repair orders, and citations. In comparison to findings reported in the *Year 1* and *Year 2 Reports* (based on data from 2006 and 2007), the bivariate and multivariate results based on data from 2008 are similar. The inclusion of the additional explanatory variables collected in the TraCS system (e.g., pre-stop indicators of possible criminal activity, number and type of pre-stop violations, driver demeanor, whether vehicle impounded), however, improved the explanatory power of the multivariate statistical models and, in some cases, reduced the strength of the impact of race/ethnicity on citations, arrests, and searches. This suggests that as racial profiling data collection efforts capture more relevant legal and extralegal information that has historically been unavailable, the previously reported impact of race/ethnicity is likely to diminish. Simply put, as we become better at measuring the relevant information, the reported level of bias is reduced significantly. This does not mean that DPS officers have changed their behavior; rather social science techniques are now better able to predict their behavior with the end result of these better traffic stop data measures being that fewer racial/ethnic disparities in traffic stop outcomes are evident.

The reasons for the remaining racial/ethnic disparities reported for traffic stop outcomes cannot be directly determined with these data. Racial / ethnic differences in stop outcomes may (or may not) be explained by factors unmeasured by these data or officer bias toward specific minority groups. The multivariate models can only measure the influence of variables for which data is collected. In addition, no statistical models can measure officers'

intent or individual prejudices. Therefore, it is the conclusion of this report that some racial/ethnic disparities in traffic stop outcomes continue, but no definitive conclusions regarding the reasons for the observed racial/ethnic disparities in traffic stop outcomes can be made.

SEARCHES & SEIZURES

Although the legal reasons for the stop and presence of multiple pre-stop indicators of possible criminal activity were the strongest predictors of decisions to search, some differences in the likelihood of conducting searches are still attributable to drivers' characteristics (most notably, drivers' race and ethnicity). Therefore, additional analyses were conducted to better understand the racial/ethnic disparities in officers' search decisions during traffic stops.

Across the DPS in 2008, officers reported 29,173 searches of drivers, vehicles, and/or passengers during officer-initiated traffic stops. At the department level, the overwhelming majority of stops (81.4%) did not involve pre-stop indicators of possible criminal activity. When these indicators were noted, however, approximately 9% of stops with at least one pre-stop indicator of possible criminal activity resulted in a search, while 31.9% of stops with two or more observed indicators resulted in a search.

All searches were classified by the UCPI research team as belonging in one of three categories based on their lowest level of discretion):

- Type I = Mandatory; required by departmental policy; little to no discretion (e.g., incident to arrest, inventory, plain view)
- Type II = Discretionary; guided by case law and/or legal statue; low/medium discretion (e.g., probable cause, canine alert, Terry)
- Type III = Consent only, high discretion

At the department level, the majority of searches conducted were Type I (low discretion) searches (76.1%), while 12.1% were Type II (guided by case law/legal statute) and 11.8% were Type III (solely consent), respectively. Analyses based on the type of search indicated statistically significant racial and ethnic disparities in searches across all three search type categories. Black drivers were *least* likely to be searched for low discretion reasons (Type I), while Native Americans were *most* likely to be searched for these reasons. For Type II searches, the opposite is true; Blacks were significantly more likely, and Native Americans significantly less likely, to be subject to Type II searches. In the case of solely consent searches (Type III searches), Hispanic motorists were significantly more likely to be searched based on consent compared to all other racial/ethnic groups.

Of the 29,173 searches, DPS officers successfully seized contraband during 5,287 searches; thus, the overall search success rate is 18.1%. The most frequent type of contraband seized was drugs (50.5%), followed by other contraband (28.7%), alcohol (18.3%), and vehicles (17.1%). Information recorded in TraCS for October – December 2008 shows that the overwhelming majority of drug seizures—85.6%—included personal use amounts, while 16.4% included quantities for sale and 16.4% included quantities for transportation.

Furthermore, racial/ethnic differences in drug seizure amounts were evident as Whites were most likely to have personal use amounts of drugs seized during searches resulting in drug seizures, while Hispanics and Blacks were significantly more likely than Whites to have sale and transportation quantities of drugs seized.

Across the department, search success rates (percent of searches that resulted in the discovery of contraband) varied considerably by the reason for the search. Probable cause, canine alert, warrant, and plain view searches were the most likely to be successful in recovering contraband (ranging from 50%-67%), while vehicle inventories and searches based solely or partially on consent were the least likely to result in the discovery of contraband (10%-15%). As noted above, over three-quarters of the searches department-wide were conducted for low-discretion reasons. In these situations, the likelihood of discovering contraband is largely not related to officer skill or criminal interdiction training.

Search success rates also varied by organizational unit. Of particular importance were the differences in the rates of contraband seizures between canine handlers assigned to the North squad versus those assigned to the Central and South squads. Across all types of searches, canine handlers assigned to the North squad were significantly more likely to report contraband seizures compared to handlers assigned to Central/South squads. This overall gap, however, has narrowed in 2008 compared to 2006 and 2007, as have the squads' search success rates for probable cause and canine alert searches.

The overall Type II (discretionary / guided by legal statue and case law) search success rate for DPS was 44.9%, but success rates varied significantly by race/ethnicity. Type II searches of Native American and White drivers resulted in the seizure of contraband in approximately half of those searches, while only 38.4% of Type II searches of Hispanics resulted in contraband seizures.

Analyses of consent searches revealed racial/ethnic differences in those asked for consent to search as well as refusals to consent. Hispanics were significantly more likely than other racial/ethnic groups to be asked for consent to search and significantly less likely than members of other racial/ethnic groups to refuse consent to search. Not surprisingly, multivariate models predicting Type III searches also indicated that there were statistically significant racial/ethnic disparities in whether or not consent searches are conducted as Hispanic and Black drivers were 3.3 and 2.0 times more likely to be searched based on consent compared to Whites given the same vehicle, stop, and legal characteristics. The strength of these relationships is slightly diminished by the inclusion of additional explanatory variables available in TraCS. The strongest predictor of whether or not a consent search is conducted is the presence of multiple pre-stop indicators of possible criminal activity. Like the previous multivariate search models, the weak overall ability of these models to predict the likelihood of consent searches indicates that this model is likely misspecified (i.e., it does not include other relevant explanatory factors, including refusal to consent, post-stop indicators of suspicion, etc.).

Because consent searches are not solely dependent on officer's discretion (i.e., a citizen may refuse), outcome test analyses of consent search success rates are not recommended. They

were, however, conducted, at the request of DPS administrators. The results indicated that Type III searches of White drivers (14.1%) were the most likely to be successful in the discovery of contraband, followed by drivers of other races/ethnicities (13.8%), and Blacks (12.2%). Consent only searches of Hispanics (7.4%) were the least likely to be successful in terms of recovering contraband.

Stops involving undocumented aliens (the majority of which involved a Hispanic driver) were significantly more likely to result in a search than stops involving legal residents. Compared to searches involving legal residents, Type II searches involving undocumented aliens were less likely to produce seizures of contraband while Type III searches involving undocumented aliens were more likely to produce seizures of contraband. When undocumented aliens are considered as another type of criminal activity discovered (despite not resulting in the discovery of contraband per se), both the Type II and Type III search success rates for Hispanic motorists increase. They still remain lower than the search success rates for Whites, but this difference is not statistically significant for Type III searches.

Based on these findings, it is the conclusion of this report that some racial and ethnic disparities exist for searches and seizures conducted during officer-initiated traffic stops. Again, these results are comparable to those reported in the Years 1 and 2 Reports, with little substantive difference in the racial/ethnic disparities discovered except for the rates of discovery of contraband or undocumented aliens now that the data field measuring the latter includes *any* undocumented aliens. These findings, however, do not address the legality of individual searches. The data collected and reported within this document only examine trends and cannot address questions of whether or not individual searches conducted by DPS officers were legally justified or based on discrimination.

RECOMMENDATIONS

Based on the findings reviewed above, a series of recommendations are provided by the UCPI research team. The purpose of these recommendations is to assist DPS administrators in continuing to improve the already rapid progress that is being demonstrated within their agency. These recommendations are divided into the following categories: Data collection and analysis, supervisory oversight, understanding and addressing racial/ethnic disparities.

Data Collection

The development and implementation of the TraCS system is a significant improvement over previous data collection methods. This system provides a more efficient, effective, and reliable means of capturing information related to traffic stops. It will be important to now analyze data collected from this new system and compare to previous reports. There are a few minor adjustments to this data collection system that DPS officials should consider.

Recommendation #1: The DPS should continue to collect and analyze traffic stop data beyond the requirements of the current settlement agreement.

Continued monitoring of racial and ethnic disparities in traffic stop outcomes, particularly searches and seizures is recommended. The DPS should continue to collect and analyze traffic stop data to examine patterns and trends across the agency and across time. The DPS should also extend the current contract with the UCPI research team or hire a different external research team to provide the statistical expertise in conducting these analyses. By comparing multiple years of traffic stop data, particularly as the data quality is improved through TraCS, it is possible to examine the relative effectiveness of any new policies and training (e.g., *Courtesy and Vigilance, Considerations for Effective and Culturally Responsible Law Enforcement in Arizona* Advanced Officer Training instituted earlier in 2009). Further, continual monitoring of traffic stops provides valuable information to the organization, while simultaneously institutionalizing a culture within the organization that inspires fair and equitable policing and demonstrating a public commitment to the same.

Recommendation #2: Develop and maintain a data collection committee to examine the current data collection system and recommend any needed changes.

It is further recommended that DPS officials convene a committee to examine the current data collection effort and consider making minor adjustments. For example, the inclusion of the state of registration is a valuable piece of information as related to criminal interdiction efforts, but was eliminated from the data collection system in the transition from KOTS to TraCS. It is also important to bring feedback from the field to administrators regarding the use of the data collection system and officers' recommendations for improvements. Finally, it will be important to consider whether any additional elements should be added to the system to better understand reported racial/ethnic disparities. Based on the initial results from the added data elements, some of the reported racial/ethnic disparities can be attributed to drivers' demeanor, pre-stop indicators of suspicion, undocumented aliens in the vehicle, etc. It is highly probable that other factors unaccounted for within this data collection system might also better predict traffic stop outcomes, including driver & passengers' behaviors during the stop, as well as the existence of a language barrier between a driver and an officer. These types of factors should be considered and recommendations (if any) should be made for the inclusion of additional data fields. These recommendations, however, must be balanced with the need for an efficient data collection system. This discussion should be the work of this internal committee (with direct consultation from the UCPI research team).

Recommendation #3: Minor adjustments to the validation rules should be incorporated into the TraCS system to further reduce and/or eliminate the small percentage of remaining errors associated with missing and invalid data.

The data audit in Section 2 revealed the error rate for stop data collected via TraCS in the last three months of 2008 to be only 2.1%, compared to 9.8% for data collected during the previous nine months via KOTS. The TraCS error rate is well under the PERF-recommended threshold of 10% (Fridell, 2004) and nearly reaches the research team's ideal goal of 2% or less for missing/invalid data. It is obvious that instituting an electronic data collection system and its accompanying training have dramatically improved the accuracy and consistency with which stop data are being collected across the department. Although the internal consistency problems associated with the stop data and violation data have also

been improved by the simultaneous collection of violation information on the electronic stop data collection form in the TraCS system, minor discrepancies remain. As described in Section 2, a small number of cases indicated violation information for outcomes that were not selected, while other cases indicated a specific outcome but no accompanying violation information. To eliminate these errors, it is recommended that the TraCS data collection system be programmed to only accept violation information when the appropriate outcomes have been selected and to require corresponding violation information for all selected outcomes. Further validation rules, default settings, and error warnings should be explored to continue to lower the small percentage of data that remains affected by missing or invalid data. The UCPI team is optimistic that the data quality will continue to be enhanced through proper data management and supervisory oversight.

Supervisory Oversight

Recommendation #4: DPS field supervisors should continue to be held directly accountable for ensuring the proper collection of traffic stop data by their subordinates.

Phase 2 of the data audit in Section 2 shows slight discrepancies between the stop data and the comparison database of officer activity logs, though the margin of error is well within acceptable limits. The UCPI research team nevertheless recommends that first line supervisors continue quality assurance measures to ensure DPS Officers are completing the data collection form for every contact. Although the electronic data capture has drastically reduced data entry errors, it will not ensure that officers are completing the form during every traffic stop. Continual supervisory oversight and routine data audits, like the weekly cross-checks currently required by DPS, are necessary to ensure the continued accuracy and validity of these data.

One specific area of concern regarding proper data collection is plain view searches. As noted in Section 6, the overall search success rate of plain view searches is 49.6%. By definition, a plain view search should result in a high contraband seizure rate. Further analyses and detailed inquiry indicated that the overall search success rate of plain view searches was due to an improper classification of a search as plain view and/or the improper documentation of contraband seized during these searches. Although these errors were committed by a small number of officers, they resulted in discrepancies that impacted the overall department's search success rates. It is important to recognize that systematic errors committed by only a handful of officers can dramatically impact the overall findings of the study. Therefore, it is recommended that all officers receive refresher training on the data collection system and that supervisors more effectively monitor the information collected by officers.

To assist supervisors in providing this type of oversight, it is recommended that monthly data status reports be developed by the UCPI team and provided to the DPS. These reports would document the number of traffic stops recorded, and some basic information about these stops for all units within the agency. The monthly status reports should be shared with supervisors so they can make any necessary adjustments quickly, rather than waiting for the results documented in final reports based on the preceding year of data. Data status reports were

originally proposed by the UCPI research team as an important way to maintain data integrity. They were not developed, however, because the original KOTS data collection system did not capture information in real time (i.e., there was a 6-10 month lag between the traffic stop and entry into the database). With the development of the TraCS data collection system, status reports could be developed for ongoing use. While these reports will not impact the data quality for information already collected during 2009, it can increase the reliability and validity of information collected in 2010.

Recommendation #5: The specific findings documented in this Year 3 Report should be disseminated immediately to DPS supervisory personnel with a clear mandate to continue exploring the reasons for the racial/ethnic disparities reported, and attempt to reduce them if believed to be based on illegitimate factors.

Better understanding of the racial/ethnic disparities in post-stop outcomes is necessary to ultimately reduce these disparities. Across the department, Hispanic, Native American, and Black motorists are significantly more likely to be issued citations, arrested, and searched compared to Whites, even after statistically controlling for reasons for the stop, vehicle, and stop characteristics. Field supervisory staff must be made aware of racial/ethnic disparities in citation, arrest, search, and seizure rates within their jurisdictions.

Although the additional information collected via TraCS has shed some additional light on these relationships, some unexplained racial/ethnic disparities in citations, arrests, and searches remain. It continues to be important for DPS administrators to better understand and examine these trends. There are several possible explanations for these elevated rates that can only be determined based on local knowledge of the area and additional information that is not included in the data collection.

Further, it is critical that field supervisory personnel examine their officers' stopping patterns and trends. If DPS officers are engaging in bias policing, it is likely to be revealed at the field supervisory level. While aggregate statistical analyses can provide supervisors with information to identify potentially problematic geographic areas or shifts, ultimately it is the more specific information available to field supervisors (e.g., citizen complaints, feedback from other officers, direct observation of patterns and practices) that will assist in identifying and eliminating any bias practices. For these reasons, it is critical that the DPS continue to improve the quality of its supervisory management and training, with an additional focus on detecting and eliminating officer bias.

Further Examination of Racial/Ethnic Disparities

Recommendation #6: If a contract extension is approved, the DPS should consider providing the additional data captured on the consent to search form to the UCPI team to allow for further exploration in the Year 4 Report of the possible explanations for the continued racial/ethnic disparities in search and search success rates.

Acting on recommendations made in the *Year 2 Report*, the DPS has made changes to the consent to search form to document pre and post stop indicators of suspicion as well as

information that confirm criminal or other suspicious activity where no seizure was made. These qualitative data could provide invaluable context for the quantitative search and seizure data similar to the information gleaned from the focus groups with DPS officers in 2008.

The analyses of 2008 data indicated that, as in previous reports, even after considering legal variables, stop, vehicle, and other driver characteristics, Hispanic, Native American, and Black drivers were all more than twice as likely to be searched compared to White drivers. The higher rates of Hispanic searches specifically, however, do not produce comparable rates of seizures. Although Hispanic motorists were significantly more likely to be searched during officer-initiated traffic stops compared to Whites, they were significantly less likely to be found in possession of contraband. There are a number of reasons that might account for these racial/ethnic disparities, including legitimate explanations, or possibly officer discrimination / bias. In an effort to better understand racial/ethnic disparities in search and seizure rates, the UC research team conducted focus groups with canine handlers and officers assigned to the Highway Division that were actively engaged in search and seizure activity. These focus groups provided context for criminal interdiction work and greater insight with which to interpret the statistical findings related to searches and seizures.

The DPS is considering voluntarily extending the contract with the University of Cincinnati to include a fourth year of data analysis. As noted in the first recommendation, the UCPI team highly recommends this, as a fourth year of analysis will allow the UCPI team to analyze a full year of data collected electronically and more fully explore the new data elements implemented in October of 2008. The quantitative analyses of these data could be enhanced considerably by the examination of qualitative data regarding pre and post stop indicators of suspicion as well as information that confirm criminal or other suspicious activity where no seizure was made (e.g., admission, drug debris, paraphernalia). This information, collected on the revised consent to search form, would likely provide additional insight into DPS officers' search and seizure activities in the same way that the focus group interviews provided invaluable context and a better understanding of the complexities of criminal interdiction work. Therefore, if the contract extension is approved, it is recommended that these data be made available to the UCPI team for inclusion in the Year 4 analyses.

Conclusion

As demonstrated by the DPS's ongoing data collection and its responsiveness to the UCPI research team's recommendations from the *Years 1 and 2 Reports*, DPS officials are dedicated to an innovative and professional approach to understanding and altering racial/ethnic disparities in traffic stop outcomes. Expedient implementation of the new recommendations provided above will assist the DPS in continuing this approach as well as providing equitable treatment across racial/ethnic groups and maintaining their legitimacy among the citizens of Arizona.

If a contract extension is reached with the UCPI team for a fourth year of data analysis, an update to this report will be delivered in November 2010, based on the statistical analyses of

data collected during traffic stops in 2009, which would provide the first full year of data collected via the redesigned and expanded TraCS electronic data collection system. It is expected that the analyses of a full year of these improved data will lead to a better understanding of the racial/ethnic disparities in traffic stop outcomes that will enable DPS administrators to make informed changes in policies, procedures, and training to ensure the continued delivery of unbiased policing services to Arizona citizens.

1. INTRODUCTION

OVERVIEW

In January 2003, the Arizona Department of Public Safety (DPS) began voluntarily collecting data regarding traffic and pedestrian stops. In 2006, as part of a settlement agreement in a class-action lawsuit, DPS officials agreed to conduct a comprehensive evaluation of stop data being collected by DPS Officers with an outside research team. The DPS contracted with Dr. Robin Engel and the University of Cincinnati Policing Institute (UCPI) to conduct this analysis over a three year period. In November 2007, the UCPI research team released its first of several reports, *Traffic Stop Data Analysis Study: Year 1 Final Report,* based on statistical analyses of traffic stops conducted from January 1 – December 31, 2006. This was followed in November 2008 by the *Traffic Stop Data Analysis Study: Year 2 Final Report,* based on data from traffic stops conducted from January 1 – December 31, 2007. Both reports summarized the current status of the data collection effort, provided descriptive statistics of the initial stop and stop outcomes, utilized multivariate analysis of post-stop outcomes, and specifically examined search and seizure rates (see Engel, Tillyer, Cherkauskas, & Frank, 2007; Engel, Cherkauskas, & Smith, 2008a).

This report documents the findings from statistical analyses of data collected during all officer-initiated traffic stops by the DPS from January 1 – December 31, 2008. The data analyzed for this report represent the third year of data collected as part of the three-year contract with the UCPI. This report differs slightly from previous reports based on revisions to the data collection system the DPS has instituted as a result of the findings and recommendations produced by the UCPI research team. Previous assessments by the UCPI research team called into question the validity and reliability of DPS traffic stop data. As a result, the DPS began collecting traffic stop data via a new electronic system known as TraCS in October 2008. The data fields included within the new TraCS system have been expanded to allow for a better understanding of the racial/ethnic disparities in traffic stop outcomes that were reported in the first two years of data analyses. The initial class-action law suit settlement agreement required analysis of a specific list of data collection points for official traffic stop data. The DPS has voluntarily added additional items for collection in an effort to better understand patterns of traffic stops and the outcomes that motorists receive. In addition, the DPS has voluntarily added additional research projects (including focus groups with officers that specialize in criminal/drug interdiction, and surveys of motorists stopped by DPS officers) to provide additional insight and a qualitative context for understanding the official stop data collection. Through the use of focus groups with Highway Patrol officers, as well as detailed assessments of the gang and canine units, these additional research studies provided insight for understanding the racial and ethnic disparities in traffic stop outcomes reported from the statistical analyses of traffic stop data. Information gleaned from the focus groups also allowed for specific recommendations regarding changes to the traffic stop data collection system that allow for a more thorough examination of factors that explain these disparities.

Because the new TraCS data collection system was not implemented until October 2008, this report is based on the statistical analyses of data collected during all traffic stops in 2008 with both the former KOTS scannable data forms and the new electronic KOTS forms. It includes, where appropriate, a direct comparison of the data collected via the KOTS system

with the three months of data collected with the redesigned and expanded TraCS electronic data collection system. The remainder of this introductory section summarizes the Year 2 Report as well as the progress the DPS has made on recommendations from that report, and concludes with an overview of the current report.

SUMMARY OF YEAR 2 REPORT

As noted above, in November 2008, the UCPI team provided the Arizona DPS with the *Traffic Stop Data Analysis Study: Year 2 Final Report,* based on analyses of data collected during traffic stops conducted from January 1 – December 31, 2007. Highlights of the findings from the most recent *Year 2 Final Report* are summarized below.

Data Audit

To assess the status of the DPS data collection process, the UCPI research team conducted a two-phase data audit to assess the validity of the 2007 data. As described above, the DPS had already begun the transition to the TraCS electronic data collection system before the completion of the *Year 2 Report*, but these changes were not instituted prior to the collection of the full year of 2007 data. Therefore, it was not surprising that the results of this data audit confirmed many of the data quality concerns that were raised by the 2006 data audit. Phase 1 of the 2007 data audit assessed the missing data and logical inconsistencies (i.e., fields with missing and/or incorrect entries that contradict other fields) within the electronic data and produced an overall error rate of 10.4%.

Phase 2 of the data audit, designed to determine the extent to which officers are completing data collection forms for all stops, examined data accuracy by comparing the content of the electronic data with the number of stops in officers' activity logs. The results of this analysis indicated that all 19 of the districts/shifts fell within a desired parameter of 10% error in either dataset, with nearly half of the districts/shifts demonstrating a difference of 1% or less between the two datasets. In addition to the activity log data, additional comparison data on violations were available for contacts in which a citation or warning was issued. Unfortunately, these comparisons suggested two types of consistent and problematic errors. In 9,090 stops, citations or warnings in the violation file were not recorded as resulting in a citation or warning in the stop data. Conversely, in 12,246 cases, citations and warnings in the stop data did not have corresponding violation information in the violation data file. These discrepancies in the data as well as the high error rate confirmed the need for the transfer to the electronic data collection system that was focused on improving data accuracy.

Traffic Stop Data

During 2007, there were 485,183 valid member-initiated traffic stops recorded by DPS Officers. Department-wide, approximately 61.3% of the drivers stopped were White, while 25.4% were Hispanic, 5.2% Native American, 4.8% Black and 3.3% Other (Asian, Middle Eastern, other or unknown). The rate of stops for particular racial and ethnic groups varied dramatically across divisions, bureaus, districts/shifts, and counties. Some variation, however, is to be expected given residential patterns related to race/ethnicity, along with

racial/ethnic differences in travel patterns on interstates, highways, and major thoroughfares. The crux of interpreting data regarding a racial/ethnic group's representation in traffic stops is dependent upon comparison data of the same group's "expected" representation in traffic stops given no officer bias. Unfortunately, all available external comparison data, or benchmarks, have severe limitations that restrict the level of confidence in the results of comparisons to traffic stop data. Internal benchmarking – which compares the racial/ethnic breakdown of traffic stops across officers assigned to the same location, assignment and shift – was also not feasible with these data given the size and deployment patterns of DPS that leads to small numbers of officers that have such similarities. In addition, internal comparisons through trend analysis are not advisable based on the data quality issues with previous years of DPS traffic stop data. Given these limitations, no statistically valid analyses of the initial traffic stop decision are available. As a result, department-wide conclusions cannot be drawn regarding whether racial/ethnic disparities in stopping behavior exist. Instead, this report focused on whether racial/ethnic disparities existed for traffic stop outcomes.

Multivariate Analysis of Stop Outcomes

The multivariate analyses of 2007 stop data demonstrated that legal variables (e.g., reason for stop, evidence seized) were the strongest predictors of drivers' likelihood of receiving warnings, repair orders, citations, and arrests. The results, however, also documented racial/ethnic disparities in post-stop outcomes motorists received even after controlling for other explanatory factors (e.g., other driver characteristics, vehicle characteristics, stop characteristics, and legal variables). For example, Hispanic, Black and drivers of other races/ethnicities were significantly less likely to be issued warnings or repair orders compared to Whites. Despite the fact that these racial/ethnic disparities were statistically significant, the odds ratios (ranging from 1.1 to 1.5) of the race/ethnicity effects in these statistical models indicate that these relationships were not particularly strong. Although the strongest predictors of the number of citations issued to drivers were also legal reasons, when examining multiple citations, more substantive racial/ethnic differences were evident, particularly as the number of citations increased. That is, while Hispanic and Black drivers were only 1.1 times more likely than White motorists to receive one citation, they were 3.4 and 1.9 times more likely to receive three or more citations, respectively.

Racial/ethnic disparities were also more substantive for arrests and searches. For the arrest model, drivers with contraband were 65 times *more* likely to be arrested compared to drivers without contraband. Despite the strength of the predictive power of the legal variables, after taking these variables into consideration, Hispanic, Native American, and Black drivers were still 1.7, 2.7, and 1.7 times *more* likely to be arrested, respectively, compared to Whites. The multivariate model predicting searches was weak in overall predictive power; this indicates that other factors more central to explaining whether or not drivers are searched have not been included in the model. Nevertheless, even after controlling for the reason for the stop and other stop characteristics that can be measured with these data, Hispanic, Native American, and Black drivers were all more than two times more likely to be searched compared to Whites.

In sum, important racial and ethnic disparities in traffic stop outcomes were found even after taking into consideration other legal and extra-legal factors known to influence police decision making during traffic stops. These findings are very similar to the results of the multivariate analyses conducted on stops from 2006, with no substantive differences in the racial/ethnic disparities discovered. It is important to note, however, that the reasons for the reported racial/ethnic disparities in post-stop outcomes cannot be determined with these data and may be explained by other characteristics that are also believed to potentially influence officer decision making, but were not available in the 2007 data. Therefore, no definitive conclusions regarding the reasons for the observed racial/ethnic disparities in traffic stop outcomes can be made.

Search & Seizure

To address the specific concerns of potential bias in search and seizure activity, further analyses were conducted on these post-stop outcomes. DPS officers conducted 24,302 searches of drivers, vehicles, and/or passengers during officer-initiated traffic stops in 2007. At the department level, the majority of searches conducted were Type I (low discretion) searches (70.2%), while 15.3% and 14.5% were Type II (guided by case law/legal statute) and Type III (solely consent), respectively. Analyses based on the type of search indicate statistically significant racial and ethnic disparities in searches across all three search type categories. Blacks were least likely to be searched for low discretion reasons, while Native Americans were most likely to be searched for these reasons. For Type II searches, the opposite was true; Blacks were significantly more likely, and Native Americans significantly less likely, to be subject to Type II searches. In the case of solely consent (Type III) searches, Black and Hispanic motorists were significantly more likely to be searched compared to Whites and Native Americans.

Searches resulted in the discovery of contraband in 5,179 cases. The overall search success rate—the percent of searches resulting in the discovery of contraband—was 21.3%. Search success rates across the department, however, varied by the reason for the search. Probable cause (66.9%) and canine alert (49.0%) searches were the most productive, while searches based solely on consent (11.1%) were the least productive in terms of contraband seizures. The overall Type II search success rate for DPS was 45.7%, but success rates varied significantly by race/ethnicity. Type II (discretionary) searches of Hispanic drivers were the least likely to be successful in the discovery of contraband, compared to all other racial/ethnic groups. Native Americans, Blacks and Whites had higher and fairly similar search success rates, when compared to Hispanics and drivers of other races/ethnicities. Therefore, although Hispanic motorists were significantly more likely than Whites to be searched during officer-initiated traffic stops, they were significantly less likely to be found in possession of contraband.

Analyses of consent searches revealed racial/ethnic differences in those asked for consent to search as well as refusals to consent. Specifically, Hispanics were significantly more likely than other racial/ethnic groups to be asked for consent to search and significantly less likely than members of other racial/ethnic groups to refuse consent to search. A multivariate model predicting consent searches revealed that, although this model is weak in predictive power,

Hispanic and Black drivers were 3.9 and 2.9 times more likely to be searched based on consent compared to Whites. The weak overall ability of this model to predict the likelihood of consent searches indicates that this model is likely misspecified. That is, other factors more central to explaining whether or not drivers are searched based on consent have likely not been included in the data collection (e.g., driver and passengers' behaviors, cues of suspicion, compliance with officers' requests, etc.). The inclusion of this type of information beginning in October 2008 could demonstrate that the reported racial/ethnic disparities in consent searches are based on motorists' behavior that may be correlated with race/ethnicity.

Because consent searches are not solely dependent on officer's discretion (i.e., a citizen may refuse), analyses of consent search success rates are not recommended. They were, however, conducted at the request of DPS administrators. Results indicated that Type III (consent only) searches of Native American drivers were the most likely to be successful in the discovery of contraband, Blacks and Whites had similar consent search success rates, while consent-only searches of Hispanic drivers were the least likely to be successful in the discovery of contraband.

Based on these findings, the UCPI research team concluded that racial and ethnic disparities exist for searches and seizures conducted during member-initiated traffic stops. These findings, however, do not address the legality of individual searches. Further, given the limitations of the available data, and the plausibility of several explanations for these racial/ethnic disparities reported during the focus group research with DPS Officers, the UCPI research team cannot determine if officers are engaging in racially biased practices.

Recommendations

Based on these findings, in the Year 2 Report, the UCPI made a series of recommendations to DPS administrators related to data collection and analysis, supervisory oversight, and training, which are summarized below.

The data collection changes instituted by the DPS in the past year have resulted in one of the most comprehensive data collection systems currently in use by any state police agency. This effort should be applauded, but also continually supported. Specifically the UCPI team recommended that:

- The established video training on the TraCS data collection protocol should be incorporated into academy training and/or the FTO time period to ensure that new officers are systematically trained on the data collection protocol in the same manner as all current officers were.
- Field supervisors should be held directly accountable for ensuring the proper traffic stop data collection by their subordinates and utilize a standardized tracking procedure to assist with this effort.
- DPS administrators should prioritize the full implementation of the electronic data collection system in the districts/shifts where it is still incomplete and explore handheld electronic options for officers assigned to Metro Motors.
- Data analyses by the external research team should be continued beyond the three year period required by the current contract because the 2008 data collection (upon

which this Year 3 Report is based) will only include 3 months of data collected under the new electronic system.

- DPS officials should consider empirically investigating the predictive power of indicators of suspicion that officers utilize.
- DPS officials should consider requiring officers heavily involved in criminal interdiction (e.g., Canine handlers) to systematically record any search situations where no contraband is seized but criminal activity (e.g., admission, drug debris) is detected. With this type of information available, this possible explanation of the racial/ethnic disparities in searches and seizures can be empirically examined.
- The DPS should expand the current process of supervisory oversight of the video recordings of traffic stops to allow for a more in-depth audit of officers' compliance with department policies and procedures.
- The DPS should prioritizing the purchase and installation of video recording equipment in all patrol cars as soon as fiscally possible to support this as a tool of officer accountability and supervisory oversight.
- The specific findings documented in the final report should be disseminated immediately to DPS supervisory personnel with a clear mandate to begin exploring the reasons for the racial/ethnic disparities reported based on their local knowledge of the area, and attempt to reduce them if believed to be based on illegitimate factors.
- Based on the continuing trends of racial/ethnic disparities in search success rates and the focus group findings, the UCPI team recommended the DPS institute changes in training related to educating officers about the complexities of interactions with members of different racial/ethnic groups and cultures.
- DPS administrators should review the manner in which members of the canine unit are trained and supervised based on research findings that demonstrated clear differences in the criminal interdiction philosophies and procedures within this unit.

DPS RESPONSE TO YEAR 2 RECOMMENDATIONS

As noted previously, the DPS has made significant progress in revisions to the data collection system, training, and supervisory oversight based on the results of the Year 1 Report and the accompanying UCPI recommendations. Most notably, the electronic data collection system (TraCS) implemented department-wide by the DPS in October 2008 should improve the quality and reliability of the data being collected. In addition, these data now include additional relevant variables that may help to explain the observed racial/ethnic disparities in post-stop outcomes. Similarly, based on the findings and recommendations of the *Year 2 Final Report*, the DPS responded with the following actions and implemented or altered the following programs:

- The DPS has followed through on recommendations from the 2006 stop data report by fully incorporated the TraCS electronic data collection system and implementing department-wide. A TraCS electronic data collection system training video was also created, in which Deputy Director Penny Gillette-Stroud provides an overview of racial profiling and the settlement agreement. The training also describes how to correctly use the TraCS system, and a detailed explanation of each data field. This

training was required of all existing sworn officers and it is currently provided to all new officers during the advanced basic training.

- The TraCS electronic data collection system provides the ability for supervisors to access the TraCS data entered by their officers. The DPS requires supervisors to compare the data entered by their officers against the other weekly activity reports produced by officers. Any discrepancy between these two data sources is brought to the officer's attention and corrected.
- As funding becomes available, the DPS plans to move forward with the purchase of electronic devices to be used on motorcycles. These devices, much like the Mobile Data Computers (MDC) currently being used in the patrol car, will provide the motor officers with the opportunity to input the TraCS data at the scene without the need to complete a worksheet and transfer the data later.
- The DPS continues to focus on supervisory oversight through current policy and procedure. Supervisors collect and review all consent to search forms used by their officers prior to submitting them to their respective district office for submission to department records.
- The DPS will await the additional information provided from a full year collection of data from the TraCS electronic data collection system before making a decision on the proposed changes to the *Mobile Video Program Supervisor Review* form. The DPS agrees that video cameras are a valuable tool in law enforcement and as funds become available, the DPS will continue to install mobile video systems into patrol vehicles.
- The DPS took a proactive approach to publishing both the Year 1 and Year 2 Traffic Stop Data Analysis studies. These studies, along with links to more information on racial profiling and the Department's policy on "Racially Biased Policing" in English and Spanish are available on the Departments web site at www.azdps.gov/About/Reports/Traffic_Stop/. Posting information in this public forum provides access not only to DPS supervisors, but also to all employees and the general public as well.
- The DPS is considering a voluntary extension of the contract with the University of Cincinnati to include a fourth year of data analysis. This fourth year of analysis would allow DPS to review a full year of data collected electronically as well as analyze the new data elements implemented in October of 2008.
- The DPS has made changes to the consent to search form to include pre- and post-stop indicators. This data will assist the DPS in the study of these indicators, as they pertain to criminal activity.
- The DPS Canine district currently documents information regarding the discovery of criminal activity when no contraband is seized on any search where a canine is used. The DPS has implemented changes to the consent to search form that allow officers, operating with or without canines to document pre- and post- stop indicators as well as facts that confirm criminal or other suspicious activity where no seizure was made.
- Each year the DPS provides Advanced Officer Training (AOT) on a chosen topic to all sworn officers within the agency as required by the Arizona Peace Officer Standards and Training board. During the development of the 2009 training titled "Courtesy and Vigilance, Considerations for Effective and Culturally Responsible Law Enforcement in Arizona", the DPS requested and received input from the

American Civil Liberties Union (ACLU). The training consisted of four hours on cultural considerations for policing in Arizona and four hours on considerations for effective and culturally responsible criminal interdiction. Completion of this training by all officers within the agency was required by the end of August 2009.

- The DPS recognizes the differences between the canine units working in the north versus the canine units working in the south. Based on the recommendations from the University of Cincinnati, the Department provided additional training to all canine officers using information gained from the study in an attempt to develop and implement best practices for the canine district state wide.

In sum, the racial/ethnic disparities in traffic stop outcomes reported within the *Year 2 Final Report* are very consistent with findings from other jurisdictions across the country. This issue is not unique to the DPS – law enforcement agencies across the country have reported reoccurring and consistent racial/ethnic disparities in traffic stop outcomes, particularly searches and seizures. As demonstrated by their ongoing data collection and responsiveness to the UCPI research team's recommendations from previous reports, DPS officials remain committed to both the data collection effort and the larger goals of reducing racial/ethnic disparities in traffic stops and post-stop outcomes, as well as providing legitimate and unbiased policing services to Arizona citizens. The willingness of the DPS to explore alternative data sources to better understand these racial/ethnic disparities should serve as a progressive and professional model for other law enforcement agencies across the country.

YEAR 3 REPORT OUTLINE

The remainder of this report examining data collected from January 1, 2008 through December 31, 2008 is organized into five sections: 1) data audit of data collected during that time period, 2) description of 2008 traffic stop data, 3) analyses of 2008 post-stop outcomes, 4) in-depth analyses of 2008 searches and seizures, and 5) conclusions and policy recommendations. The general content for Sections 2 - 6 are described below.

Section 2: Data Audit

Section 2 briefly summarizes the results of previous data audits as background for presenting the method and results of the two-phase data audit of 2008 stop data. Phase I examines all 2008 traffic stops to assess the missing and logical inconsistencies for each field captured during a traffic stop and provides an overall assessment of the error rate within the electronic database. Phase II examines the data accuracy by comparing the number of stops in the electronic data with other independent sources of information.

Section 3: Traffic Stop Data Descriptive Statistics

Section 3 describes the final police stop dataset that includes 539,344 officer-initiated traffic stops in 2008. Specifically, it provides information derived from the traffic stop data such as the number of stops, characteristics of the stops (e.g., time, day, month, length of the stop), the reason for the stop (e.g., moving violation, equipment violation, non-moving violation, etc.), the characteristics of the vehicle (e.g., state of vehicle registration, vehicle condition,

vehicle type), and the characteristics of the drivers (e.g., gender, race, demeanor, age, residency). The averages for this information are reported in tables at the department, division, bureau, and district/shift levels.

In earlier racial profiling studies reported in the literature, the racial and/or ethnic composition of drivers stopped by the police was compared to driving population estimates to determine whether minorities were disproportionately stopped. That is, a group's representation in traffic stops is only meaningful when compared to the same group's "expected" representation in traffic stops, based on external data such as a group's census population. Unfortunately, all available external benchmarks have limitations that restrict the level of confidence in the results of these comparisons. Internal benchmarking – which compares the racial/ethnic breakdown of traffic stops across officers assigned to the same assignments, shifts, and districts – is also impossible with these data because of the small number of officers that have such similarities. In addition, data quality issues with previous years of DPS traffic stop data led the UCPI research team to conclude that internal comparisons through trend analysis would not be advisable either. Therefore, no department-wide conclusions can be drawn as to whether racial/ethnic disparities in stopping behavior exist. Instead, this report focuses on whether racial/ethnic disparities are evident in post-stop outcomes.

Section 4: Post-Stop Outcome Analyses

Post-stop outcomes (e.g., warning, repair order, citation, arrest, search, and seizure of contraband) are documented in Section 4. Information examining post-stop outcomes is presented for different drivers by race and gender across all organizational units. Information examining the types of violations for which specific stop outcomes are given is also presented. At the conclusion of Section 4, several multivariate analyses are presented that predict officer decision- making after the traffic stop has been made. Section 4 documents the outcomes drivers receive after traffic stops are made (e.g., warnings, repair orders, citations, arrests, searches, and seizures), and whether these outcomes differ significantly based on a multitude of factors.

Section 5: Search and Seizure Analyses

Section 5 focuses specifically on the post-stop outcomes of searches and seizures. This section describes the types of searches and seizures at the department, division, bureau, and district/shift levels. It also compares the search rates of minority motorists to Whites and describes racial/ethnic disparities in types of searches and seizures at multiple organizational levels. Finally, this section describes the search and seizure rates for undocumented aliens as compared to legal residents.

Section 6: Summary and Recommendations

Section 6 summarizes the information presented in earlier sections of the report and provides policy recommendations based on the results of the data analysis. The findings reported in this document must be interpreted cautiously. The data collected and presented in this report

cannot be used to determine whether or not DPS officers have individually or collectively engaged in "racial profiling." In addition, the legality of prior or future individual traffic stops cannot be assessed with these data. This report is designed to give feedback to DPS administrators regarding the status of the data collection process, along with exploring trends and patterns in the data that may be utilized for training purposes.

2. DATA AUDIT

OVERVIEW

Data integrity is a crucial component to effective data analyses. Even the most sophisticated statistical analyses are meaningless if the data used to generate the analyses lack reliability and validity. Data "auditing" is an important oversight mechanism to maintain data quality. Improving data accuracy ensures that recommendations regarding policy and training changes are made based on the highest quality data possible. Typically data audits for traffic stop data collection involve a number of different procedures to check for several types of inaccuracies. Types of traffic stop data inaccuracies include:

- Incorrect copying of information from one form to another (e.g., data transfer or entry errors)
- Missing specific information on individual forms
- Invalid (incorrect) information on individual forms
- Missing information about some officer-initiated stops conducted (no forms generated)
- Data contains misstatements of facts (e.g., Black motorist is recorded as White)

In addition to increasing data quality, a data auditing system can also help ensure officer compliance with the data collection protocol. Officers will likely be more diligent in their data collection if they know it is being reviewed for comprehensiveness and quality (Fridell, 2004).

The audit of 2008 traffic stop data represents the third data audit conducted by the UCPI. A brief summary of the methodology and results of the 2006 and 2007 data audits is provided as background below (for additional information, see Engel et al., 2007c, 2008).

In 2006, the Year 1 Data Audit consisted of three phases. Phase 1 involved a manual comparison of 1,000 paper copies of traffic stop forms with information in the electronic database to determine the extent of errors due to the data transfer process. Of the sampled forms, 26.5% had at least one data field with an error where the scan form did not match the electronic copy. The Scantron imaging system simply did not accurately capture the information on the scan forms, and the electronic images are not properly corrected by data entry personnel. In Phase II, the research team assessed the missing data and logical inconsistencies within the electronic data for all traffic stops conducted by DPS officers from January 1 – December 31, 2006; an overall error rate of 14.1% was calculated for this portion of the audit. Finally, the third phase of the data audit was designed to examine the data accuracy by comparing the number of stops in the electronic data with the number of stops in officers' activity logs. This comparison revealed that 18 of 19 districts/shifts fell within a desired parameter of 10% error in either dataset. Additional comparisons with violation data, however, were more problematic, as some citations or warnings in the violation file were not recorded as resulting in a citation or warning in the stop data, and conversely, in other cases, citations and warnings in the stop data did not have corresponding violation information in the violation data file.

In 2007, the manual comparison of paper forms and electronic data was not repeated because no changes in the data collection system were made prior to the collection of 2007 data and there was no reason to believe the electronic data transfer process for 2007 data would be any more reliable or valid compared to those reported in 2006. To assess the status of the DPS data collection process, the remaining two phases of the 2006 audit were repeated by the UC research team for 2007 data. Phase 1 of the 2007 data audit assessed the missing data and logical inconsistencies (i.e., fields with missing and/or incorrect entries that contradict other fields) within the electronic data and produced an overall error rate of 10.4%, a slight reduction from Year 1. Phase 2 of the data audit, designed to determine the extent to which officers are completing data collection forms for all stops, examined data accuracy by comparing the content of the electronic data with the number of stops in officers' activity logs. The results of this analysis indicated that all 19 of the districts/shifts fell within a desired parameter of 10% error in either dataset, with nearly half of the districts/shifts demonstrating a difference of 1% or less between the two datasets. Additional comparisons with violation data, however, continued to be problematic in terms of internal consistency between the violation and outcome data.

The DPS had already begun the transition to the TraCS electronic data collection system before the completion of the *Year 2 Report*, but these changes were not instituted prior to the collection of the full year of 2007 data. Therefore, it was not surprising that the results of this data audit confirmed many of the data quality concerns that were raised by the 2006 data audit. Based on the documented problems from the 2006 and 2007 data audits and the UCPI team's recommendations, the DPS revamped its entire data collection system from the scanning method to a more efficient and accurate electronic-capture system. Although TraCS was not implemented until October 2008, the Year 3 data audit does provide a preliminary examination of the improvements in data quality as a result of this system. Details regarding the new TraCS data collection system are documented below.

The DPS began the process of transitioning to a new data collection system by forming a committee comprised of representatives from all four divisions within the Department. This committee reviewed different data collection formats and commercial products used by other agencies to provide a more effective and efficient means of data collection. The committee recommended the department move to an electronic data collection form and ultimately decided on the Traffic and Criminal Software (TraCS) application. This software provides a means for officers to input electronic form data thru a laptop or desktop computer and then print the forms and electronically file them in a database centrally located in the Department Records Unit (DRU). The implementation of TraCS simplifies the data collection process, improves the data quality through validation checks, and eases the administrative burden on officers and records clerks.

Based on the recommendation of the committee, a pilot program for the TraCS electronic data collection system was developed. The program allowed officers and supervisors in the field to use an electronic form and provide feedback on its strengths and weaknesses. Supervisors also provided feedback on how oversight and monitoring of officers' collection of the stop data via the new electronic system might work best.

Prior to the implementation of the TraCS system, another DPS committee was formed to develop a training program to teach officers the proper procedures needed to complete this form. This training was designed to ensure officers were selecting information based on departmental guidelines and there was consistency in the data collection effort across the state. The committee developed a specialized training video that allowed officers throughout the department to receive the same training. The content of the training video included: 1) a review of the background of the data collection effort, 2) a reaffirmation of the DPS commitment against bias-based policing, 3) a renewed departmental emphasis and focus on the accuracy and importance of the data collection effort, 4) an explanation of the TraCS system and its data collection advantages, and 5) the specific guidelines to be used in order to properly record stop data within TraCS. The content of the training curriculum is also readily accessible to officers in the field through a TraCS help menu option for each of the included data fields. If an officer is unsure about how to record any portion of the required data collection information, he/she may utilize the help menu to immediately access the established department training guidelines for the proper procedure for filling out individual data fields.

Following the pilot test and training of officers described above, the use of the redesigned electronic data collection form department-wide began October 1, 2008. The electronic capture of traffic stop data is a dramatic improvement over the use of scannable forms for validity, accuracy and consistency. In addition to improvements in data quality, the TraCS system also features several additional data fields that DPS voluntarily included based on the recommendations of the UCPI research team. Under the electronic format, DPS included the following data fields in addition to the 13 fields required by the settlement agreement:

- What pre-stop indicators of criminal activity were observed
- Vehicle year and condition
- Whether vehicle impounded due to A.R.S. 28-3511[1]
- Subject demeanor
- The number and type of violations observed prior to the stop
- The number and type of violations resulting in a warning, repair order, citation or arrest
- In the case of a search, if probable cause is the reason for search, the type of probable cause (e.g., K-9 alert, Plain View, Plain Smell, Admission, Search Warrant, and/or Officer Experience)
- Drug seizure type (i.e., personal use, sale, transportation).

[1] A.R.S. §28-3511 went into effect in 2005 but, due to resource issues, was not strictly enforced by the DPS until late 2006. This law was revised in September 2007 to make its terms more strict and stipulates that law enforcement officers shall impound a person's vehicle under the following circumstances: 1) If a driver has a suspended license, has never been issued a license in Arizona or cannot produce evidence of a driver's license issued by another jurisdiction, or 2) If a driver is not in compliance with the financial responsibility requirements of this state and is driving on a suspended, revoked or canceled license or without a license when the driver is involved in an accident that results in either property damage or injury to or death of another person. The original statute stated that impounds were only required if a suspended license occurred in conjunction with DUI or offenses for license points, whereas the revisions in 2007 altered the terms of the statute to include any suspended license.

Furthermore, a number of fields were revised to better capture information related to the stop. Specifically, the following changes were made:

- Rather than a single category of whether a driver was an undocumented alien, this data field now includes categories to identify if the driver, passengers, both, or none were undocumented aliens.
- Rather than a single data field for whether a search was performed (Yes, No, Refused), there are now separate data fields for whether: a consent search was requested, a consent search was accepted, if consent request granted whether the form was signed or refused, and whether the consent request was audio or video recorded.
- The question regarding the search target (i.e., driver, vehicle, passenger, pedestrian) was expanded to include multiple data fields for each search target. Specifically, the data fields regarding whether a search was performed, the search authority, and whether contraband was seized are now available for each possible search target rather than confounded into all-encompassing data fields regarding any search that was conducted.

Finally, one data field—state of vehicle registration—was not carried over from the KOTS to the TraCS data collection system. It is the recommendation of the UCPI research team that this data collection field be reintroduced to the TraCS system.

The remainder of this section outlines the method and results of the two phases of the 2008 data audit, including a direct comparison between the error rates of the KOTS and TraCS systems. Recommendations for continued data collection and auditing techniques are also provided.

DATA AUDIT: PHASE 1

Description

Phase 1 assessed the missing data and logical inconsistencies within the electronic data for all traffic stops conducted by DPS officers from January 1, 2008 – December 31, 2008. This phase of the data audit was comprised of two analytical components. First, the percentage of missing information for each field of interest was determined. "Missing data" simply indicates that there was no information entered on the form by the officer (or that the information was entered by the officer, but was not properly recorded by the text recognition software). The result is data fields with no information available. Second, the percentage of invalid information was determined. "Invalid data" refers to collected information that contains logical inconsistencies (e.g., no search, but contraband seized; search conducted but no search target identified) or inaccurate information (e.g., badge numbers that do not correspond to known employees). These two components – missing data and invalid data – are combined to produce an overall error rate. One limitation of this data audit is the inability to assess to what degree, if any, the error rates in Phase 1 are due to the data transfer errors previously identified and documented in the Year 1 Data Audit.

Although the total number of stops provided by the DPS to the UCPI research team for 2008 was 587,943, this phase of the data audit only examines: 1) officer-initiated traffic stops (i.e., non-traffic, pedestrian, crash, and motorist assists were eliminated), 2) only original cases (i.e., duplicate entries discovered using the primary document number were eliminated), 3) only stops that resulted in outcomes other than voided citations (per DPS requests to remove), and 4) only stops with valid data for the type of contact and reason for the stop (0.57% of the total number of stops were missing on these items). Therefore, this data audit only examines cases that were retained for later statistical analyses (n=539,344). See additional details in Section 3 regarding the elimination of cases for analyses.

Results

Due to the transition to the TraCS electronic data collection system in October 2008, Table 2.1 reports the missing data rates, invalid data rates, and the overall error rates for all data fields of interest for both the KOTS and TraCS data collection systems, as well as the overall error rate for the merged data file of all 2008 officer-initiated traffic stops. This allows for a direct comparison between the error rates of the two data collection systems. Each of the data fields that appear in the data collection systems are categorized into stop, driver, vehicle, and officer characteristics, and their individual missing, invalid, and overall error rates are reported below. In addition, an overall error rate for the total combination of all data fields is provided in the first row of the table. All of the fields analyzed in this data audit were assessed based on codebooks provided by the DPS. If information was entered on the traffic stop form that did not match the codebooks, it would appear as invalid and contributed to the overall error rate. The steps undertaken to create these fields are provided in footnotes below. Where data fields did not appear in one or the other of the data collection systems, "NA" is reported in the table.

The overall error rate (7.81%) calculated for Phase 1 of the data audit is based on all fields listed in the table. This error rate is smaller than the total of all individual fields due to the possibility that one form could have more than one error. In such a situation, those errors will be reflected in the individual fields, but only counted once in the overall error rate. The primary contributors to this rate are: driver's zip code (3.7%), location of the stop (1.8%), vehicle type (1.2%), and vehicle license plate (1.1%). In addition, while the "result of contact" field is not missing any information, subsequent analyses performed (documented in Phase 2 of the data audit) did demonstrate inconsistencies in this field that are not captured in the data audit reported in Table 2.1.

As is demonstrated in Table 2.1, there are marked differences between the error rates of the two data collection systems. The overall error rate for KOTS is 9.8%, a rate that is only slightly better than the error rate reported in the 2007 data audit. Five different variables show error rates of over 1.0%. On the other hand, the error rate for TraCS is only 2.1%, showing a dramatic reduction in the percent of missing and invalid information. An examination of the overall error rate for the individual data fields within the TraCS system reveals that no variable's error rate was larger than 0.7%. It is expected that the full year of 2009 data collected with the TraCS system will show even further reductions in the overall error rate.

Table 2.1: Analysis of Missing Data & Logical Inconsistencies from all 2008 Officer-Initiated Traffic Stops

	% Missing (KOTS)	% Invalid (KOTS)	% Overall Error Rate (KOTS)	% Missing (TraCS)	% Invalid (TraCS)	% Overall Error Rate (TraCS)	% Overall Error Rate
Valid Forms (N = 539,344)			**9.83**			**2.06**	**7.81**
Stop Characteristics							
Date of Contact	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time of Contact	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duration of Stop	0.01	0.00	0.01	0.00	0.00	0.00	<0.01
Location of Stop[2]	1.93	2.33	4.26	0.00	0.37	0.37	1.82
Type of Contact *	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pre-Stop Viols. Obs.	NA	NA	NA	0.00	0.00	0.00	0.00
Reason for the Contact*	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Result of Contact	0.00	0.00	0.00	0.05	0.00	0.05	0.00
Valid Search[3]	<0.01	0.18	0.18	<0.01	0.02	0.03	0.14
Pre-Stop Indicators	NA	NA	NA	0.00	0.00	0.00	0.00
Vehicle Impounded	NA	NA	NA	0.01	0.00	0.01	0.01
Driver Characteristics							
Date of Birth	0.15	0.14	0.29	0.02	0.14	0.16	0.25
Gender	0.01	0.00	0.01	0.00	0.00	0.00	0.01
Race	<0.01	0.00	<0.01	0.00	0.00	0.00	<0.01
Demeanor	NA	NA	NA	0.00	0.00	0.00	0.00
UDA	0.08	0.00	0.08	0.00	0.00	0.00	0.06
Zip Code	<0.01	4.72	4.72	0.19	0.45	0.64	3.67
Vehicle Characteristics							
State of Vehicle Plate	0.85	0.22	1.08	NA	NA	NA	1.08
Vehicle Type	0.44	1.06	1.50	0.01	0.12	0.13	1.15
Vehicle Condition	NA	NA	NA	0.01	0.00	0.01	0.01
Officer Characteristics							
Badge	0.00	1.05	1.05	<0.01	0.22	0.22	0.83
Locator Code	<0.01	0.52	0.52	<0.01	0.52	0.52	0.52

*As described above, the 3,372 cases with missing data on the type of contact or reason for the stop were removed prior to this analysis of missing data.

[2] "Location of Stop" was created by combining the following fields: direction, highway, and milepost. The DPS codebook outlines the following rules that apply to these fields in KOTS: 1) If direction is identified, a highway and milepost must also be identified, 2) If the highway field contains an entry, the milepost field must also be completed, and 3) If the milepost field contains an entry, the highway field must also be completed. Based on these rules, the missing rate on location of the stop reflects the rate of missing information on direction. The missing rates for highway and milepost are included in the overall invalid rate for location of stop. When analyzing the entries for highway, any "0" was considered an "off-highway" stop and considered valid for this analysis. In addition, when highway was identified as "off-highway," there was no requirement for milepost to be identified. Similarly, the TRACS system includes a data field for "stop occurred on highway." If this variable was equal to zero but an alternative location was specified in the "other location" variable, this was also considered a valid location for this analysis. The invalid rate on location of stop reflects any violation of the aforementioned rules.

[3] "Valid Search" was created based on the search-related data available. Specifically, if a search was indicated, the search authority, search target, and contraband seized fields must contain a valid entry. Any deviation from these criteria resulted in an "invalid search." The missing rate for valid search reflects missing data for the "search performed" field.

DATA AUDIT: PHASE 2

Description

Phase 2 examines the data accuracy by comparing the content of the electronic data to other independent sources of information and addressing the question of whether all stops recorded in external sources of information are represented in the electronic data. This type of audit determines the extent to which officers are completing data collection forms for all stops. The method and results are reported below.

To determine whether information is being recorded for all eligible traffic stops, an external data source that records the same stops is necessary. Typical comparison sources of data include: computer aided dispatch (CAD) data, citation data, written warning data, videotapes, or other departmental data (Fridell, 2004). Based on discussions with DPS personnel, it was determined that the most appropriate comparison data were officers' activity logs. The reporting standards are the same for the activity logs and the stop form data collection. This dataset was provided to the UCPI research team and the aggregate totals of stops in the DPS activity logs and electronic data were compared. In order to ensure the greatest degree of comparability between the two data sets, 9,636 records were removed from the 587,943 total documents in the electronic data set (stop records resulting in only a voided citation and stop records with more than one completed document) as they would not be reflected in the activity logs.

Results

Table 2.2 compares the raw number of traffic stops included in DPS activity logs with the raw number of traffic stops included in the electronic data set for the DPS overall, the Highway Patrol Division, and the HPD districts/shifts. Due to a small number of traffic stops conducted by the other DPS divisions, comparisons are not made for these organizational units. Their total number of stops, however, is included in the total for the department overall. Table 2.2 presents the raw number of traffic stops in the activity logs, the raw number of traffic stops in the electronic data, and the percent error, which represents the percentage of traffic stops that do not match across the two data sources. Positive error rates indicate the percent of stops that appear in the electronic stop data but not in the activity logs. Negative error rates indicate the percent of stops that appear in the activity logs but not in the electronic stop data.

The results are displayed in Table 2.2. Overall, the percent error between the two datasets at the department level is only -0.3%. In 16 of the 20 districts/shifts, there were greater numbers of stops in the activity logs compared to the electronic data set, while in the other 4 districts/shifts, there were greater numbers of stops in the electronic data set compared to the activity logs. The Police Executive Research Forum (Fridell, 2004, 54) suggests that "correspondence of 90 percent or more between the two sources of information is quite acceptable." Using this standard, the results of this audit are positive. All twenty of the districts/shifts fall within the parameter of 10% error in either dataset, with 15 of the districts/shifts demonstrating a difference of 2% or less between the two datasets.

Table 2.2: Comparison of Number of Stops in Activity Logs and KOTS and TraCS Electronic Data Sets

	Total Number of Police-Citizen Interactions (2008)		
	In DPS Activity Logs	In Electronic Data Set	Percent Error
Department of Public Safety	580,272	578,307	-0.34%
Highway Patrol Division	573,836	571,238	-0.45%
Northern Bureau			
District 1—Kingman	32,140	32,370	0.72%
District 2—Flagstaff	35,186	35,103	-0.24%
District 3—Holbrook	41,538	41,501	-0.09%
District 11—Globe	29,842	29,693	-0.50%
District 12—Prescott	35,583	35,321	-0.74%
Metro West Bureau			
MW Shift 1	37,588	37,466	-0.32%
MW Shift 2	36,712	36,152	-1.53%
MW Shift 3	15,983	15,732	-1.57%
Southern Bureau			
District 4—Yuma	46,193	45,975	-0.47%
District 6—Casa Grande	47,066	46,269	-1.69%
District 8—Tucson	51,289	50,639	-1.27%
District 9—Sierra Vista	32,514	32,024	-1.51%
Commercial Vehicle Enforcement Bureau			
District 15	10,171	9,910	-2.57%
District 16	13,481	13,712	1.71%
District 17	560	595	6.25%
Metro East Bureau			
ME Shift 1	16,720	16,240	-2.87%
ME Shift 2	28,606	28,215	-1.37%
ME Shift 3	22,193	21,238	-4.30%
District 7—Metro Motorcycles	29,848	29,568	-0.94%
Canine	10,065	10,413	3.46%

In addition to the availability of the activity log data, additional comparison data are available regarding specific violations resulting from outcomes. For the KOTS data collection system, violation data are available for contacts in which a citation or warning was issued. That is, an additional data file documenting the specific number and types of warnings and citations issued was provided to the UCPI research team. One way to further examine the traffic stop data is to compare the two data sets (i.e., stop data and violation details for the stop data) for internal consistency. Unfortunately, these comparisons suggested multiple errors in one or both data sources. These inconsistencies are documented below for traffic stops that resulted in citations and warnings:

- Citations
  - 3,007 citations that were reported in the violation data file did not have "citation" indicated as an outcome in the original stop data file (0.75% error).

  - In contrast, 4,209 citations that were reported in the original stop data file have no corresponding citation information in the violation data.

- Warnings
  - 3,765 warnings that were reported in the violation data file did not have "warning" indicated as an outcome in the original stop data file (0.94%).
  - In contrast, 6,561 warnings that were reported in the original stop data file have no corresponding warning information in the violation data.

The research team proceeded with data analysis based on the assumption that if a citation or warning appears in either data set, it should be treated as a valid outcome. Thus, if the stop data – used as the basis for this report – indicated that a citation or warning was not issued, but information from the violation data indicated that one (or more) citations or warnings were issued for the stop, the stop outcome was changed in the stop data file by the research team. **This resulted in changing 3,007 traffic stops that originally indicated no citation was issued to indicate that at least one citation was issued. In addition, 3,765 stops that indicated no warning was issued were altered to indicate that at least one warning was issued.**

The second data problem identified above is more problematic – some citations and warnings in the original stop data that did not have corresponding violation information in the violation data file. After consultation with DPS officials, the UCPI research team decided to retain the original information as presented in the stop data file.

Violation comparison data also are available for the TraCS data collection system. For each traffic stop, DPS officers also recorded the specific violations resulting in either: 1) a citation and/or arrest, or 2) a repair order, warning, or DVER. Similar, though far less frequent, discrepancies were discovered in the TraCS electronic stop data as well. Specifically:

- Citations/Arrests:
  - 336 cases where a citation or arrest was indicated in the violation data were not recorded as such in the stop outcome data field (n=300 warnings, n=36 miscellaneous combinations of other outcomes)
  - 279 cases where a citation or arrest were indicated but no violation information was provided for those outcomes
- Warnings/Repair Orders/DVERs:
  - 19 cases where a repair order, warning, or DVER was indicated in the violation data were not recorded as such in the stop outcome data field (n=19 miscellaneous combinations of other outcomes including arrest and citations)
  - 1 case where a warning, repair order or DVER were indicated but no violation information was provided for those outcomes

Due to the statistical infrequency of these internal consistency errors, the original outcomes recorded in the TraCS system were retained. Note, however, that bivariate and multivariate analyses of stop outcomes (reported in Section 5) did not significantly differ when these cases were altered. To eliminate the error associated with providing violation information for

outcomes not selected, the TraCS data collection system can likely be programmed to only accept violation information when the appropriate outcomes have been selected.

RECOMMENDATIONS

The Police Executive Research Forum recommends less than a 10% error rate for traffic stop data (Fridell, 2004). Our research team recommends a more stringent standard of under 5%, with a goal of 2% missing/invalid data. This analysis produced an overall error rate of 7.8% based on the fields listed in Table 2.1. When the error rates for both the KOTS and TraCS data collection systems are compared, however, it is clear that the transition to improved data accuracy is already underway. Specifically, the error rate for stop data collected via TraCS in the last three months of 2008 is only 2.1%, compared to 9.8% for KOTS. The TraCS error rate is well under the PERF-recommended threshold and nearly reaches the research team's ideal goal of 2% or less for missing/invalid data. It is obvious that instituting an electronic data collection system and its accompanying training have dramatically improved the accuracy and consistency with which stop data are being collected across the department.

Phase 2 of the data audit shows slight discrepancies between the stop data and the comparison database of officer activity logs, though the margin of error is well within acceptable limits. The UCPI research team nevertheless recommends that first line supervisors continue quality assurance measures to ensure DPS Officers are completing the data collection form for every contact. The TraCS system assigns a contact data number every time officers complete a data sheet, and officers are now required to document this number in their time and activity weekly logs next to the primary document number. When first-line supervisors receive officers' time and activity weeklies, they should first ensure that a document number is listed next to the primary document number for the stop. Supervisors should also check the database to see the last document number shown assigned to the officer. If the numbers do not match, the supervisor can take corrective actions on a weekly basis. Conducting these cross-checks between the electronic data and DPS activity logs on a routine basis should ensure that all traffic stops are being appropriately recorded.

The internal consistency problems associated with the stop data and violation data have also been improved by the simultaneous collection of violation information on the electronic stop data collection form in the TraCS system. To eliminate the error associated with providing violation information for outcomes not selected, the TraCS data collection system can likely be programmed to only accept violation information when the appropriate outcomes have been selected. The UCPI team is optimistic that the data quality will continue to be enhanced through proper data management and supervisory oversight.

3. DESCRIPTION OF TRAFFIC STOP DATA

OVERVIEW

Section 3 describes the findings based on traffic stop data collected by DPS officers for the period of January 1 – December 31, 2008.[4] This section is divided into three parts that report: 1) missing or invalid data for the traffic stops, 2) characteristics of traffic stops conducted in 2008, and 3) characteristics of vehicles and drivers stopped by DPS officers in 2008. The information reported is strictly descriptive in nature. This summary does not include analyses that examine causal influences, and any data presented at aggregate levels are solely for purposes of comparison across DPS organizational units.

The first section provides a summary in Table 3.1 of the percentages of missing or invalid data for each of the variables included in later analyses. The second section includes Tables 3.2 – 3.5, which report the characteristics of traffic stops for 2008 across the department, division, bureau, and district/shift levels. Table 3.2 reports the total number of stops, the percentage of stops by weekday and daytime hours, and the duration of the stop. Table 3.3 provides a monthly breakdown of traffic stops across the department, division, bureau, and district/shift levels in 2008. For the stops collected via TraCS in the last three months of 2008, Table 3.4 reports the average number of violations observed prior to the stop and the types of violations that were observed prior to the stop. Table 3.5 reports the reasons for the stop across the department, division, bureau, and district/shift levels. The third section includes Tables 3.6 – 3.7, which report the characteristics of vehicles (the percentage of Arizona-registered vehicles, vehicle condition, and vehicle type) and drivers (e.g., age, gender, race/ethnicity, demeanor, undocumented alien status, and residency) stopped by DPS officers in 2008 across the department, division, bureau, and district/shift levels.

DATA

Based on the data available, DPS officers recorded 587,943 stops of citizens during 2008. The majority of these were recorded in the KOTS data collection system (n=437,732 stops), while the final three months of data collection for traffic stops were completed with the TraCS electronic system (n=150,211 stops). To properly examine issues surrounding racial/ethnic disparities, only officer-initiated traffic stops should be considered. Further, from January – September, 2008 DPS collected traffic stop data on both citation and warning documents. It is imperative that only one source of information be used for each stop, so as not to duplicate stop information (i.e., one stop is entered multiple times into the dataset). Therefore, the following numbers of traffic stops have been excluded from further analyses for the reasons noted:

- 17,959 non-driver or non-traffic enforcement contacts were removed

[4] Most variables are identical between the two data collection systems—KOTS and TRACS. Where they are not, these differences are footnoted.

- 3,372 contacts with missing data on the type of contact (n=1,643) or reason for the stop (n=1,729) were removed because it is not possible to determine whether these stops were initiated by an officer or citizen
- 26,005 citizen-initiated stops (specifically, 19,743 collisions and 4,177 motorist assists) were removed
- 8,729 contacts that had secondary documents issued containing duplicate information were removed[5]
- 907 that listed the only outcome as voided citation were removed

Therefore, the remaining analyses in this report are based on **539,344 officer-initiated traffic stops of drivers conducted during 2008, which represents 92% of the total stops recorded during the year**.[6] Although these data were collected via two different data collection methods, they are collectively examined throughout the majority of this report when the same information is collected in both systems.[7]

Of the 539,344 officer-initiated traffic stops, Table 3.1 documents the missing data percentages for the variables used in analyses. The first column lists the variables, followed by the percent of missing or invalid data, and the remaining valid number of cases.

As demonstrated in Table 3.1, three variables show rates of missing/invalid data that are higher compared to other variables. This is due primarily to the fact that these variables existed in either the KOTS or TraCS data collection system, but not both. They are included here to illustrate that analyses examining these variables will not be based on the full traffic stop data file, but only those cases for which these data are available.

Of the variables that are available for the full data file, the variable with the highest percentage of missing/invalid data is location of stop (8.3%), followed by vehicle type (1.2%). The remaining variables to be used in analyses have less than 1.0% of cases with missing or invalid data. Percentages provided in Tables 3.2 – 3.7 (and in later sections) are based on data from the number of valid cases only.[8]

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[5] If a primary document number was indicated on the form, the contact corresponds to another contact (and therefore results in multiple entries for the same traffic stop). In some cases, the primary document number did not match another valid document number in the data set. In other cases, the primary document number matched multiple documents numbers. There are clearly errors associated with this item on the data collection form. Therefore, when making adjustments to correct for these errors, the UC team decided to eliminate all cases with primary document numbers under the assumption that they were double entries into the data set. Statistical analyses were initially performed with these cases included – the results with the cases excluded do not significantly differ from those when the cases were included. The results reported within this report are based on statistical analyses with these cases excluded.

[6] Some traffics stops had multiple reasons for exclusion; therefore, the total number of cases excluded is less than the sum of cases eliminated for the various reasons.

[7] Descriptive analyses of each dataset separately revealed no substantive differences between the two datasets..

[8] In an effort to utilize as much information as possible for statistical analyses, a number of assumptions regarding these data have been made. Specifically:

- For 19,498 cases (3.6%) that indicated a zero for citizen zip code, these were assumed to not be Arizona residents. Therefore, these cases are included and coded as non-Arizona residents.
- For 70 cases (0.01%) that did not indicate that a search was conducted, but a search target and search authority were listed, an assumption was made that a search was conducted.

Table 3.1: Analysis of Missing Data from all 2008 Traffic Stops

	% Missing/Invalid	# Valid Cases
Valid Traffic Stops	--	539,344
Stop Characteristics		
Organizational Unit (division, bureau)	0.43	537,015
Organizational Unit (district/shift)	0.58	536,204
Date of Contact (month, weekday)	0.00	539,344
Time of Contact (daytime)	0.00	539,344
Location of Contact (county)	8.33	494,420
Duration of Stop	<0.01	539,323
Reason for the Contact*	0.00	539,344
Result of Contact/Stop Outcome (warning, repair order, citation, arrest)	0.01	539,280
Vehicle Characteristics		
State of Vehicle Registration**	26.64	395,693
Vehicle Type	1.15	533,153
Vehicle Condition***	74.16	139,376
Citizen Characteristics		
Age	0.17	538,447
Gender	0.01	539,303
Race	<0.01	539,331
Demeanor***	74.16	139,389
Undocumented Alien Status	0.06	539,036
Zip Code (Arizona state residency, county residency)	0.05	539,069

* Cases that were missing reason for the contact (n=1,729) were removed per the description above.
** Variable included only in KOTS data
*** Variable include only in TraCS data

TRAFFIC STOP CHARACTERISTICS

Traffic Stop Descriptives

Table 3.2 documents specific information regarding traffic stops at the department, division, bureau, and district/shift levels, including: Total number of stops, percent of stops occurring on weekdays, and during daytime hours, as well as the duration of the stops.

- Of the 29,173 searches, 64 (0.22%) did not indicate any type of seizure (including "none"); an assumption was made by the research team that these missing cases indicated no seizures.

These cases remain in the analyses. Therefore, while the data audit demonstrated larger percentages of missing data for some data fields, these assumptions regarding the likely source of the errors and their subsequent correction allow the cases to be included in the analyses.

As shown in Table 3.2, stops by Highway Patrol Division officers accounted for the overwhelming majority of all DPS stops (99%). Within the Highway Patrol Division, the Northern Bureau and Southern Bureau conducted approximately 60 percent of all stops (n=331,389). At the district/shift level, District 8 (Tucson) performed the largest number of stops (n=47,839), while District 17 had the fewest stops (n=585).

The majority of the 539,344 stops for the department were initiated on a weekday (75.0%) and occurred during the daytime (66.6%). The overwhelming majority of stops lasted between zero and twenty minutes (0-10 minutes 21.0%; 11-20 minutes 65.9%). These trends are fairly consistent across divisions, bureaus, and districts/shifts. For each of the categories, the variation at the district/shift level is, as expected, most pronounced. Please refer to Table 3.2 for specific variation at these organizational levels.[9]

[9] Beginning in Table 3.2 and continuing throughout the report, the Central and South Canine squads are examined together but separated from the Northern Canine squad based on recommendations from DPS officials.

Table 3.2: 2008 Traffic Stop Characteristics – Statewide, Division, Bureaus, & Districts/Shifts

				Duration of Stop (in Minutes)					
	Total # of Stops	**% Weekday**	**% Daytime**	**% 0-10**	**% 11-20**	**% 21-30**	**% 31-45**	**% 46-60**	**% 60+**
DPS Statewide	539,344	75.0	66.6	19.0	65.9	7.7	2.8	1.9	2.8
Criminal Investigations Division	3,753	71.5	41.2	21.0	57.1	11.9	4.1	2.1	3.9
Highway Patrol Division	537,015	75.1	66.8	19.0	65.9	7.6	2.8	1.9	2.8
Northern Bureau	163,667	71.1	78.8	24.5	68.4	3.3	1.3	0.8	1.7
D1-Kingman	30,642	73.8	72.7	15.1	76.9	3.4	1.3	0.9	2.4
D2-Flagstaff	33,183	72.1	66.9	29.5	63.1	3.9	0.9	0.6	1.9
D3-Holbrook	38,968	70.2	77.1	23.7	69.0	3.2	1.4	1.0	1.8
D11-Globe	27,980	66.6	76.2	40.1	54.6	2.8	0.8	0.5	1.2
D12-Prescott	32,753	72.2	71.5	15.8	77.1	3.4	1.8	0.8	1.1
Metro West Bureau	80,975	76.6	57.2	6.3	69.2	16.4	3.4	1.6	3.0
Shift #1	33,689	79.2	82.0	8.8	76.0	10.7	1.7	0.9	2.0
Shift #2	32,602	77.4	56.1	5.4	67.4	17.6	4.4	2.2	3.0
Shift #3	14,443	68.8	1.8	2.7	57.6	27.0	5.2	1.9	5.6
Southern Bureau	167,722	72.2	66.3	27.4	64.7	4.2	1.2	0.8	1.6
D4-Yuma	44,815	69.0	68.3	32.7	59.4	4.3	1.0	0.8	1.7
D6-Casa Grande	43,964	68.8	65.1	28.5	64.7	4.2	1.2	0.6	0.8
D8-Tucson	47,839	78.5	64.0	19.9	70.8	4.4	1.6	1.2	2.1
D9-Sierra Vista	30,622	72.2	68.8	29.6	63.0	3.4	1.2	0.8	2.0
Commercial Vehicle Bureau	24,914	90.1	89.4	1.2	12.9	23.0	24.6	20.7	17.6
District 15	9,832	90.4	93.6	1.5	17.5	17.0	23.1	17.9	23.0
District 16	13,384	90.2	89.2	0.8	9.3	27.6	24.0	23.0	15.2
District 17	585	92.5	94.0	6.2	22.9	22.7	23.6	13.5	11.1
Metro East Bureau	95,419	81.8	59.4	10.4	74.6	9.7	1.7	1.1	2.5
Shift #1	13,850	83.7	83.5	6.6	80.6	7.6	1.5	1.5	2.3
Shift #2	25,148	77.1	59.2	4.7	75.2	14.4	1.8	1.4	2.6
Shift #3	19,513	66.8	4.6	5.7	73.3	14.2	2.3	1.1	3.4
Metro Motors	26,581	95.9	78.2	12.0	80.7	4.5	0.8	0.5	1.4
Canine	10,298	82.5	82.4	34.0	65.9	6.0	2.8	1.7	3.5
Canine North	3,035	84.2	86.3	33.6	54.1	4.0	2.4	1.7	4.3
Canine Central & South	7,232	81.7	80.8	34.3	51.0	6.8	3.1	1.7	3.2

Traffic Stops By Month

Table 3.3 provides the temporal breakdown of traffic stop occurrences by month for 2008. At the department level, August accounted for the highest percentage of stops (9.3%), followed by July (9.1%), November (9.0%), May (8.8%). The lowest percentage of traffic stops at the department level occurred in February (7.0%), March (7.6%), and June (7.9%). Overall, however, stop activity at the department level is fairly consistent across months, with a difference of only 2.3% between the busiest and slowest months. Table 3.3 also documents the slight variation in temporal trends at the division, bureau, and district/shift levels.

Table 3.3: 2008 Traffic Stops by Month - Statewide, Divisions, Bureaus, & Districts/Shifts

	% Jan	% Feb	% Mar	% Apr	% May	% Jun	% Jul	% Aug	% Sep	% Oct	% Nov	% Dec
DPS Statewide	8.1	7.0	7.6	7.9	8.8	7.9	9.1	9.3	8.6	8.3	9.0	8.6
Crim. Invest. Division	9.5	6.4	6.4	8.4	11.2	5.9	8.1	11.3	5.9	8.7	9.8	8.4
Highway Patrol Division	8.1	7.0	7.6	7.9	8.8	7.9	9.1	9.3	8.6	8.3	8.9	8.6
Northern Bureau	7.9	6.4	7.5	8.0	8.9	8.1	9.9	9.7	8.7	8.3	9.1	6.9
D1-Kingman	10.1	7.4	7.1	9.2	9.3	7.9	10.5	8.1	7.0	7.9	8.5	6.5
D2-Flagstaff	8.2	6.7	7.7	7.5	8.9	7.6	8.1	9.6	9.9	8.4	10.9	8.0
D3-Holbrook	7.9	6.8	9.0	8.3	8.6	8.2	9.4	9.3	8.6	7.4	8.4	8.0
D11-Globe	5.5	4.3	6.1	7.1	9.3	9.4	10.7	11.4	9.7	9.6	8.8	8.1
D12-Prescott	7.4	6.3	7.3	7.7	8.6	7.4	11.1	10.2	8.2	8.7	9.0	8.8
Metro West Bureau	9.1	7.1	6.6	7.7	8.7	8.1	9.0	8.3	8.8	8.4	8.8	9.4
Shift #1	7.9	6.4	6.4	8.9	10.0	8.4	9.4	7.6	8.8	8.4	9.1	8.8
Shift #2	10.0	7.7	6.7	7.1	8.3	8.2	8.6	8.1	8.2	8.1	8.9	10.0
Shift #3	9.9	7.4	6.7	6.0	6.7	7.5	8.9	10.4	9.9	9.0	8.0	9.7
Southern Bureau	8.4	7.3	8.3	8.1	8.7	7.1	8.3	9.6	8.0	8.3	9.2	8.7
D4-Yuma	7.9	7.7	9.1	8.8	9.2	7.9	8.6	9.4	7.6	7.8	8.9	7.1
D6-Casa Grande	7.8	6.8	7.0	7.5	9.7	6.8	7.7	8.6	7.2	9.4	10.6	10.7
D8-Tucson	8.4	6.7	7.1	8.4	7.7	6.8	8.5	10.9	8.9	8.9	8.8	8.9
D9-Sierra Vista	10.1	8.3	11.0	7.5	7.7	7.0	8.6	9.1	8.5	6.3	8.2	7.6
Commercial Vehicle Bureau	6.4	6.2	7.0	7.5	8.5	9.0	10.2	8.9	8.9	7.6	9.8	10.1
District 15	4.2	4.5	5.0	7.5	7.2	7.7	10.0	10.1	10.0	9.5	11.4	12.7
District 16	8.8	8.3	7.7	7.1	9.1	8.4	9.9	7.6	7.4	6.7	9.4	9.5
District 17	0.0	0.0	7.4	5.3	8.9	18.6	10.1	8.9	9.9	6.3	14.7	9.9
Metro East Bureau	7.4	7.6	7.5	7.5	8.7	8.4	9.1	9.0	9.1	8.2	8.1	9.3
Shift #1	7.9	9.7	8.4	8.6	7.7	8.4	7.9	8.4	8.9	7.1	7.6	9.3
Shift #2	8.3	6.8	7.6	7.6	7.4	8.1	9.6	9.2	8.5	8.3	9.1	9.5
Shift #3	7.2	6.7	7.9	7.1	8.8	8.1	8.2	10.3	10.2	7.8	7.7	9.9
Metro Motors	6.0	7.1	6.4	7.5	10.4	9.5	10.6	8.8	9.1	8.3	7.6	8.8
Canine	8.5	9.9	8.5	6.9	8.7	7.1	7.2	7.3	9.0	10.0	8.1	8.7
Canine North	8.3	8.4	7.3	6.4	10.1	5.5	10.1	5.6	11.5	9.7	10.1	7.1
Canine Central & South	8.6	10.5	9.0	7.1	8.2	7.7	6.0	8.0	7.9	10.1	7.3	9.5

Observed Violations and Reason for the Stop

Table 3.4 documents information regarding the number of observed violations prior to the stop and the type of violation observed (including speeding, equipment violations, following distance, failure to stop, failure to yield, failure to properly use a turn signal, improper lane change, other moving violation and other miscellaneous reasons). DPS began collecting this information in the TraCS electronic data collection system beginning in October 2008. Therefore, the data presented in Table 3.4 are drawn only from stops reported by DPS officers from October – December 2008.

At the department level, the average number of observed violations prior to the stop was 1.05 violations. There was very little variation in the average number of observed violations at the bureau and district/shift levels. The largest difference among organizational units in the number of observed violations occurred at the division level, as the average number of observed violations for the Criminal Investigations Division (1.12) was slightly larger than the Highway Patrol Division (1.05).

At the department level, only one violation was recorded for the overwhelming majority of stops (95.3%), while 4.2% of stops recorded two violations and 0.5% recorded three or more. This pattern was generally consistent across organizational units, although there was some variation at the division level in the number of observed violations. Two violations were observed in 7.0% of stops made by officers in the Criminal Investigations Division compared to 4.2% of stops made by officers in the Highway Patrol Division. Additionally, a larger percentage of stops made by the Criminal Investigations Division had 3 or more observed violations (2.1% for CID, compared to 0.5% for HPD).

The most common violation observed by DPS officers prior to the stop was speeding (43.2%). The next most common violations were equipment (26.3%) and other (17.3%). The least common violations were failure to yield (0.5%), turn signal (1.0%) and failure to stop (1.6%). There are some noteworthy differences at the division level. While speeding was the most common (43.4%) observed violation for the HPD, other and speeding were the most commonly observed violations (29.0% and 28.4% respectively) for the CID. Additionally, violations that were relatively uncommon overall—failure to stop and turn signal—were considerably more common in stops made by the CID (5.9% and 5.3%, respectively).

Greater variation exists at the bureau level. The percentages of observed speeding violations ranged from 59.7% in the Northern Bureau to 6.8% in the Commercial Vehicle Bureau. Perhaps due to the nature of their assignment, the most common observed violation for stops made by officers assigned to the Commercial Vehicle Bureau was equipment violations (53.7%). Equipment violations were the second most common observed violation in the Northern and Southern Bureaus and the third most common observed violation in the Metro West and Metro East Bureaus. The other violation category represented a large percentage of observed violations in the Commercial Vehicle, Metro West, and Metro East Bureaus (34.5%, 30.0%, and 26.2 respectively).

There was also variation in observed violations at the district/shift level. Officers in District 11 reported the largest percentage of observed speeding violations (70.4%) and officers in District 16 had the smallest percentage of observed speeding violations (5.3%). Observed equipment violations ranged from 67.6% (District 16) to 13.6% (Metro Motors). For a complete description of the various observed violations at the lower organizational levels, please refer to Table 3.4.

Table 3.4: Violations Observed Prior to the Stop (TraCS only) for 2008 Traffic Stops – Statewide, Division, Bureaus, & Districts/Shifts

	Avg # of Observed Violations	% Speeding	% Equipment	% Following Distance	% Failure to Stop	% Failure to Yield	% Turn Signal	% Lane Use	% Other Moving	% Other
DPS Statewide	1.05	43.2	26.3	2.8	1.6	0.5	1.0	5.6	6.9	17.3
Crim. Invest. Division	1.12	28.4	20.2	2.7	5.9	1.3	5.3	10.9	8.7	29.0
Highway Patrol Division	1.05	43.4	26.2	2.8	1.5	0.5	0.9	5.6	6.9	17.3
Northern Bureau	1.05	59.7	25.7	2.1	1.5	0.6	0.8	3.7	4.0	7.4
D1-Kingman	1.05	62.8	21.5	2.2	1.9	0.4	1.9	1.6	4.6	6.2
D2-Flagstaff	1.03	49.5	33.6	2.3	1.7	0.4	1.7	0.4	3.3	8.5
D3-Holbrook	1.08	66.3	22.9	2.0	1.2	0.4	1.2	0.8	2.9	8.6
D11-Globe	1.05	70.4	17.8	0.4	1.7	0.4	1.7	0.2	4.3	5.3
D12-Prescott	1.06	50.6	31.3	3.3	1.1	1.3	1.1	1.2	5.4	7.7
Metro West	1.06	29.3	23.6	2.4	2.4	0.4	0.9	8.7	8.1	30.0
Shift #1	1.04	33.6	26.1	1.5	3.2	0.2	3.2	0.5	8.4	26.6
Shift #2	1.06	25.8	24.1	3.2	1.9	0.6	1.9	1.3	7.8	32.8
Shift #3	1.09	27.5	16.8	2.4	1.5	0.4	1.5	0.9	8.0	31.2
Southern Bureau	1.05	47.4	27.7	3.7	1.1	0.7	1.1	4.5	6.5	12.6
D4-Yuma	1.06	61.5	21.9	1.5	1.3	0.7	1.3	0.8	6.3	8.8
D6-Casa Grande	1.06	42.1	34.2	6.9	0.5	0.4	0.5	1.0	4.6	11.7
D8-Tucson	1.05	37.0	25.0	3.0	1.2	1.2	1.2	1.6	9.8	19.6
D9-Sierra Vista	1.04	56.2	28.2	1.9	1.5	0.3	1.5	0.5	4.3	7.4
Commercial Vehicle	1.03	6.8	53.7	0.6	1.0	0.5	0.5	1.6	4.3	34.5
District 15	1.05	8.5	39.3	0.9	0.8	0.5	0.8	0.6	7.3	45.5
District 16	1.02	5.3	67.6	0.4	1.3	0.4	1.3	0.4	1.5	23.8
District 17	1.04	6.6	35.9	0.0	0.6	1.7	0.6	1.1	6.6	48.1
Metro East	1.04	31.5	18.9	3.7	1.9	0.3	1.0	9.0	12.0	26.2
Shift #1	1.04	30.9	14.7	1.4	2.0	0.4	2.0	0.8	15.8	30.5
Shift #2	1.04	23.3	22.8	1.4	1.6	0.1	1.6	0.8	9.0	36.6
Shift #3	1.05	34.4	19.3	1.2	2.3	0.2	2.3	1.3	12.0	23.1
Metro Motors	1.03	39.7	13.6	1.1	2.4	0.3	2.4	1.0	16.2	19.4
Canine	1.07	43.4	26.3	22.6	0.7	0.3	0.7	1.6	4.8	17.5
Canine North	1.12	46.6	14.7	27.9	0.6	0.5	0.7	4.3	3.3	13.3
Canine Central & South	1.05	18.8	31.1	20.4	0.7	0.3	1.9	7.6	5.4	19.3

The recorded official reason for the stop differs from the previously described observed violations variable. The observed violations variable records officers' perceptions of the number and type of violations committed prior to initiating a traffics stop. The reason for the traffic stop is the primary legal justification for the traffic stop. Officers are trained to select only one reason for the stop, whereas they are trained to mark any and all applicable violations for the above-described pre-stop violations observed variable. If an officer has multiple reasons for the stop, the officer is trained to select and record the "highest priority" reason for the stop using the following priority structure[10]:

- Collision
- Externally Generated Stop (pre-existing information)
- Moving Violation
- Investigative Stop
- Motor Assist
- Non-Moving Violation
- Criminal Offense
- Vehicle Equipment Violation

Table 3.5 reports the reasons for the stops by DPS officers, including: 1) moving violations, 2) non-moving violations, 3) equipment violations, 4) investigatory stops, 5) preexisting information, and 6) criminal offenses. Information for these categories is summarized at the department, division, bureau, and district/shift levels. Across the department in 2008, the most frequent reason for the stop was a moving violation (62.4%), followed distantly by equipment violations (23.0%), and non-moving violations (12.7%).

Greater variation in the reasons for stops is evident at the bureau level. For all bureaus except the Commercial Vehicle Enforcement Bureau, moving violations are the most common reason for the stop. In the Commercial Vehicle Bureau, equipment violations are the most frequent reason for the stop (53.1%); officers in this bureau also record the highest percentage of stops for investigatory purposes (16.0%) across bureaus. In the Metro West and Metro East Bureaus, the second most common reason for the stop is a non-moving violation, while in the Northern and Southern bureaus the second most common reason for the stop is an equipment violation.

The districts/shifts also exhibit variation in reasons for stops. For example, the range of stops for moving violations at the district level varied from a high of 82.8% (District 11) to a low of 12.0% (District 16). Note, however, that of the 20 districts/shifts, 15 reported moving violations as the reason for the stop for over 50% of drivers stopped. Districts/shifts also varied considerably in the other reasons for stops. For a complete description of the various categories of reasons for the stop at the lower organizational levels, please refer to Table 3.5.

[10] Note that, within this list of reasons by highest priority, collisions and motorist assists have been removed from these data as they are not officer-initiated stops. For more detail, see page 25.

Table 3.5: Reasons for the 2008 Traffic Stops – Statewide, Division, Bureaus, & Districts/Shifts

	% Moving	% Non-Moving	% Equipment	% Investigation	% Preexisting Info	% Criminal Offense
DPS Statewide	62.4	12.7	23.0	1.2	0.4	0.3
Criminal Investigations Division	56.1	22.0	18.3	2.3	0.3	1.1
Highway Patrol Division	62.4	12.6	23.0	1.2	0.4	0.3
Northern Bureau	73.1	5.1	20.6	0.5	0.4	0.3
D1-Kingman	76.7	4.3	17.9	0.4	0.5	0.2
D2-Flagstaff	64.4	7.0	27.5	0.5	0.5	0.1
D3-Holbrook	76.2	4.4	18.2	0.5	0.2	0.5
D11-Globe	82.8	2.4	13.4	0.6	0.7	0.2
D12-Prescott	66.7	6.9	25.5	0.6	0.2	0.1
Metro West	55.0	23.1	20.8	0.6	0.1	0.3
Shift #1	59.0	20.8	19.6	0.3	0.1	0.2
Shift #2	48.6	25.2	24.9	0.8	0.1	0.4
Shift #3	60.7	23.6	14.7	0.6	0.1	0.4
Southern Bureau	64.1	10.1	24.7	0.4	0.5	0.2
D4-Yuma	71.1	6.7	21.5	0.2	0.3	0.2
D6-Casa Grande	60.9	9.8	28.4	0.3	0.3	0.3
D8-Tucson	57.7	17.1	24.1	0.5	0.4	0.2
D9-Sierra Vista	58.4	4.4	24.9	0.9	1.2	0.3
Commercial Vehicle	16.3	13.0	53.1	16.0	1.5	0.1
District 15	21.8	17.1	34.9	24.0	2.0	0.1
District 16	12.0	8.6	67.7	10.4	1.3	0.0
District 17	23.4	12.3	32.1	32.1	0.0	0.0
Metro East	59.5	21.0	18.3	0.5	0.1	0.7
Shift #1	57.0	25.7	16.2	0.3	0.2	0.7
Shift #2	45.5	30.5	22.6	0.7	0.1	0.7
Shift #3	63.2	17.1	18.7	0.5	0.1	0.5
Metro Motors	71.5	15.2	12.2	0.2	0.0	1.0
Canine	59.0	14.0	25.5	1.2	0.2	0.2
Canine North	73.1	8.2	18.1	0.3	0.1	0.2
Canine Central & South	53.0	16.4	28.7	1.5	0.2	0.1

VEHICLE AND DRIVER CHARACTERISTICS

Tables 3.6 – 3.7 report the characteristics of vehicles and drivers stopped by DPS officers during 2008. The characteristics of the vehicle are reported at the department, division, bureau, and district/shift levels in Table 3.6 and include the percent of Arizona registered vehicles, vehicle condition, and vehicle type. The characteristics of the drivers include age, gender, race/ethnicity, demeanor, undocumented alien status, and residency. These characteristics are described at the department, division, bureau, and district/shift levels in Table 3.7.

Vehicle Characteristics

Table 3.6 reports the characteristics of vehicles involved in DPS traffic stops in 2008, including the percent of Arizona registered vehicles, vehicle condition (excellent, good, fair, and poor) and vehicle type (e.g., car, convertible, motorcycle, van or station wagon, SUV, pickup truck, truck or tractor trailer, and other). Each of these categories is reported at the department, division, bureau, and district/shift levels.

Vehicle Registration

At the department level, the majority of vehicles stopped (76.6%) were registered in the state of Arizona. The state of vehicle registration was not included in the TraCS data collection system. Therefore, the information presented for this variable in Table 3.5 and the accompanying text is based solely on the KOTS data collected during stops between January and September 2008.[11] The percent of Arizona-registered vehicles varied considerably by bureau and district/shift. For example, at the bureau level, the percentage of Arizona-registered vehicles ranged from a high of 89.9% (Metro East Bureau) to a low of 42.4% (Commercial Vehicle Bureau). Similar variation existed at the district/shift level, with a range from 93.8% (Metro East Shift #1) to 42.4% (District 15) of Arizona-registered vehicles. Northern Canine officers also stopped a majority of vehicles registered outside of Arizona (85%).

Vehicle Condition

Vehicle condition is a new variable that was added in the TraCS data collection system; the condition levels were determined based on Kelly Blue Book standards. This variable was included in the new data collection system to better understand traffic stopping patterns and outcomes (particularly stops that result in repair orders, multiple citations, and searches). The data collection allowed for four categories from which officers are to best classify the stopped vehicle, including excellent, good, fair, and poor. These categories are defined as described below:

[11] The reason for this variables' exclusion in the TRACS system is unknown to the UCPI research team, however this variable is an important predictor of traffic stops and traffic stop outcomes. It is strongly recommended that this variable be reintroduced into the TRACS system.

- Excellent: Look new, are in excellent mechanical condition and needs no reconditioning. These vehicles have never had any paint or bodywork and are free from rust. They have a clean title history and would pass a smog and safety inspection.
- Good: Are free of any major defects. The paint, body and interior have only minor blemishes and there are no major mechanical problems. Good vehicles also have little or no rust and have tires that match and have substantial tread wear left.
- Fair: Have some mechanical or cosmetic defects, and need some servicing, but are still in reasonable running condition. The paint, body, and/or interior need work performed by a professional. Additionally, the tires may need to be replaced and there may be some reparable rust damage.
- Poor: Have severe mechanical and/or cosmetic defects and are in poor running condition. Vehicles in poor condition may have problems that cannot be readily fixed as a damaged frame or a rusted through body.

At the department level, the majority of vehicles stopped were in good or fair condition (54.5 and 25.5 respectively).[12] Vehicles in excellent condition accounted for 15.2% of all stops. Finally, vehicles in poor condition accounted for 4.7% of all vehicles stopped. Trends at the bureau and district levels were similar to the department level trends, with the exception of the Criminal Investigation Division which stopped significantly more vehicles in poor condition (13.7%) compared to other divisions.

Vehicle Type

The most common vehicle types stopped at the department level were cars (47.3%), followed by pickup trucks (22.5%), vans/station wagons (12.8%), trucks/tractor trailers (6.8), and SUVs (6.1%). With the exception of the Commercial Vehicle Enforcement Bureau, these percentages are fairly similar at the bureau and district/shift level. Due to the nature of their assignment, Commercial Vehicle Enforcement Bureau officers stopped a much larger percentage of trucks and/or tractor trailers (86.1%) in comparison to officers in other organizational units.

[12] As noted above, vehicle condition was included only in the TRACS data collection system. Therefore, the information presented for this variable in Table 3.6 and the accompanying text is based solely on stops that occurred between October and December 2008.

Table 3.6: Vehicle Characteristics of 2008 Traffic Stops – Statewide, Divisions, Bureaus, & Districts/Shifts

		Vehicle Condition				Vehicle Type							
	% AZ Regist.	% Excel.	% Good	% Fair	% Poor	% Car	% Convert.	% Mtrcyc.	%Van or Stat.Wag.	% SUV	% P/U Truck	% Truck or Tr.Trailer	% Other
DPS Statewide	76.6	15.2	54.7	25.5	4.7	47.3	2.7	1.2	12.8	6.1	22.5	6.8	0.7
Crim. Invest. Division	84.7	9.8	36.7	39.8	13.7	56.4	4.6	5.2	10.2	3.5	17.9	1.1	1.0
Highway Patrol Division	76.5	15.2	54.8	25.3	4.6	47.2	2.7	1.2	12.8	6.1	22.5	6.8	0.7
Northern Bureau	67.3	16.7	55.9	23.3	4.1	45.4	2.6	1.0	13.4	8.5	24.9	3.5	0.7
D1-Kingman	53.5	14.6	59.3	22.8	3.2	49.6	2.1	1.7	12.1	10.2	20.2	3.2	0.8
D2-Flagstaff	62.6	18.0	55.3	22.3	4.4	47.5	1.7	0.4	15.7	8.3	24.0	1.9	0.4
D3-Holbrook	64.5	16.3	59.0	21.1	3.6	42.8	2.3	0.6	12.0	9.4	27.3	4.7	1.0
D11-Globe	89.4	16.5	57.3	23.3	2.9	39.8	2.8	1.5	15.5	6.3	30.2	3.3	0.5
D12-Prescott	70.3	17.8	49.2	27.0	6.0	47.0	4.4	1.0	12.4	7.8	22.7	4.1	0.6
Metro West Bureau	87.0	14.0	52.6	28.5	4.9	53.7	3.7	1.8	11.8	4.7	21.7	2.1	0.5
Shift #1	86.8	7.3	55.7	32.7	4.4	48.5	3.6	2.4	13.7	5.7	23.7	1.9	0.5
Shift #2	85.2	18.0	52.1	25.1	4.7	55.1	3.9	1.5	10.7	4.3	21.4	2.5	0.5
Shift #3	91.7	20.4	46.8	26.5	6.3	62.8	3.2	1.1	10.1	3.3	17.9	0.9	0.7
Southern Bureau	77.8	16.8	52.1	25.7	5.3	46.5	2.0	0.7	14.8	7.0	25.4	3.0	0.6
D4-Yuma	63.0	21.4	52.5	20.8	5.3	48.6	1.8	0.6	15.7	8.7	21.6	2.3	0.7
D6-Casa Grande	86.9	14.8	51.9	27.4	5.9	46.0	2.4	0.6	14.4	6.7	25.9	3.7	0.4
D8-Tucson	85.8	14.9	47.9	31.7	5.5	48.0	1.7	0.7	15.0	4.9	26.1	3.0	0.7
D9-Sierra Vista	75.6	17.5	60.2	18.7	3.6	42.0	2.2	0.8	13.7	8.1	29.5	3.0	0.7
Commercial Vehicle Bureau	42.4	11.2	53.6	30.6	4.5	4.8	0.4	0.6	2.6	0.8	3.3	86.1	1.4
District 15	42.4	11.7	56.5	27.4	4.3	6.2	0.6	0.8	2.8	1.2	4.4	82.3	1.8
District 16	43.7	10.9	49.8	34.4	4.8	3.5	0.3	0.4	2.4	0.4	2.5	89.5	1.1
District 17	54.9	12.7	57.5	26.5	3.3	8.9	0.5	1.4	7.1	1.7	7.1	71.5	1.7
Metro East Bureau	89.9	11.8	60.0	23.9	4.3	57.3	3.8	1.9	11.7	3.2	19.0	2.3	0.8
Shift #1	93.8	12.5	51.4	29.3	6.8	52.4	4.8	1.5	13.2	3.3	23.1	1.0	0.6
Shift #2	93.3	10.3	67.6	18.3	3.7	61.2	3.1	1.1	12.1	1.9	18.7	0.9	0.9
Shift #3	93.6	9.3	52.8	32.7	5.3	61.9	4.0	1.5	10.9	3.1	16.3	1.6	0.7
Metro Motors	93.2	11.1	66.2	19.3	3.4	55.6	4.3	3.8	10.9	3.4	19.8	1.7	0.5
Canine	59.9	21.0	50.1	26.0	2.9	49.7	2.4	0.2	12.4	5.6	17.7	10.7	1.3
Canine North	15.0	39.1	42.4	17.4	1.1	49.3	1.2	0.2	11.6	7.4	11.4	16.8	2.0
Canine Central & South	78.6	13.5	53.3	29.6	3.6	49.9	2.9	0.2	12.6	4.9	20.3	8.1	1.0

Driver Characteristics

Table 3.7 reports the characteristics of drivers stopped by DPS officers in 2008, including their average age, percent male, percent racial/ethnic groups (e.g., White, Black, Hispanic, Native American, Asian, Middle Eastern, and other), percent with an uncooperative or combative demeanor, percent undocumented alien, percent motorists that reside in Arizona, and percent of motorists stopped in the county in which they reside. Information for each of these variables is presented at the department, division, bureau, and district/shift levels.

Drivers' Age & Gender

The average age of drivers and the percent of drivers who were male are reported at the department, division, bureau, and district/shift level in Table 3.7. At the department level, the average age of drivers stopped was 38.0 years, which is similar to the individual averages at the bureau, and district/shift levels (see Table 3.7). Of note, the average age of drivers stopped by the Commercial Vehicle Enforcement Bureau (43.5 years) is older compared to other bureau averages; whereas drivers stopped in the Metro West and East Bureaus tended to be somewhat younger (36.1 and 34.6 years, respectively) compared to the department and other bureau averages. These age differences are likely based on traffic patterns and DPS assignments.

Also shown in Table 3.7, 70.8% of the stopped drivers across the department were male; likewise, males were more likely than females to be stopped at all levels within the department, particularly within the Commercial Vehicle Enforcement Bureau. These differences may be related to traffic patterns (more male drivers), differential driving behaviors (more males violate traffic laws or engage in aggressive driving behaviors), or officers' reluctance to stop female motorists.

Drivers' Race & Ethnicity

DPS officers recorded the race or ethnicity of drivers based solely on the officers' perceptions of citizens' race or ethnicity; no drivers were asked about their race/ethnicity. The reliability and validity of citizens' race involves two related concerns for data collected by the police. First, police may be reluctant to indicate drivers' race or may simply report that information inaccurately. Second, officers may "disengage," or initiate fewer traffic stops overall. Unfortunately, the validity of the data collected by DPS officers on citizen race/ethnicity cannot be assessed directly using the current data audit methodology.

The racial and ethnic descriptions of drivers stopped by officers are reported at the department, division, bureau, and district/shift levels in Table 3.7. Officers recorded their perceptions of drivers' race/ethnicity in one of seven categories, with the percentage across the department indicated in parentheses:

- White (61.9%)
- Hispanic (25.2%)
- Native American (4.8%)

- Black (4.9%)
- Asian (1.8%)
- Middle Eastern (1.0%)
- Other/Unknown race/ethnicity (0.5%)

It is important to note that the differences in the percentages of racial/ethnic groups stopped across counties do not necessarily indicate that DPS officers make stopping decisions based on race/ethnicity. Indeed, some variation in the racial and ethnic background of drivers stopped across division, bureau, and district/shift levels is to be expected due to differences in the demographic makeup of residents and travelers, as well as differences in traffic flow patterns in these locations and possible differences in traffic violations. As shown in Table 3.7, variations in the racial/ethnic background of stopped drivers at the division, bureau and district/shift levels are evident. For example, at the division level, CID officers stop higher percentages of Hispanic and Black drivers compared to Highway Patrol Division officers. At the bureau level, the Northern Bureau reported the highest percentage of White drivers stopped (69.4%), while officers in the Commercial Vehicle Bureau stopped the lowest percent of White drivers (53.0%). Differences in racial composition of drivers stopped across bureaus are also pronounced for Hispanic, Native American, and Black drivers. For example, the largest percentages of Hispanic drivers were stopped in the Southern and Commercial Vehicle Bureaus (37.0 and 36.1%, respectively), while the lowest percent was in the Northern Bureau (11.5%). Native Americans accounted for 12.8% of drivers stopped in the Northern Bureau, but their percentage of drivers stopped in each of the other bureaus was 1.5% or smaller. Black drivers accounted for 7.6% of drivers stopped in the Metro East Bureau and 7.5% of drivers stopped in the Metro West Bureau, compared to 2.6% of drivers in the Northern Bureau. The percentages of Asian, Middle Eastern, and other drivers stopped were extremely low across all organizational units.

As shown in Table 3.7, variations at the district/shift level in percentages of racial/ethnic groups stopped were also evident. The percentage of White drivers stopped at the district/shift level varied from a high of 79.2% in District 11 (Globe) to a low of 37.1% in the Canine District. The percentages of motorists stopped recorded as Hispanic varied from 49.9% of the stops in the Canine District, to only 9.8% of stops in District 11 (Globe). Officers in District 16 (45.5%) and District 8 (Tucson) (43.9%) also stopped a significantly higher percentage of Hispanic drivers. Percentages of drivers recorded as Native Americans varied from a high of 25.2% in District 3 (Holbrook), to a low of 0.3% in District 16. Finally, Black drivers represented 10.2% of stops by the Metro West Shift and 8.7% of stops by Metro East Shift 3, but only 1.4% of stops in District 11 (Globe).

Driver Demeanor

Driver demeanor is a new variable in the TraCS data collection system and is collected to better understand post-stop outcomes. Driver demeanor has three categories: cooperative, uncooperative, and combative. Officers select the most appropriate of the three categories based on the training guidance below. Further, officers were instructed to select uncooperative or combative if the subject displays uncooperative or combative demeanor at any point during the encounter.

- Cooperative: Those that comply with the officer's requests even if they do so in a rude or discourteous manor. A subject is still considered cooperative if he or she refuses to cooperate because of some issue related to the subject's Fifth Amendment right against self incrimination.
- Uncooperative: When a subject refuses to answer an officer's question (not related to self-incrimination) or comply with an officer's request.
- Combative: Those that verbally abuse the officer, including cursing at or threatening the officer or if the subject displays resistance toward the officer that is physical in nature. This physical resistance may include, but is not limited to, fleeing from the officers, physically threatening the officers, striking officers, etc.

Due to the small number of subjects in the uncooperative or combative categories, those categories were collapsed so that the reported variable has two categories, cooperative and uncooperative/combative. At the department level the vast majority (99.3%) of stops involved cooperative individuals.[13] The largest amount of variation was at the division level. Officers in the Criminal Investigations Division experienced uncooperative/combative subjects in 3.6% of encounters compared to 0.7% of encounters with officers in the Highway Patrol Division. At the bureau level, officers in the Commercial Vehicle Bureau had the largest percentage of encounters involving uncooperative/combative subjects (1.2%) and officers in the Southern Bureau had the smallest percentage of encounters involving uncooperative/combative subjects (0.4%). This trend is similar at the district/shift level. The district/shift with largest percentage of encounters involving uncooperative/combative subjects was District 16 (1.5%) and the districts/shifts with the smallest percentages were District 17 (0.0%) and District 4 (Yuma) (0.2%).

Undocumented Alien Status

Table 3.7 also reports the percent of vehicles stopped that officers indicated were of undocumented aliens. As shown in Table 3.7, DPS officers indicated that 1.0% of vehicles stopped department-wide involved undocumented aliens. At the bureau level, the highest percentage of undocumented aliens was stopped in the Metro East Bureau (1.8%), while the lowest percent was 0.6% in the Commercial Vehicle Bureau and Southern Bureau. At the district/shift level, Metro East Shift #2 (1.8%), Metro West Shift #3 (3.0%), and the Canine District (3.7%) all stopped larger percentages of undocumented aliens.

It is important to remember that, for the KOTS data collection system in effect until September 2008, the data field regarding undocumented aliens applied only to the driver. Therefore, this information fell short of indicating whether any passengers in the vehicle are considered by officers as being undocumented aliens. That is, situations where a legal-resident driver is transporting illegal aliens were not captured using this method. One of the revisions included in the redesigned TraCS electronic data collection form was an undocumented alien data field that does account for undocumented passengers. While this only contributed to slightly less than 0.1% of the rate of undocumented aliens stopped, it is important to remember that this

[13] As noted above, driver demeanor was included only in the TRACS data collection system. Therefore, the information presented for this variable in Table 3.7 and the accompanying text is based solely on stops that occurred between October and December 2008.

percentage is based only on 3 months of data collection. In addition, during the 2008 focus group sessions with DPS officers and sergeants, participants' comments suggested that the use of the UDA data field within the KOTS system was not uniform across the department. Specifically, many officers indicated that, due to the layout of the KOTS form, they thought they had to choose between a racial category and the UDA data field. Therefore, it is possible that this data field had been underutilized on the form even for drivers suspected to be undocumented aliens. Examining the percentages of undocumented aliens in the two datasets reveals that only 0.5% of the stops recorded in KOTS were considered to be of drivers who were undocumented aliens, while 2.7% of the stops recorded in TraCS involved a driver and/or passenger that had undocumented status. Therefore, the redesigned TraCS data collection now in use is presumed to be offering a more accurate representation of the frequency with which undocumented aliens are encountered by DPS officers.

Drivers' Residency

Finally, Table 3.7 reports drivers' residency based on reported residential zip codes. For every traffic stop, drivers' zip codes were recorded to determine the percentage of stops that occurred in locations (i.e., state and county) where the drivers actually resided. This is important information to collect because benchmarks based on Census data assume that the driving population is similar to the residential population of an area. As shown in Table 3.7, however, this is an inaccurate assumption for these data. Specifically, at the department level, approximately 25% of drivers stopped statewide did not reside in the state of Arizona, and over 60% of drivers stopped did not reside in the county in which they were stopped.

The department averages of in-state (i.e., drivers who live in Arizona) and in-county residents (i.e., drivers stopped in the county in which they reside) are 74.3% and 41.8%, respectively. However, when examined at the division, bureau, and district/shift levels, it is obvious that the percentages of out-of-state residents stopped by DPS officers varied dramatically by location and assignment (see Table 3.7). For example, officers assigned to the Criminal Investigations Division stopped 83.0% Arizona residents, compared to 74.2% by officers in the Highway Patrol Division. Furthermore, Criminal Investigations Division officers are considerably less likely to stop in-county residents (12.3%) than Highway Patrol Division officers (42.0%).

Similar variation was evident at the bureau level. Officers working in Metro West and East Bureaus were more likely to stop in-state residents (86.9% and 88.6%, respectively). Of the drivers stopped by officers assigned to the Commercial Vehicle Enforcement Bureau, only 34.8% were Arizona residents. Of the geographic bureaus (i.e., excluding Commercial Vehicles), the Northern Bureau stopped the lowest percentage of Arizona residents (64.9%). Similarly, Metro West and East officers were the most likely to stop in-county residents (68.4 and 66.9%, respectively). Due to the nature of their assignment, Commercial Vehicle Enforcement Bureau officers were least likely to stop drivers in counties in which they are residents (15.3%).

At the district/shift levels, more dramatic differences in the percentages of non-residents stopped were reported. For example, the highest percentage of in-state drivers stopped at the district/shift level was in Metro East Shift #1 (94.2%), while the lowest percentage of in-state

drivers was stopped in District 15 (33.3%). For the Canine squads, Canine officers in the Central and South were considerably more likely to stop Arizona residents (67.2%) compared to Canine officers in the North (only 17.0%). Similar differences exist for the percentages of drivers stopped in their county of residency. For example, officers assigned to Districts 16, as well as Canine officers, stop less than 15% in-county residents. Conversely, over 60% of drivers stopped by officers assigned to Metro West and East shifts are residents of the county in which the stop occurred.

Table 3.7: Citizen Characteristics of 2008 Traffic Stops – Statewide, Division, Bureaus, & Districts/Shifts

	Ave. Citizen Age	% Male	% White	% Hispanic	% Native Am.	% Black	% Asian	% Mid. East.	% Other	% Uncoop-erative or Combative	% UDA	% AZ Resident	% County resident
DPS Statewide	38.0	70.8	61.9	25.2	4.8	4.9	1.8	1.0	0.5	0.7	1.0	74.3	41.8
Crim. Invest. Division	32.7	78.1	38.7	50.4	3.0	6.2	0.9	0.5	0.3	3.6	3.5	83.0	12.3
Highway Patrol Division	38.1	70.7	62.1	25.0	4.8	4.9	1.8	1.0	0.5	0.7	1.0	74.2	42.0
Northern Bureau	40.0	70.3	69.4	11.5	12.8	2.6	2.1	1.1	0.5	0.7	0.7	64.9	27.0
D1-Kingman	40.5	72.5	76.0	14.0	1.7	3.7	3.0	1.3	0.2	0.9	1.2	51.9	16.7
D2-Flagstaff	38.5	69.8	61.2	9.9	21.0	2.5	3.1	1.5	0.8	0.8	0.4	59.0	29.7
D3-Holbrook	40.4	68.2	58.9	11.1	25.2	2.4	1.2	0.8	0.5	0.7	0.4	62.2	27.6
D11-Globe	41.9	70.8	79.2	9.8	8.2	1.4	0.7	0.5	0.3	0.3	0.5	86.6	33.0
D12-Prescott	38.7	70.7	75.5	12.9	4.2	3.0	2.4	1.4	0.6	0.6	1.3	67.5	28.0
Metro West Bureau	36.1	69.3	61.7	26.7	0.8	7.5	1.9	0.9	0.5	1.0	1.7	86.9	68.4
Shift #1	37.0	69.0	66.6	23.7	0.7	6.2	1.6	0.8	0.4	0.7	1.6	86.6	65.1
Shift #2	36.2	69.6	59.4	28.6	0.7	7.8	1.9	0.9	0.6	1.2	1.2	85.2	67.5
Shift #3	33.4	69.2	55.3	29.6	1.1	10.2	2.3	1.1	0.4	1.4	3.0	92.0	78.3
Southern Bureau	38.3	69.0	54.9	37.0	1.5	4.1	1.4	0.7	0.4	0.4	0.6	74.9	33.7
D4-Yuma	38.3	69.2	55.9	34.8	1.0	4.7	2.3	1.1	0.3	0.2	0.3	61.6	25.0
D6-Casa Grande	38.5	69.5	57.5	33.1	2.4	4.7	13	0.6	0.5	0.5	0.8	82.4	24.5
D8-Tucson	38.5	67.8	49.6	43.9	1.1	3.3	1.1	0.6	0.3	0.5	0.8	82.1	50.5
D9-Sierra Vista	38.0	69.6	58.3	35.1	1.4	3.5	0.9	0.3	0.6	0.5	0.4	72.1	33.2
Comm. Vehicle Bureau	43.5	94.8	53.0	36.1	0.6	5.6	1.7	2.3	0.7	1.2	0.6	34.8	15.3
District 15	43.8	93.3	61.5	24.6	1.1	6.2	2.7	3.2	0.8	0.9	0.5	33.3	17.2
District 16	43.2	96.0	46.0	45.5	0.3	5.1	1.2	1.5	0.5	1.5	0.8	36.0	13.4
District 17	44.3	90.8	58.6	31.8	1.0	3.8	1.2	2.6	1.0	0.0	1.4	55.4	29.4
Metro East Bureau	34.6	69.4	64.9	22.6	1.4	7.6	1.9	1.1	0.6	0.8	1.8	88.6	66.9
Shift #1	35.8	68.3	71.2	17.7	1.3	7.0	2.1	1.2	0.4	0.6	1.7	94.2	74.1
Shift #2	34.3	66.9	69.4	18.4	1.5	7.0	2.1	1.2	0.4	0.8	1.8	93.3	73.9
Shift #3	33.0	67.7	65.8	19.2	1.7	8.7	2.6	1.2	0.6	1.2	1.2	92.9	70.4
Metro Motors	34.5	69.3	67.2	20.9	1.1	7.7	1.5	0.9	0.7	0.5	1.4	92.3	74.1
Canine	37.1	80.7	37.7	49.9	1.7	7.0	1.2	1.4	1.0	1.2	3.7	52.4	14.9
Canine North	39.0	82.7	55.2	26.4	1.6	11.1	1.9	2.6	1.2	0.5	4.6	17.0	2.9
Canine Central & South	36.3	79.8	30.4	59.8	1.8	5.3	0.9	0.9	0.9	1.5	3.4	67.2	19.8

SECTION SUMMARY

Section 3 described the characteristics of traffic stops and stopped drivers at the department, division, bureau, and district/shift levels based on data collected from January 1 – December 31, 2008. The trends in these descriptive findings are summarized below.

- At the department level, 539,344 traffic stops were conducted in 2008. The majority of these stops had the following characteristics:
  - Conducted by Highway Patrol Division officers (99%)
  - Occurred on a weekday (75.0%)
  - Occurred during the daytime (66.6%)
  - Lasted between 0-20 minutes (0-10 minutes 19.0%; 11-20 minutes 65.9%)
  - August accounted for the largest percentage of traffic stops (9.3%); overall, stop activity at the department level was fairly consistent across months, with a difference of only 2.3% between the busiest and slowest months
  - Trends were generally consistent across divisions, bureaus, and districts/shifts

- At the department level, an average of 1.05 violations was observed prior to a stop, with the overwhelming majority of stops (95.3%) being made based on a single violation.
  - The most frequent violations were: speeding (43.2%), equipment (26.3%), and other (17.3%)

- At the department level, the most frequent reasons for the stop included:
  - Moving violations (62.4%)
  - Equipment violations (23.0%)
  - Non-moving violations (12.7%)

- Department-wide, DPS officers stopped vehicles and drivers with the following characteristics:
  - Vehicles:
    - Arizona-registered vehicle (76.6%)
    - Vehicle condition: excellent (15.2%), good (54.7%), fair (25.5%), and poor (4.7%)
    - Types of vehicles: cars (47.3%), pickup trucks (22.5%), vans/station wagons (12.8%), trucks/tractor trailers (6.8%), and SUVs (6.1%)
      - As expected, Commercial Vehicle Enforcement Bureau officers stopped a much larger percentage of trucks and/or tractor trailers (86.1%) compared to officers in other bureaus
  - Drivers:
    - Average age of 38.0 years
    - 70.8% male
    - White (61.9%), Hispanic (25.2%), Native American (4.8%), Black (4.9%), Asian (1.8%), Middle Eastern (1.0%), Other/unknown (0.5%)
    - 0.7% Uncooperative/combative
    - 1.0% Undocumented alien status

        - The percentage of vehicles stopped with undocumented aliens increased from 0.6% in 2007 to 1.0 in 2008, this increase is likely due to better clarification of this variable in the TraCS data collection system. Further evidence of this is that 0.5% of stops in KOTS were of UDA drivers, while 2.7% of stops in TraCS involved drivers and/or passengers of UDA status.
    - 74.3% Arizona resident
    - 41.8% County resident

- Drivers' characteristics, particularly race and residency, varied considerably by bureau, district, and shift
    - The variation in residency of drivers stopped indicates that it is inappropriate to assume residential populations are similar to driving populations – i.e., Census data are not appropriate comparisons for benchmark analyses
    - Some variation in the racial and ethnic background of drivers stopped across bureaus, districts, and shifts is to be expected due to differences in the demographic makeup of residents and travelers, along with differences in traffic flow patterns in these locations

4. ANALYSES OF TRAFFIC STOP OUTCOMES

OVERVIEW

In this section, differences in post-stop outcomes (e.g., warnings, citations, arrests, and searches) are examined in greater detail. Specifically, Section 4 includes: 1) a descriptive overview of traffic stop outcomes across DPS organizational units, as well as by severity of outcomes, 2) a descriptive overview of the types of violations that result in specific stop outcomes, 3) differences in post-stop outcomes across types of drivers, and 4) multivariate statistical analyses predicting post-stop outcomes.

Initially, Figure 4.1 and Table 4.1 report the percent of each type of stop outcome at the department, division, bureau, and district/shift levels for 2008. Table 4.2 displays the percentages of each of the most severe stop outcomes for motorists. Tables 4.3 – 4.6 report the percentages of the types of violations resulting in particular stop outcomes. Thereafter, post-stop outcomes for officer-initiated traffic stops conducted during 2008 are examined by drivers' race/ethnicity and gender at the department, division, bureau, and district/shift levels. Figure 4.2 and Tables 4.7 and 4.8 document statistically significant differences across racial/ethnic and gender groups for warnings, citations, arrests, and searches across all organizational units. Figure 4.3 displays the racial/ethnic differences in most severe outcome received. These relationships are then further explored in multivariate statistical analyses presented in Tables 4.9 – 4.16. These multivariate analyses are designed to examine the independent effect of drivers' race/ethnicity over the likelihood of receiving warnings, repair orders, citations, arrests, searches, and seizures. A description of the multivariate analyses is provided, and the findings are explained that predict these officer actions.

TRAFFIC STOP OUTCOMES

Analyses of post-stop outcomes are an important consideration of any data collection effort because the potential exists for differential treatment based on the drivers' race, ethnicity, gender, and/or age *after* the initial stop has been made. Therefore, in addition to comparisons of traffic stop data, analyses of post-stop outcomes must be conducted. These analyses should examine racial/ethnic differences in outcomes and include warnings, citations, arrests, searches and/or seizures of contraband (Fridell, 2004). A major advantage of examining post-stop outcomes is that, unlike traffic stops where the comparison population is unknown and can only be estimated, the comparison population for post-stop outcomes is known (i.e., all stopped drivers). When examining post-stop outcomes, benchmark comparison are unnecessary if information is collected on all stopped drivers regardless of the outcomes they received. Because the comparison population (all stopped drivers) is known, more rigorous statistical and methodological techniques can be applied to understanding disparity in post-stop outcomes.

Within social science, studying a behavior, condition, or outcome invariably involves the collection of multiple pieces of information. Often several data sources are used in an effort to collect as much information as possible regarding the topic of study with the assumption that more information on the topic will provide greater understanding. Regardless of the topic of study, it is believed that any outcome is the product of numerous factors/variables coalescing to produce the result. This approach to studying post-stop outcomes is grounded

in the scientific method. In short, to understand a phenomenon, all potential, reasonable explanations need to be examined and factors that could contribute to the outcome need to be represented in the analysis.

Upon the discovery of a racial disparity in outcomes, several explanations could exist for such a scenario, including but not limited to racial bias. Just as with disparity in traffic stops, a number of other reasons beyond officer bias toward minorities could explain disparate outcomes. For each stop that occurs, there are a multitude of characteristics or variables that can be measured, such as the outcome of the stop (e.g., warning, citation, search, and/or arrest), the characteristics of the driver (e.g., race/ethnicity of the driver, age of the driver, etc.), legal considerations (e.g., the reason for the stop, seriousness of the offense, discovery of contraband, etc.), the characteristics of the officer (e.g., length of service, education level, etc.) and the characteristics of the geographic location where the stop occurred (e.g., crime rate of the neighborhood, racial composition of the neighborhood, etc.). Each of these factors has the potential to have some explanatory power in understanding the complex nature of police-citizen interactions and specifically, post-stop outcomes.

There are several methods for assessing post-stop outcomes described in *Traffic Stop Data Analysis Study Report: Final Literature Review and Review of Other Jurisdictions* (Engel et al., 2007a) including multivariate analyses, outcome tests, propensity scores, trend analyses, spatial analyses, and hierarchical linear modeling. Due to data limitations, only multivariate analyses and outcome test analyses are conducted for this report. This section describes the use of multivariate analyses. Prior to these analyses, the frequency of post-stop outcomes and bivariate analyses of outcomes by racial/ethnic groups are presented.

Post-Stop Outcomes

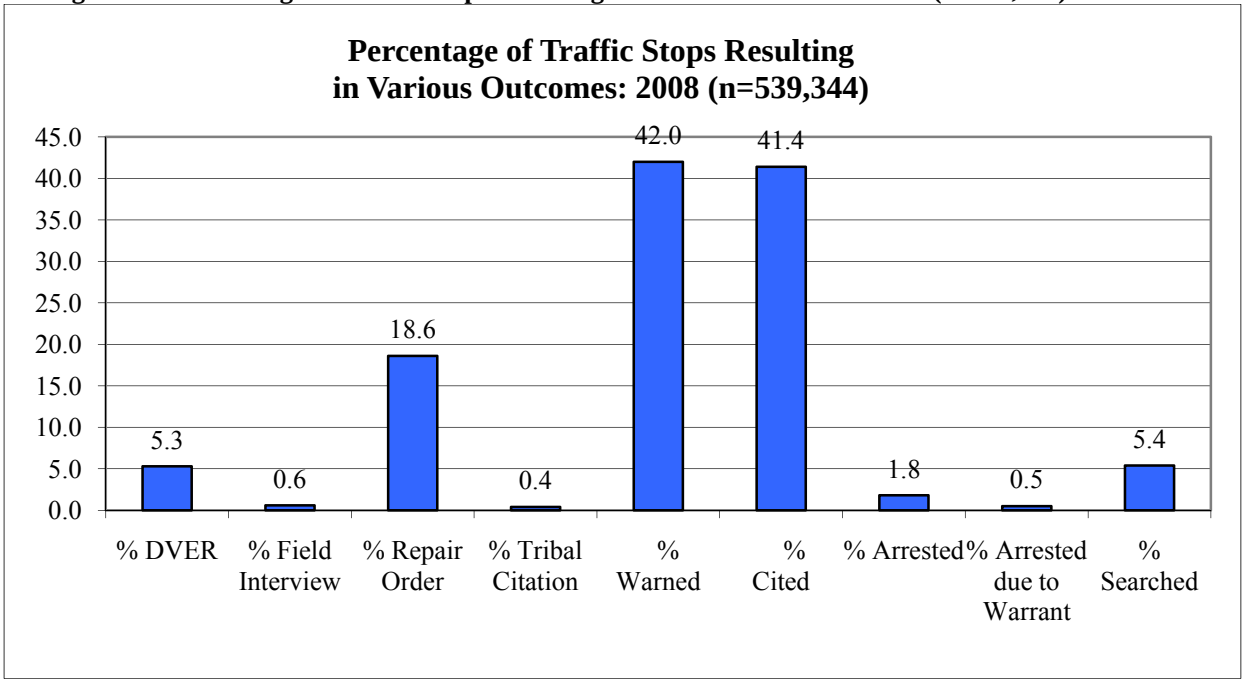
As with previous analyses, the examination of post-stop outcomes is based on 539,344 officer-initiated traffic stops conducted in 2008. As described in Phase 2 of the data audit (Section 2), however, changes were made by the UCPI research team for some stops based on additional information from the violation data file. Specifically, 3,007 traffic stops that originally indicated no citation was issued were changed to indicate that at least one citation was issued. In addition, 3,765 stops that indicated no warning was issued were altered to indicate that at least one warning was issued. It is believed that these changes accurately reflect the outcomes for these stops.[14]

Table 4.1 reports at the department, division, bureau, and district/shift level the percentage of *drivers* receiving each of the following stop outcomes: 1) DVER (Driver Vehicle Examination Report, used to inspect trucks/commercial carriers/drivers), 2) field interview, 3) repair order, 4) tribal order, 5) warning, 6) citation, 7) arrest, 8) warrant arrest, and 9) search. Note that drivers may receive multiple outcomes (e.g., a warning and citation) during a single traffic stop. Therefore, the percentages across stop outcome categories may exceed 100%.

[14] Statistical models were run both before and after changing the outcomes of these traffic stops. The results did not substantially differ.

Table 4.1 and Figure 4.1 demonstrate that at the department level, the most frequent outcome for stopped drivers in 2008 was warnings (42.0% of all drivers received at least one warning). In addition, 41.4% of drivers stopped were issued at least one citation, while 18.6% were issued repair orders. Occurring rarely were the most serious stop outcomes – specifically, arrests (1.8% of drivers stopped), warrant arrests (0.5%), and searches of the drivers, occupants, or vehicles (5.4% of the stops). A little over 5% of drivers were issued DVERs. Stops resulting in field interviews and tribal orders were statistically infrequent events across the department, and are not examined in detail within this report. Figure 4.1 displays the percentage of stops in 2008 that resulted in each of these outcomes.

Figure 4.1: Percentage of Traffic Stops Resulting in Various Outcomes: 2008 (n=539,344)



Post-Stop Outcomes by Organizational Level

Table 4.1 provides information about the outcomes of officer-initiated traffic stops at the division, bureau, and district/shift level. At the division level, officers assigned to the Criminal Investigations Division were more likely to issue warnings, and more likely to conduct arrests, warrant arrests, and searches, while officers assigned to the Highway Patrol Division were more likely to issue citations, repair orders and DVERs. At the bureau level, the Southern Bureau issued the highest percentage of repair orders (23.8%), while the Commercial Vehicle Bureau issued the fewest (7.1%). At the bureau level, the Northern Bureau issued the highest percentage of warnings (45.5%), while the Commercial Vehicle Enforcement Bureau issued the fewest (9.3%). There was also variation at the bureau level in the percentages of drivers that were issued citations. Metro East had the highest percentage with 49.3% of stops resulting in citations, while the Commercial Vehicle Enforcement Bureau had the lowest, with 22.0% of stops resulting in a driver citation. These

lower percentages of repair orders, warnings, and citations for the Commercial Vehicle Enforcement Bureau are likely due to their high percentage of stops resulting in DVERs (87.6%).

When compared to the bureau level, traffic stop outcomes at the district/shift level demonstrated greater variation, with warnings ranging from a high of 77.4% of stops by the Canine Unit to a low of only 5.4% of stops in District 16. The range of repair orders issued is narrower, with a high of 28.0% in District 2 (Flagstaff) and a low of 2.2% in District 17. Finally, the percentage of citations issued varies widely, with a range from 70.0% by Metro Motors to a low of 3.8% by the Canine Unit.

Table 4.1 also reports the percent of traffic stops that resulted in arrests and searches across organizational units. At the division level, Table 4.1 demonstrates noticeable differences in the patterns of arrests and searches between the Criminal Investigations and Highway Patrol Divisions. Most likely due to the nature of their assignment, officers assigned to the CID were at least three times as likely to arrest drivers they stopped, and almost four times as likely to search drivers they stopped compared to Highway Patrol Division officers. At the bureau level, the Metro East Bureau conducted the highest percentages of arrests and searches (2.6% and 7.5%, respectively), while the Commercial Vehicle Bureau conducted the fewest (0.4% and 2.4%, respectively).

At the district/shift level, Metro West Shift #3 arrested the highest percentage of those stopped (5.7%), while the Canine unit performed the highest percentage of searches (18.3%). District 17 conducted the fewest number of arrests and searches (0.3% and 0.7%, respectively).

Table 4.1: 2008 Traffic Stop Outcomes – Statewide, Division, Bureaus, & Districts/Shifts

	Total # of Stops	% DVER	% Field Interview	% Repair Order	% Tribal Order	% Warned	% Cited	% Arrested	% Warrant Arrest	% Searched
DPS Statewide	539,344	5.3	0.6	18.6	0.4	42.0	41.4	1.8	0.5	5.4
Criminal Investigations Division	3,750	0.3	1.9	13.7	0.0	56.5	32.6	6.7	1.5	21.1
Highway Patrol Division	533,201	5.3	0.6	18.7	0.5	41.9	41.5	1.8	0.5	5.3
Northern Bureau	163,653	1.7	0.9	19.7	1.4	45.5	41.4	1.6	0.4	3.9
D1-Kingman	30,641	1.3	0.7	17.1	0.0	41.9	47.8	1.7	0.4	4.5
D2-Flagstaff	33,180	0.8	0.9	28.0	1.2	49.0	31.5	1.9	0.5	3.9
D3-Holbrook	38,959	2.5	0.7	17.8	4.6	46.1	42.4	1.5	0.4	4.1
D11-Globe	27,980	2.0	0.9	13.9	0.4	50.3	42.1	1.3	0.2	2.2
D12-Prescott	32,752	1.8	1.1	21.0	0.0	40.5	43.8	1.8	0.3	4.6
Metro West Bureau	80,971	0.8	0.6	16.7	0.0	39.9	47.3	2.4	0.6	7.3
Shift #1	33,688	0.5	0.3	16.6	0.0	39.5	48.5	1.5	0.6	4.8
Shift #2	32,600	1.2	0.5	19.0	0.0	37.1	47.6	1.8	0.6	7.6
Shift #3	14,442	0.3	1.3	11.7	0.0	47.7	43.7	5.7	0.8	12.6
Southern Bureau	167,702	1.7	0.6	23.8	0.0	45.3	37.2	1.3	0.5	4.9
D4-Yuma	44,810	1.1	0.3	19.9	0.0	43.2	43.4	1.0	0.2	3.2
D6-Casa Grande	43,960	2.8	0.7	27.8	0.0	49.6	29.5	1.1	0.4	5.2
D8-Tucson	47,830	1.0	0.5	22.3	0.0	48.2	34.9	1.6	0.9	6.4
D9-Sierra Vista	30,620	2.1	0.9	26.2	0.0	37.9	43.0	1.5	0.3	4.5
Commercial Vehicle Bureau	24,911	87.6	0.1	7.1	0.0	9.3	22.0	0.4	0.1	2.4
District 15	9,379	82.6	0.1	7.5	0.0	12.8	32.6	0.6	0.1	3.6
District 16	13,384	91.7	0.1	6.1	0.0	5.4	16.1	0.3	0.2	1.3
District 17	585	75.9	0.0	2.2	0.2	11.8	15.4	0.3	0.0	0.7
Metro East Bureau	533,201	0.2	0.5	12.7	0.0	40.1	49.3	2.6	0.7	7.5
Shift #1	13,847	0.1	0.2	10.2	0.0	37.1	55.0	1.8	1.0	5.6
Shift #2	25,143	0.1	0.7	14.8	0.0	39.0	47.3	2.1	1.0	6.5
Shift #3	19,511	0.1	0.9	14.4	0.0	44.4	43.3	4.6	0.6	8.7
Metro Motors	26,580	0.1	0.3	7.0	0.0	25.2	70.0	1.9	0.3	4.3
Canine	10,298	0.8	0.8	22.2	0.0	77.4	3.8	2.9	0.2	18.3
Canine North	3,035	0.1	0.5	15.7	0.0	84.0	4.6	2.9	0.3	11.7
Canine Central & South	7,232	1.1	1.0	25.0	0.0	74.7	3.4	2.8	0.2	21.1

NOTE: Stops may result in multiple outcomes; therefore the percentages across categories may exceed 100%

Post Stop Outcomes by Severity

As noted previously, a single traffic stop often results in multiple outcomes. In terms of official sanctions by DPS, it is important to consider traffic stop outcomes as rank ordered by severity. In this section, the categories of outcomes described are rank ordered and the categories are mutually exclusive.[15] Each traffic stop is categorized based on the *most severe sanction* received by the motorist. The rank ordering is as follows (from least severe to most severe):

- Level 1: Warning
- Level 2: Repair Order or DVER
- Level 3: Citation or Tribal Order
- Level 4: Any Arrest

For example, if a driver received both a warning and a citation, he/she would be included only in the citation category. Table 4.2 below displays the total number of traffic stops and the percentages of each of the most severe consequences for motorists. As documented, at the department level, for 36.6% a warning was the most severe outcome received. For 21.2% of all traffic stops, a repair order or DVER was the most severe outcome received. For 40.1% of stops, a citation was the most severe outcome a motorist received. Finally, 2.1% of all stops resulted in an arrest being the most severe outcome.

At the division level, a higher percentage of drivers stopped by the CID received a warning (51.6%) as the most severe outcome, as compared to citations (27.6%), whereas for drivers stopped by HPD officers, 40.2% were issued citations compared to 36.5% who were issued warnings. In addition, during stops by CID officers, over twice the percentage of drivers were arrested (7.9%) as the most severe outcome when compared to 2.1% by Highway Patrol Division. The overall department trends are fairly consistent at the bureau and district level with the exceptions of the Commercial Vehicle Bureau and Canine District. Specifically, the majority of stops (73.1%) by the Commercial Vehicle Bureau resulted in a repair order or DVER as the most severe outcome. The majority of stops by the Canine District (71.0%) resulted in a warning being the most severe outcome issued.

[15] 2,087 contacts (0.4%) resulting only in field interviews were excluded due to their statistical infrequency. Therefore, the total number of stops analyzed for severity of outcomes is 537,257, rather than 539,344.

Table 4.2: 2008 Most Severe Traffic Stop Outcome Received – Statewide, Division, Bureaus, & Districts/Shifts

	Total # Stops	% Warning	% Repair Order or DVER	% Citation or Tribal Order	% Arrest
DPS Statewide	537,257	36.6	21.2	40.1	2.1
Criminal Investigations Division	3,716	51.6	12.9	27.6	7.9
Highway Patrol Division	531,225	36.5	21.2	40.2	2.1
Northern Bureau	162,867	39.0	18.8	40.4	1.9
D1-Kingman	30,511	35.6	16.0	46.5	1.9
D2-Flagstaff	33,014	42.4	25.3	30.2	2.1
D3-Holbrook	38,839	39.2	17.3	41.7	1.8
D11-Globe	27,841	43.1	14.2	41.2	1.4
D12-Prescott	32,522	34.8	20.5	42.7	2.0
Metro West Bureau	80,736	35.6	15.5	45.2	2.8
Shift #1	33,637	35.1	15.9	47.1	1.9
Shift #2	32,941	32.8	19.0	45.9	2.3
Shift #3	14,367	43.4	11.5	39.1	6.0
Southern Bureau	167,106	39.0	23.2	36.2	1.6
D4-Yuma	44,738	37.2	19.1	42.7	1.1
D6-Casa Grande	43,806	42.0	27.8	28.9	1.4
D8-Tucson	47,663	43.0	21.5	33.4	2.2
D9-Sierra Vista	30,417	31.1	25.1	42.1	1.7
Commercial Vehicle Bureau	24,899	4.6	73.1	21.8	0.5
District 15	9,371	6.6	60.5	32.3	0.6
District 16	13,381	2.6	81.0	16.0	0.4
District 17	585	10.3	74.0	15.4	0.3
Metro East Bureau	95,053	37.2	12.5	47.2	3.0
Shift #1	13,826	34.3	10.0	53.1	2.6
Shift #2	25,022	37.2	14.7	45.3	2.7
Shift #3	19,398	40.9	14.4	39.7	5.0
Metro Motors	26,541	23.0	6.7	68.3	2.1
Canine	10,237	71.0	22.4	3.5	3.1
Canine North	3,035	76.8	15.5	4.5	3.2
Canine Central & South	7,232	68.5	25.4	3.1	3.0

Citations & Warnings by Types of Violations

In addition to data regarding the traffic stop, additional information is also available regarding the violations associated with particular outcomes. Note, however, that this information is not the same for the KOTS and TraCS data collection systems. For the KOTS data, if a citation or warning was issued, information linking to the original stop regarding the number of citations/warnings issued and the specific violations was collected. Tables 4.3 – 4.4 report the percentages of the types of violations for which citations (Table 4.3) and warnings (Table 4.4) [16] are issued. The types of violations included are not an exhaustive list of all possible violations; rather they represent the most frequent types of violations for which citations and warnings are issued. Furthermore, multiple violations may be included on citation and warning forms. Therefore, the percentages across violation categories exceed 100%.

As shown in Table 4.3, at the department level, between January and September 2008 there are 164,422 citations for which we have corresponding violation data. The most common types of violations resulting in citations were speeding (54.4%), insurance (20.6%), and drivers' license (14.3%). These were the three most common types of violations across most organizational units. Four of the five bureaus tend to follow this same pattern. However, the three most common types of violations resulting in citations for the Commercial Vehicle Bureau were speeding (14.9%), seat belt/child restraint (14.3%), and insurance (8.2%).

As shown in Table 4.4, at the department level, between January and September 2008 there are 162,060 warnings for which we have corresponding violation data. Over half of these warning violations were for speeding (54.3%), 18.7% were for registration/license plate violations, and violations related to drivers' license and insurance violations were 2.9% and 3.0%, respectively. The trends at the bureau and district/shift levels are generally similar to the department level trends; the Commercial Vehicle Bureau, however, did issue a higher percent of seat belt/child restraint warnings than in other organizational units.

The TraCS violation data is collected directly on the data collection form as other traffic stop data fields. It is also collected for different combinations of stop outcomes. Specifically, violations are recorded for stops resulting in citations and/or arrests and stops resulting in warnings, repair orders, and/or DVERs. Furthermore, the categories of violations included do not directly match those created from the KOTS violation data. The types of violations captured in the TraCS system include: speeding, following too close, failure to signal, failure to stop, improper turn, lamps required, other moving, other non-moving, unsafe lane usage, registration, license, equipment, insurance and DUI. The final two types of violations—insurance and DUI—are not included among the list of violations for warnings, repair orders, and DVERs.

[16] The following violations were excluded from the warning table due to less than 0.1% of department-wide warnings being issued for those violations: speeding greater than 85 mph, DUI or reckless driving, and drug offenses.

Tables 4.5 – 4.6 report the percentages of the types of violations for which citations and arrests (Table 4.5) and warnings, repair orders, and DVERs (Table 4.6) were issued between October and December 2008. Again, multiple violations may be recorded within a single stop; therefore, the percentages across violation categories exceed 100%.

As shown in Table 4.5, at the department level, there were 55,767 violations that resulted in a citation and/or arrest. The most common types of violations resulting in citations or arrests were speeding (50.5%), other non-moving (17.6%), insurance (16.5%), drivers' license (12.0%), and registration (9.9%). At the division level, the results for the Highway Patrol Division largely mirror the department level trends, while officers assigned to the Criminal Investigations Division most frequently issued citations and/or arrested individuals for violations related to drivers license (34.1%), other non-moving (26.6%), speed (16.9%, and insurance (15.5%). Most of the bureaus and districts/shifts followed the department-level trends in violations resulting in citations and/or arrest. In Metro West and Metro East, violations related to insurance were somewhat higher than the department average. In addition, the Commercial Vehicle Bureau's most common violations resulting in citations and/or arrests were other non-moving (64.6%), equipment (14.6%), other moving (13.6%), and speeding (12.1%). For details regarding district/shift level violations resulting in citations and/or arrests, see Table 4.5.

As shown in Table 4.6, at the department level, there were 88,198 violations that resulted in a warning, repair order, and/or DVER. The most common types of violations resulting in a warning, repair order or DVER were equipment (37.1%), speeding (33.4%), and other non-moving (15.5%). At the division level, the results for the Highway Patrol Division largely mirror the department level trends, while officers assigned to the Criminal Investigations Division most frequently issued warnings, repair orders, or DVERS for speed (27.9%), equipment (24.0%), other non-moving (14.7%), and unsafe lane usage (10.3%). Most of the bureaus and districts/shifts followed the department-level trends in violations resulting in warning, repair order, and/or DVER. In the Commercial Vehicle Bureau, however, speeding was an infrequently recorded violation for stops resulting in a warning, repair order or DVER (4.1%). Instead, the Commercial Vehicle Bureau issued warnings, repair orders and DVERs for a substantially larger percentage of equipment violations (67.4%). For details regarding district/shift level violations resulting in warnings, repair orders, and DVERS, please refer to Table 4.6.

Table 4.3: 2008 Violations for Citations Issued – Statewide, Division, Bureaus, & Districts/Shifts

	Total # of Citation Violations	% Speeding	% Speeding over 85 mph	% Registration / License Plate	% Drivers License	% Seat belt / Child restraint	% Required Equipment	% Insurance	% DUI / Reckless driving	% Drug offense
DPS Statewide	164,422	54.4	6.9	9.8	14.3	7.2	1.5	20.6	1.7	0.4
Criminal Investigations Division	855	12.0	1.8	12.6	43.9	7.4	1.2	34.9	2.9	9.0
Highway Patrol Division	162,909	54.7	7.0	9.8	14.1	7.2	1.5	20.5	1.7	0.3
Northern Bureau	49,657	70.7	8.7	3.6	9.1	6.4	0.8	12.9	1.2	0.5
D1-Kingman	11,098	70.8	3.5	3.4	8.0	7.8	0.3	11.1	1.3	0.8
D2-Flagstaff	7,369	62.4	11.3	3.6	11.5	4.6	0.2	15.8	1.2	0.8
D3-Holbrook	12,265	71.2	9.9	2.9	8.7	8.0	0.4	9.9	1.2	0.2
D11-Globe	86,33	82.9	3.1	3.3	5.9	6.8	0.3	8.7	0.7	0.0
D12-Prescott	10,244	65.7	16.0	5.1	11.6	4.1	2.8	19.8	1.5	0.8
Metro West Bureau	28,153	40.1	4.7	18.7	21.6	4.3	2.9	30.6	2.4	0.0
Shift #1	12,261	48.8	5.8	15.4	18.1	4.7	2.3	25.1	0.8	0.0
Shift #2	11,220	34.9	3.8	20.6	22.6	4.6	3.6	32.8	1.4	0.0
Shift #3	4,597	30.0	3.7	22.8	28.6	2.3	2.6	40.4	9.4	0.0
Southern Bureau	45,590	62.5	8.8	6.1	10.9	10.2	0.7	18.3	1.4	0.5
D4-Yuma	14,621	70.8	16.4	4.1	6.7	6.7	0.2	17.2	1.1	0.6
D6-Casa Grande	8,881	62.5	2.9	4.9	14.5	11.5	0.6	14.7	1.2	0.0
D8-Tucson	11,815	40.2	2.0	12.3	15.6	14.9	1.6	27.7	2.3	0.9
D9-Sierra Vista	10,157	76.5	11.0	2.8	8.1	8.5	0.5	11.9	1.0	0.4
Commercial Vehicle Bureau	4,010	14.9	2.6	5.8	6.0	14.3	0.7	8.2	0.4	0.1
District 15	2,121	11.2	1.5	5.7	4.9	22.3	0.8	7.8	0.6	0.2
District 16	1,655	18.8	3.9	6.1	6.9	5.2	0.5	8.5	0.2	0.1
District 17	69	15.9	2.9	4.3	7.2	5.8	2.9	8.7	0.0	0.0
Metro East Bureau	35,230	28.4	4.2	16.5	20.4	5.8	2.4	27.5	2.1	0.1
Shift #1	5,765	28.1	2.2	20.3	21.5	8.4	2.1	33.7	0.8	0.0
Shift #2	8,759	28.5	3.5	21.6	25.7	3.6	2.0	34.6	1.4	0.0
Shift #3	6,259	42.3	6.4	12.2	22.0	6.3	1.5	23.2	7.8	0.0
Metro Motors	14,148	47.2	4.5	13.9	15.5	5.9	3.1	22.6	0.7	0.0
Canine	285	24.2	8.4	7.4	39.3	3.5	1.4	16.8	2.5	7.0
Canine North	98	35.7	19.4	4.1	28.6	2.0	0.0	11.2	1.0	18.4
Canine Central & South	183	16.9	2.7	9.3	45.9	4.4	2.2	19.7	3.3	1.1

Table 4.4: 2008 Violations for Warnings Issued – Statewide, Division, Bureaus, & Districts/Shifts

	Total # of Warning Violations	% Speeding	% Registration / License Plate	% Drivers License	% Seat belt / Child restraint	% Required Equipment	% Insurance
DPS Statewide	162,060	54.3	18.7	2.9	0.2	2.0	3.0
Criminal Investigations Division	1,467	34.8	15.8	3.3	0.7	5.5	5.4
Highway Patrol Division	159,960	54.5	18.8	2.9	0.2	2.0	3.0
Northern Bureau	54,278	71.0	12.3	2.5	0.2	1.4	2.3
D1-Kingman	9,265	66.4	11.5	2.5	0.2	1.8	2.1
D2-Flagstaff	11,948	73.2	11.7	2.2	0.2	1.8	1.2
D3-Holbrook	13,429	77.6	11.6	3.1	0.2	0.4	2.2
D11-Globe	9,867	79.7	11.6	2.8	0.3	1.4	4.9
D12-Prescott	9,707	55.1	15.7	1.9	0.0	1.8	1.3
Metro West Bureau	22,972	41.8	27.4	3.5	0.3	2.3	4.0
Shift #1	9,511	50.1	23.8	3.3	0.3	0.7	4.4
Shift #2	8,535	33.3	33.2	3.4	0.3	3.2	4.5
Shift #3	4,868	40.6	24.3	4.3	0.2	3.7	2.1
Southern Bureau	54,056	53.3	18.0	2.9	0.2	1.8	2.7
D4-Yuma	14,138	63.0	16.0	2.2	0.1	2.2	2.8
D6-Casa Grande	14,712	50.5	17.0	2.7	0.2	2.1	2.5
D8-Tucson	16,549	39.8	23.1	3.3	0.2	1.1	2.6
D9-Sierra Vista	8495	68.6	13.2	3.2	0.0	2.0	3.2
Commercial Vehicle Bureau	1,371	44.9	15.1	3.4	4.2	0.9	3.6
District 15	661	48.1	12.1	3.5	7.6	0.6	3.5
District 16	422	42.4	16.4	2.6	0.7	1.4	4.7
District 17	50	62.0	16.0	4.0	2.0	2.0	4.0
Metro East Bureau	27,165	35.3	26.0	2.9	0.3	3.3	3.9
Shift #1	3,772	36.1	29.7	3.6	0.1	1.8	3.5
Shift #2	6,847	29.2	34.6	1.8	0.1	3.8	5.0
Shift #3	6,313	40.8	21.2	3.3	0.2	5.7	4.2
Metro Motors	4,649	35.3	29.3	1.9	0.2	1.9	1.5
Canine	5,572	35.9	15.4	4.1	0.6	2.3	4.3
Canine North	1,713	59.1	11.3	0.9	0.0	2.4	0.2
Canine Central & South	3838	25.5	17.3	5.5	0.8	2.3	6.1

Table 4.5: 2008 Violations Resulting in Citations and/or Arrests – Statewide, Division, Bureaus, & Districts/Shifts

	# Violations resulting in Citation and/or Arrest	% Speed	% Follow too close	% Fail to signal	% Fail to stop	% Improper Turn	% Lamps Required	% Other Moving	% Other Non-Moving	% Unsafe Lane Usage	% Regist.	% Equip.	% License	% Insur.	% DUI
DPS Statewide	55,767	50.5	1.1	0.2	1.6	0.1	0.2	8.2	17.6	1.8	9.9	4.5	12.0	16.5	2.0
Crim. Invest. Division	361	16.9	1.4	1.9	3.9	0.6	0.8	10.8	26.6	2.2	8.3	8.0	34.1	15.5	3.6
Highway Patrol Division	55,187	50.7	1.1	0.2	1.6	0.1	0.2	8.2	17.5	1.8	9.9	4.5	11.8	16.4	2.0
Northern Bureau	16,749	69.0	0.7	0.2	1.4	0.1	0.1	3.3	13.6	0.9	2.8	3.9	8.8	11.1	1.7
D1-Kingman	3,214	74.4	0.3	0.2	1.5	0.1	0.1	2.1	10.1	1.1	2.6	1.2	6.9	12.6	1.5
D2-Flagstaff	2,666	62.3	0.5	0.2	2.6	0.0	0.2	3.3	15.6	0.6	3.2	2.0	10.5	11.5	2.1
D3-Holbrook	4,062	71.3	0.8	0.1	1.1	0.1	0.2	3.2	15.4	0.7	2.7	3.4	9.4	10.0	2.0
D11-Globe	2,829	80.0	0.1	0.0	1.2	0.2	0.0	2.6	13.0	1.2	2.4	1.8	6.7	5.7	1.0
D12-Prescott	3,974	58.9	1.3	0.4	1.1	0.1	0.2	5.0	13.7	0.9	2.9	9.5	10.0	14.5	1.7
Metro West Bureau	9,728	31.9	1.6	0.3	2.5	0.1	0.3	11.1	19.2	2.5	21.5	5.4	18.2	24.2	2.4
Shift #1	4,047	36.9	1.2	0.2	3.1	0.2	0.1	12.9	19.1	1.2	18.0	6.1	14.9	16.0	0.4
Shift #2	4,077	30.7	2.1	0.4	2.2	0.0	0.3	12.0	19.2	2.8	23.4	5.8	19.9	28.3	1.7
Shift #3	1,601	22.4	1.4	0.2	2.0	0.1	0.6	4.6	19.2	5.2	25.8	2.7	22.2	34.9	9.1
Southern Bureau	15,734	58.8	1.4	0.2	1.1	0.2	0.1	5.4	16.9	1.1	5.8	3.3	9.9	14.2	1.7
D4-Yuma	4,480	69.8	1.0	0.2	1.0	0.2	0.0	2.7	11.9	0.5	4.1	2.6	6.5	13.3	1.3
D6-Casa Grande	3,940	54.8	2.2	0.2	0.6	0.2	0.1	5.1	18.8	0.7	4.4	3.2	13.0	10.8	1.3
D8-Tucson	4,575	41.9	1.5	0.2	1.4	0.3	0.1	8.9	24.0	2.2	10.5	4.4	11.7	21.7	2.5
D9-Sierra Vista	2,722	74.9	0.4	0.1	1.6	0.2	0.1	4.2	10.4	0.7	2.6	2.6	7.8	7.8	1.7
Comm. Vehicle Bureau	1,417	12.1	0.7	0.4	2.5	0.1	1.1	13.6	64.6	1.6	2.3	14.6	4.6	4.4	0.1
District 15	897	11.7	1.0	0.1	1.1	0.1	0.9	15.1	64.4	1.7	2.6	9.3	4.0	5.0	0.1
District 16	499	12.6	0.2	0.8	5.0	0.0	1.6	10.2	66.1	1.2	1.8	24.8	5.2	2.4	0.0
District 17	19	15.8	0.0	0.0	5.3	5.3	0.0	36.8	31.6	5.3	5.3	0.0	15.8	31.6	0.0
Metro East Bureau	11,471	33.6	1.0	0.2	1.7	0.1	0.2	15.9	16.8	3.7	17.3	4.6	14.4	22.1	2.7
Shift #1	1,832	30.9	0.8	0.2	1.6	0.3	0.1	16.2	22.6	2.1	16.5	5.4	14.7	22.4	2.2
Shift #2	3,075	22.3	0.8	0.2	1.3	0.1	0.4	10.4	18.2	2.9	25.1	5.0	21.5	31.7	1.5
Shift #3	2,174	36.2	0.5	0.3	2.0	0.2	0.2	10.1	16.6	3.2	17.4	2.7	16.1	19.9	7.3
Metro Motors	4,239	42.4	0.8	0.3	2.0	0.0	0.2	23.1	12.9	5.0	12.3	4.7	7.9	16.8	1.5
Canine	149	14.1	22.1	0.7	1.3	0.0	0.0	6.7	28.9	6.0	3.4	9.4	20.1	4.0	2.0
Canine North	59	27.1	16.9	0.0	0.0	0.0	0.0	6.8	33.9	3.4	5.1	5.1	15.3	5.1	1.7
Canine Central & South	90	5.6	25.6	1.1	2.2	0.0	0.0	6.7	25.6	7.8	2.2	12.2	23.3	3.3	2.2

Table 4.6: 2008 Violations Resulting in Warnings, Repair Orders, and/or DVERs – Statewide, Division, Bureaus, & Districts/Shifts

	# Violations resulting in Warning, Rep. Ord. or DVER	% Speed	% Follow too close	% Fail to signal	% Fail to stop	% Improper Turn	% Lamps Required	% Other Moving	% Other Non-Moving	% Unsafe Lane Usage	% Regist.	% Equip.	% License.
DPS Statewide	88,198	33.4	3.5	1.1	1.5	0.7	2.5	6.6	15.5	5.7	5.0	37.1	0.4
Crim. Invest. Division	667	27.9	2.7	5.1	7.9	1.3	2.8	5.8	14.7	10.3	7.8	24.0	1.0
Highway Patrol Division	86,919	33.5	3.6	1.1	1.4	0.7	2.5	6.6	15.4	5.7	5.0	37.1	0.4
Northern Bureau	25,742	46.6	2.8	1.1	1.5	0.9	2.9	4.9	11.8	4.5	1.9	35.0	0.4
D1-Kingman	4,135	46.4	3.3	2.3	2.0	0.9	1.7	6.0	10.3	5.6	1.7	33.1	0.4
D2-Flagstaff	6,421	39.4	2.8	0.6	1.2	0.2	6.0	3.5	10.5	3.2	1.5	37.9	0.2
D3-Holbrook	5,581	54.0	2.7	1.0	1.3	0.2	2.8	3.3	15.7	4.2	2.0	33.6	0.5
D11-Globe	4,737	59.1	0.7	0.3	1.9	3.0	0.7	4.9	11.8	4.7	1.9	27.4	0.4
D12-Prescott	4,853	35.9	4.4	1.5	1.1	0.5	1.9	7.6	10.1	5.4	2.5	41.9	0.5
Metro West Bureau	12,308	23.2	2.5	1.0	2.2	0.3	2.5	6.3	17.5	9.5	11.6	34.5	0.3
Shift #1	5,191	26.3	1.7	0.7	3.3	0.4	0.8	5.8	18.1	4.3	9.8	39.7	0.4
Shift #2	4,814	18.9	3.3	1.6	1.6	0.2	3.2	7.0	18.6	8.2	12.6	35.1	0.2
Shift #3	2,300	25.3	2.4	0.7	0.8	0.3	5.2	6.1	13.5	23.9	13.5	21.6	0.4
Southern Bureau	29,256	36.6	4.4	1.2	1.0	0.8	1.6	7.5	11.3	4.7	3.5	37.6	0.3
D4-Yuma	6,419	48.6	1.8	1.1	1.4	1.1	2.2	8.7	8.8	2.9	2.9	31.2	0.2
D6-Casa Grande	9,900	33.4	8.0	1.2	0.5	0.1	0.9	4.7	11.8	4.2	2.9	42.6	0.2
D8-Tucson	8,482	30.6	3.3	1.7	1.0	0.7	1.2	11.4	13.5	6.8	5.8	33.5	0.3
D9-Sierra Vista	4,316	38.9	2.3	0.7	1.6	2.2	3.2	3.8	10.0	4.2	1.5	43.0	0.6
Comm. Vehicle Bureau	6,508	4.1	0.5	0.3	0.8	0.1	5.7	4.3	49.0	1.3	0.4	67.4	0.5
District 15	2,900	4.6	0.7	0.2	0.5	0.0	8.7	7.4	64.6	1.4	0.5	54.0	0.6
District 16	3,335	3.7	0.2	0.4	1.1	0.1	3.4	1.7	36.3	1.3	0.3	79.3	0.4
District 17	165	4.8	1.2	0.6	0.0	1.2	2.4	3.6	47.3	1.8	0.6	53.3	2.4
Metro East Bureau	13,048	25.0	5.8	1.3	2.1	0.9	2.3	9.8	13.3	8.8	10.5	27.5	0.4
Shift #1	1,511	25.2	1.8	0.7	2.3	0.4	1.3	15.2	14.9	9.1	13.0	25.1	0.4
Shift #2	3,664	19.7	1.4	0.8	2.0	0.7	3.2	8.5	14.2	7.9	16.9	29.8	0.2
Shift #3	2,776	27.4	1.4	1.4	2.5	1.5	3.7	12.0	10.4	12.4	8.5	27.6	0.3
Metro Motors	2,418	27.6	1.2	1.9	3.1	1.7	2.0	11.4	12.8	8.3	10.3	25.0	0.2
Canine	2,679	27.1	22.7	1.7	0.6	0.1	0.3	4.7	14.6	6.3	2.4	27.9	0.7
Canine North	782	46.9	28.0	0.9	0.4	0.1	0.4	2.7	11.0	4.3	2.4	16.1	0.1
Canine Central & South	1,897	18.9	20.5	2.0	0.7	0.2	0.3	5.5	16.1	7.1	2.3	32.7	0.9

Differences in Stop Outcomes across Types of Drivers

Analysis of racial/ethnic differences in post-stop outcomes is an important component of any traffic stop data analysis study because the potential for racial bias in police decision-making is not limited to the initial stopping decision. Differential treatment based on the drivers' race/ethnicity *after* the initial stop must also be examined. The remainder of this subsection examines racial/ethnic differences in warnings, repair orders, citations, arrests, and searches (Figure 4.2, and Tables 4.7 – 4.8), along with the severity of outcomes (Figure 4.3). For racial/ethnic comparisons across organizational units, drivers' race is collapsed into four categories – White, Hispanic, Native American, and Black. Traffic stops where the driver's race was Asian, Middle Eastern, other or unknown, or where the race/ethnicity of the driver was missing on the data collection form (3.3% of the cases) are excluded from these analyses because their total numbers were too small to make racial/ethnic comparisons across organizational units.

Racial/Ethnic Differences in Warnings, Repair Orders, Citations, Arrests & Searches

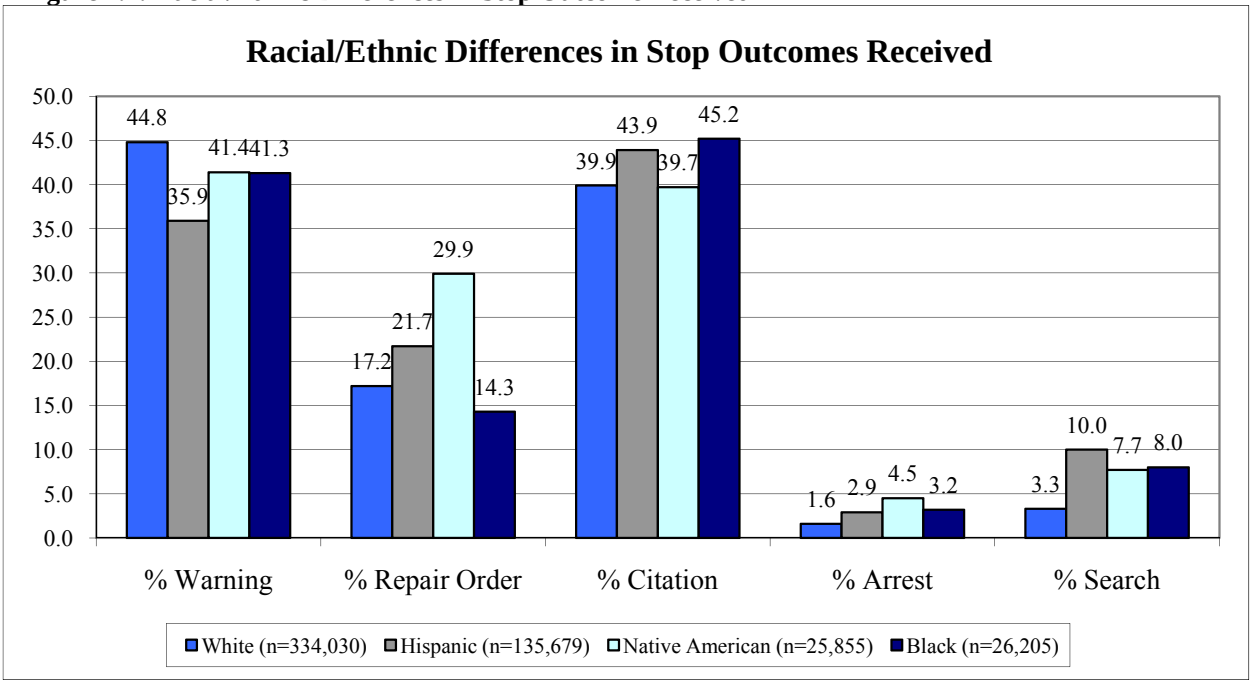
It is important to consider racial/ethnic differences in *any* outcomes received. For the comparisons reported below, the outcomes are not mutually exclusive. Drivers could receive multiple outcomes, and therefore when summed, the percentage of outcomes exceed one hundred percent. Tables 4.7 – 4.8 report the following information by organizational unit: the total number of stops, the percentage of drivers issued warnings, repair orders, and citations, as the well as the percentage of drivers arrested and searched by race/ethnicity and gender categories.[17]

Table 4.7 illustrates the variation in post-stop outcomes (i.e., warnings, repair orders, citations, arrests, and searches) by drivers' race and gender for the department, division, and bureau levels in 2008. At the department level (also graphically displayed in Figure 4.2), Hispanic drivers were the least likely to be issued warnings (35.9% of stops) compared to White (44.8%), Black (41.3%), and Native American (41.4%) drivers. Native Americans were the most likely to be issued repair orders (29.9% of stops) compared to Black (14.3%), White (17.2%), and Hispanic (21.7%) drivers. Blacks received the highest percentage of citations (45.2%), followed closely by 43.9% of Hispanics, while Native Americans (39.7%) and Whites (39.9%) were significantly less likely to be cited than Hispanics and Blacks. Hispanic, Native American and Black drivers were all significantly more likely than White

[17] In Tables 4.7 – 4.8, the asterisks indicate statistically significant differences in the outcomes received by racial and gender groups based on bivariate chi-square associations. Chi-square statistics are based on the differences between groups and the sample size. Because this statistical technique is sensitive to sample size, smaller differences between groups can result in statistically significant differences when the sample size is large. Therefore, depending on the sample size used in the chi-square test, statistical significance is reported at the 0.05, 0.01, or 0.001 level. For example, if the 0.05 level is used, a finding is statistically significant if we are 95% confident that the difference between groups is not due to chance; in contrast, a 0.001 level is interpreted as 99.9% confident that the result is not due to chance. Also note that these analyses are based on only the relationship between two variables (e.g., drivers' race and citations). For each chi-square test, the comparison is between one outcome (e.g., citation) and one explanatory variable (e.g., drivers' race). These analyses do not take into account any other factors that might influence the outcome of the stop.

drivers to be arrested and searched. Specifically, Native Americans were the most likely to be arrested (4.5%), followed by Blacks (3.2%), Hispanics (2.9%), and Whites (1.6%). Hispanics were the most likely to be searched (10.0% of stops), followed by Blacks (8.0%), Native Americans (7.7%), and Whites (3.3%).[18]

Figure 4.2: Racial/Ethnic Differences in Stop Outcome Received



Division and bureau level differences in stop outcomes by racial/ethnic characteristics are also displayed in Table 4.7. At the division level, differences are evident between the Criminal Investigation Division and the Highway Patrol Division. Specifically, of stops conducted by CID officers, Native Americans, not Hispanics, were the least likely to be warned by CID officers. Whites, however, were still the most likely to be issued warnings by both HPD and CID officers. Whites were the least likely to be issued repair orders by CID officers, while Hispanics were the most likely. Blacks were the least likely to be issued repair orders by HPD officers, but Native Americans, not Hispanics, were the most likely to receive repair orders from HPD officers. Citations by HPD officers exhibit the same

[18] These racial/ethnic differences in stop outcomes are statistically significant based on a 0.001 level chi-square analysis. That is, the differences noted are likely due to chance no more than 0.1% of the time. Based solely on the statistical significance, these results suggest that a difference exists in the likelihood of receiving various stop outcomes depending on the race of the driver. It is important to recognize, however, that chi-square analyses do not consider other variables when determining statistical significance. The chi-square test does not measure other factors potentially associated with the likelihood of receiving particular stop outcomes; rather, it only considers the race/ethnicity of the driver. Consequently, the results of these analyses should be interpreted with caution and the multivariate models (reported later in this section) should be examined prior to reaching conclusions regarding the relationship between race of the driver and post-stop outcomes. This caution also applies to the additional findings at lower organizational units reviewed below.

racial/ethnic differences as at the department level. For CID officers, however, Native Americans and Hispanics were the most likely to be issued citations. Finally, both CID and Highway Patrol officers exhibited the same trends as the department for arrests and searches of different racial/ethnic groups.

At the bureau level, Hispanics were the least likely to be warned in the Northern, and Commercial Vehicle Bureaus, and Native Americans were least likely to be warned in the remaining three bureaus. In addition, Native Americans were the most likely to be issued citations in four of the five bureaus. Other racial/ethnic variation in warnings, repair orders, and citations at the bureau level is shown in Table 4.7. In all bureaus – except the Commercial Vehicle Bureau where the overrepresentation is limited to Blacks – the trends in racial/ethnic disparities for arrests and searches are similar to the department-wide pattern. That is, Hispanic, Native American and Black drivers were significantly more likely than White drivers to be arrested and searched. For the Commercial Vehicle Bureau, Hispanics and Whites were the least likely to be arrested and Whites were the least likely to be searched compared to the other racial/ethnic categories. Native Americans and Blacks, however, still had higher arrest rates, and Blacks had higher search rates than Whites.

Gender differences for 2008 stop outcomes are also displayed in Table 4.7. At the department level, male drivers were more likely to be issued repair orders (19.1% of stops), arrested (2.4%), and searched (6.2%) compared to female drivers (17.6% repair orders, 1.4% arrested, and 3.4% searched). There were no differences in the percentages of drivers cited based on gender. In contrast, female drivers were significantly more likely to be issued warnings (46.1%) compared to male drivers (40.4%). At the division level, the patterns in gender differences for CID and HPD were very similar to the overall department.

At the bureau level, the patterns in gender differences are quite similar to the overall department trend. That is, in each of the bureaus, male drivers were more likely to be issued repair orders, cited, arrested, and searched compared to female drivers; female drivers were more likely than males to be issued warnings. The exception to this pattern was the Commercial Vehicle Enforcement, who issued citations to more females (26.0%) than males (21.2%). In addition, the Commercial Vehicle Enforcement bureau did not exhibit any statistical significance between males and females for repair orders, or arrests.

Table 4.7: 2008 Stop Outcomes by Race and Gender for Department, Division, and Bureaus (p. 1 of 2)

	Drivers	Total # of stops	% drivers warned	% drivers issued repair order	% drivers cited	% drivers arrested	% drivers searched
DPS Dept	White	334,030	44.8***	17.2***	39.9***	1.6***	3.3***
	Hispanic	135,679	35.9	21.7	43.9	2.9	10.0
	Native American	25,885	41.4	29.9	39.7	4.5	7.7
	Black	26,205	41.3	14.3	45.2	3.2	8.0
	Male	381,663	40.4***	19.1***	41.4	2.4***	6.2***
	Female	157,640	46.1	17.6	41.5	1.4	3.4
Criminal Investigation Division	White	1,454	64.6***	13.0	24.9***	5.4***	14.0***
	Hispanic	1,891	51.5	14.2	37.4	9.2	25.4
	Native American	113	46.9	15.9	46.9	15.9	25.7
	Black	232	50.4	13.9	34.5	10.2	29.3
	Male	2928	55.7	13.3	33.3	8.9***	23.3***
	Female	823	59.4	15.4	29.9	4.1	13.1
Highway Patrol Division	White	331,112	44.0***	17.3***	40.0***	1.5***	3.2***
	Hispanic	133,214	35.0	21.8	44.0	2.8	9.8
	Native American	36,609	40.4	29.8	39.8	4.5	7.6
	Black	25,866	40.4	14.3	45.3	3.2	7.8
	Male	376,983	39.5***	19.1***	41.5	2.3***	6.1***
	Female	156,180	45.4	17.6	41.6	1.4	3.4
Northern Bureau	White	113,525	47.6***	17.9***	40.0***	1.4***	2.6***
	Hispanic	18,871	37.2	21.3	49.8	2.6	8.7
	Native American	21,007	42.5	31.6	38.4	4.1	6.8
	Black	4,271	48.4	15.0	42.6	1.7	6.0
	Male	115,011	44.5***	19.9*	42.0***	2.2***	4.6***
	Female	48,642	47.9	19.4	40.0	1.1	2.3

NOTE: Asterisks indicate statistically significant chi-square associations across 4 racial groups and 2 gender groups. *** $p \leq .001$ ** $p \leq .01$ * $p \leq .05$

Table 4.7: 2008 Stop Outcomes by Race and Gender for Department, Division, and Bureaus (p. 2 of 2)

	Drivers	Total # of stops	% drivers warned	% drivers issued repair order	% drivers cited	% drivers arrested	% drivers searched
Metro West Bureau	White	49,957	43.7***	16.8***	43.3***	1.9***	4.2***
	Hispanic	21,646	31.4	17.9	55.2	4.3	14.1
	Native American	634	30.4	17.2	57.1	6.6	11.7
	Black	6,100	40.1	13.6	49.3	4.2	10.0
	Male	56,125	38.5***	17.5***	48.0***	3.2***	8.5***
	Female	24,845	43.2	14.8	45.6	1.8	4.7
Southern Bureau	White	92,145	48.6***	21.7***	35.0***	1.2***	2.9***
	Hispanic	62,054	40.8	28.0	39.5	2.0	7.5
	Native American	2,448	39.9	28.6	39.9	5.4	10.5
	Black	6,867	44.8	18.7	41.4	1.9	6.2
	Male	115,645	44.1***	25.1***	27.1	1.8***	5.6***
	Female	52,067	48.0	21.1	37.4	1.1	3.2
Commercial Vehicle Enforcement Bureau	White	13,202	11.3***	6.9***	22.3***	0.4***	2.0***
	Hispanic	8,998	6.1	6.6	19.2	0.4	2.5
	Native American	155	12.3	12.3	37.4	1.3	2.6
	Black	1,393	10.1	9.8	27.9	1.7	5.4
	Male	23,617	8.0***	7.1	21.2***	0.5	2.5***
	Female	1,296	31.9	6.9	36.0	0.5	1.1
Metro East Bureau	White	61,929	41.4***	12.1***	48.5***	2.2***	4.4***
	Hispanic	21,536	36.0	15.0	51.2	4.6	15.9
	Native American	1,364	35.9	12.2	53.5	8.7	14.4
	Black	7,208	40.5	11.2	50.3	4.5	9.1
	Male	66,224	39.1***	13.4***	49.6**	3.5***	8.8***
	Female	29,187	42.4	11.1	48.5	2.0	4.5

NOTE: Asterisks indicate statistically significant chi-square associations across 4 racial groups and 2 gender groups. *** $p \leq .001$ ** $p \leq .01$ * $p \leq .05$

Table 4.8 displays the differences in stop outcomes by driver race and gender at the district/shift level for 2008. Statistically significant differences in warnings between racial/ethnic groups were evident for all twenty districts/shifts. For ten of the twenty districts/shifts, Hispanics were the least likely racial/ethnic group to be issued warnings, while in the other ten, Native American drivers received the lowest percentage of warnings.

Nineteen of the twenty districts/shifts exhibited statistically significant differences in repair orders between racial/ethnic groups. Specifically, Black drivers were the least likely to be issued repair orders in the majority of districts (n=11 districts). Native Americans and Hispanics were the most likely to be issued repair orders in seven districts each.

For citations, eighteen districts/shifts reported statistically significant differences between racial/ethnic groups. In eleven of these districts/shifts, Hispanic drivers had the highest percentage of citations while Native Americans had the highest percentages of citations in five districts/shifts. Whites were the least likely to be cited in 13 of the 18 districts/shifts with statistically significant racial/ethnic differences.

Nineteen of twenty districts/shifts had statistically significant differences between racial/ethnic groups for percentages of drivers arrested. In fourteen of those districts, Native Americans were the most likely to be arrested, followed either by Hispanics or Blacks, while in every district except Districts 16 and 17, Whites were the least likely racial/ethnic group to be arrested. Nineteen of twenty districts/shifts had statistically significant differences between racial/ethnic groups for percentages of drivers searched. In all but one of the nineteen districts/shifts (Districts 16), Whites were the least likely racial/ethnic group to be searched, while Native Americans (n=9 districts) and Hispanics (n=7 districts) were the most likely to be searched.

Table 4.8 also reports differences in stop outcomes by gender at the district/shift level. Of the twenty districts/shifts, eighteen reported statistically significant differences in the likelihood of male and female motorists receiving warnings. Specifically, female drivers were significantly more likely than male drivers to receive warnings. In sixteen of the twenty districts/shifts, statistically significant differences in the likelihood of male and female drivers receiving repair orders were evident. In all but four of these districts, male drivers were significantly more likely than female drivers to be issued repair orders. Seventeen of the twenty districts/shifts reported statistically significant gender differences in the likelihood of receiving a citation. In all but six of these districts (Districts 4, 9, 12, 15, 16, and 17), male drivers were significantly more likely than female drivers to be issued citations. For arrests, seventeen of the twenty districts/shifts had statistically significant gender differences, and male drivers were more likely than female drivers to be arrested. Additionally, in eighteen of the twenty districts/shifts, it was also significantly more likely for a search to be conducted in stops of male drivers when compared to stops of female drivers.

Table 4.8: 2008 Stop Outcomes by Race and Gender for Districts/Shifts (p. 1 of 5)

	Drivers	Total # of stops	% drivers warned	% drivers issued repair order	% drivers Cited	% drivers arrested	% drivers searched
District 1 Kingman	White	23,292	43.4***	17.4***	45.9***	1.8***	3.7***
	Hispanic	4,299	35.0	19.7	53.0	2.1	8.5
	Native American	536	39.2	19.6	51.5	5.2	8.6
	Black	1,138	44.6	11.2	51.2	1.9	6.7
	Male	22,206	40.6***	17.6***	48.4***	2.2***	5.3***
	Female	8,433	45.1	15.5	46.2	1.2	2.6
District 2 Flagstaff	White	20,307	52.6***	25.3***	28.6***	1.2***	2.2***
	Hispanic	3,282	43.7	27.7	40.6	2.7	8.2
	Native American	6,962	41.0	42.5	30.6	5.0	7.4
	Black	829	59.6	17.6	31.4	2.3	5.2
	Male	23,163	48.5**	27.3***	32.5***	2.5***	4.5***
	Female	10,018	50.0	29.7	29.3	1.2	2.4
District 3 Holbrook	White	22,947	48.8***	14.3***	41.1***	1.1***	2.2***
	Hispanic	4,306	37.0	17.0	52.5	1.7	7.3
	Native American	9,816	44.8	27.5	40.2	3.7	6.9
	Black	924	44.9	13.7	45.5	1.8	8.9
	Male	26,563	44.7***	17.5*	43.5***	2.2***	4.8***
	Female	12,403	49.1	18.5	40.1	1.1	2.5
District 11 Globe	White	22,154	51.8***	12.8***	41.0***	1.1***	1.7***
	Hispanic	2,747	43.6	18.7	46.7	2.9	4.7
	Native American	2,294	45.4	20.0	45.1	2.0	3.3
	Black	391	49.9	13.0	40.4	1.8	3.1
	Male	19,814	49.3***	14.1	42.6**	1.6***	2.5***
	Female	8,163	52.7	13.3	40.8	0.9	2.2

NOTE: Asterisks indicate statistically significant chi-square associations across 4 racial groups and 2 gender groups. *** $p \leq .001$ ** $p \leq .01$ * $p \leq .05$

Table 4.8: 2008 Stop Outcomes by Race and Gender for Districts/Shifts (p. 2 of 5)

	Drivers	Total # of stops	% drivers warned	% drivers issued repair order	% drivers cited	% drivers arrested	% drivers searched
District 12 Prescott	White	24,717	42.6***	20.5***	41.9***	1.6***	3.1***
	Hispanic	4,224	30.3	24.2	52.7	3.9	13.2
	Native American	1,388	30.8	30.5	48.1	4.7	8.0
	Black	987	46.0	19.1	40.5	0.8	4.5
	Male	23,165	39.8***	22.2***	43.4*	2.4***	5.5***
	Female	9,584	42.2	18.2	44.9	1.0	2.5
Metro West Shift #1	White	22,447	42.5***	16.6***	45.3***	1.3***	2.6***
	Hispanic	7,978	31.3	18.1	56.0	3.3	10.6
	Native American	251	29.9	15.5	60.6	3.2	6.4
	Black	2,079	40.0	12.7	51.3	3.1	6.5
	Male	23,234	38.1***	17.7***	49.1***	2.3***	5.7***
	Female	10,451	42.6	14.0	47.2	1.0	2.7
Metro West Shift #2	White	19,375	41.5***	18.6***	43.5***	1.6***	4.4***
	Hispanic	9,323	28.1	21.4	54.9	3.2	14.1
	Native American	228	27.2	22.8	53.5	7.5	13.6
	Black	2,529	36.6	15.7	50.1	3.8	10.2
	Male	22,707	35.5***	19.9***	48.3***	2.7***	8.8***
	Female	9,895	40.5	16.9	46.1	1.4	4.9
Metro West Shift #3	White	7,991	52.7***	12.7***	37.4***	4.6***	8.2***
	Hispanic	4,275	39.1	9.9	54.5	8.5	20.7
	Native American	153	35.9	11.8	57.5	11.1	17.6
	Black	1,477	46.4	11.3	45.6	6.8	14.6
	Male	9,988	46.5***	11.5	45.1***	6.8***	14.3***
	Female	4,455	50.6	12.0	40.7	4.2	8.8

NOTE: Asterisks indicate statistically significant chi-square associations across 4 racial groups and 2 gender groups. *** $p \leq .001$ ** $p \leq .01$ * $p \leq .05$

Table 4.8: 2008 Stop Outcomes by Race and Gender for Districts/Shifts (p. 3 of 5)

	Drivers	Total # of stops	% drivers warned	% drivers issued repair order	% drivers cited	% drivers arrested	% drivers searched
District 4 Yuma	White	25,046	46.3***	17.8***	41.4***	1.0***	2.3***
	Hispanic	15,584	39.6	24.7	44.4	1.2	4.3
	Native American	434	38.9	27.7	43.8	5.4	9.7
	Black	2,940	38.4	14.9	51.9	1.5	4.7
	Male	30,992	42.9	21.4***	42.5***	1.2***	3.6***
	Female	13,818	43.8	16.4	45.5	0.8	2.1
District 6 Casa Grande	White	25,266	51.3***	25.4***	29.4**	1.0***	2.7***
	Hispanic	14,541	46.4	32.8	29.5	1.8	9.1
	Native American	1,048	44.0	29.8	34.4	3.9	6.9
	Black	2,065	52.2	25.3	28.0	2.0	6.8
	Male	30,562	48.1***	29.1***	29.4	1.5***	6.1***
	Female	13,402	53.0	24.8	29.6	1.0	3.1
District 8 Tucson	White	23,719	54.4***	19.9***	29.9***	1.5***	3.6***
	Hispanic	21,021	51.1	25.7	40.0	2.8	9.2
	Native American	530	38.1	27.2	42.6	9.1	19.2
	Black	1,601	50.9	15.4	37.7	2.6	8.7
	Male	32,449	46.4***	23.4***	35.6***	2.5***	7.4***
	Female	15,386	52.1	19.9	33.5	1.5	4.4
District 9 Sierra Vista	White	17,844	40.5***	24.2***	40.9***	1.4***	3.2***
	Hispanic	10,737	34.5	30.7	44.8	2.1	6.8
	Native American	432	33.3	28.0	46.3	4.9	9.3
	Black	1,084	34.1	17.9	52.0	1.7	4.3
	Male	21,300	36.8***	26.8***	42.8	1.9***	5.1***
	Female	9,319	40.3	24.6	43.3	1.2	3.1

NOTE: Asterisks indicate statistically significant chi-square associations across 4 racial groups and 2 gender groups. *** $p \leq .001$ ** $p \leq .01$ * $p \leq .05$

Table 4.8: 2008 Stop Outcomes by Race and Gender for Districts/Shifts (p. 4 of 5)

	Drivers	Total # of stops	% drivers warned	% drivers issued repair order	% drivers cited	% drivers arrested	% drivers searched
District 15	White	5,767	14.3***	7.0***	32.3	0.7	2.9***
	Hispanic	2,309	9.3	7.7	31.3	0.5	4.6
	Native American	104	12.5	16.3	38.5	1.9	3.8
	Black	580	12.6	9.3	33.8	0.7	5.3
	Male	8,752	11.3***	7.7*	32.2**	0.7	3.8***
	Female	629	33.2	5.1	38.3	0.3	1.0
District 16	White	6,155	6.5***	6.1***	15.2***	0.2***	0.9***
	Hispanic	6,090	4.2	5.6	15.2	0.4	1.4
	Native American	34	8.8	2.9	41.2	0.0	0.0
	Black	681	5.3	9.5	25.1	1.9	3.5
	Male	12,844	4.4***	6.0*	15.4***	0.4	1.3
	Female	540	28.1	8.1	33.7	0.9	1.5
District 17	White	343	14.0	1.7	12.8	0.3**	0.6
	Hispanic	186	9.7	3.2	18.3	0.0	0.5
	Native American	6	0.0	0.0	16.7	0.0	0.0
	Black	22	4.5	4.5	31.8	4.5	4.5
	Male	531	9.4***	1.7**	11.9***	0.4	0.8
	Female	54	35.2	7.4	50.0	0.0	0.0
Metro East Shift #1	White	9,858	40.3***	10.2*	51.7***	1.9***	3.5***
	Hispanic	2,445	25.1	11.2	66.5	4.9	13.6
	Native American	181	29.3	13.8	58.6	8.8	13.3
	Black	971	34.0	7.9	60.0	3.9	6.9
	Male	9,463	35.0***	11.3***	56.0***	3.0***	6.6***
	Female	4,387	41.5	7.7	52.9	1.7	3.3
Metro East Shift #2	White	17,460	41.9***	15.3*	44.1***	2.1***	4.2***
	Hispanic	4,632	27.0	14.0	59.5	4.0	14.6
	Native American	367	36.2	11.2	53.4	7.9	11.4
	Black	1,766	38.6	14.0	49.1	4.5	8.3
	Male	16,813	36.6***	15.6***	49.0***	3.3***	7.9***
	Female	8,333	43.8	13.3	44.0	1.6	3.6

NOTE: Asterisks indicate statistically significant chi-square associations across 4 racial groups and 2 gender groups. *** $p \leq .001$ ** $p \leq .01$ * $p \leq .05$

Table 4.8: 2008 Stop Outcomes by Race and Gender for Districts/Shifts (p. 5 of 5)

	Drivers	Total # of stops	% drivers warned	% drivers issued repair order	% drivers cited	% drivers arrested	% drivers searched
Metro East Shift #3	White	12,846	47.8***	15.2***	39.6***	3.9***	6.4***
	Hispanic	3,753	32.3	12.7	56.4	7.5	15.1
	Native American	340	33.5	10.6	55.6	14.2	22.4
	Black	1,705	45.2	13.8	42.0	6.1	10.9
	Male	13,216	43.2***	14.3	44.5***	5.5***	9.7***
	Female	6,295	46.9	14.6	40.9	3.8	6.7
Metro Motors	White	17,860	28.2***	6.7***	67.3***	1.4***	2.4***
	Hispanic	5,561	15.4	8.6	78.1	3.8	10.0
	Native American	297	21.5	6.4	76.4	5.7	11.1
	Black	2,040	26.7	5.5	69.7	3.3	5.8
	Male	18,408	23.5***	7.6***	71.2***	2.5***	5.2***
	Female	8,169	29.0	5.6	67.4	1.2	2.3
All Canine	White	3,887	81.6***	17.5***	3.8*	2.1***	9.7***
	Hispanic	5,140	74.1	26.1	3.5	3.6	25.2
	Native American	179	70.4	25.1	6.7	4.5	12.3
	Black	722	82.1	18.4	5.3	5.0	19.1
	Male	8,306	77.2	22.5	3.7	3.4***	19.7***
	Female	1,992	78.4	20.9	4.1	1.8	12.6
Canine North	White	1,675	87.3***	11.9***	3.9***	2.9**	8.3***
	Hispanic	801	80.5	20.7	4.6	2.7	17.0
	Native American	50	78.0	10.0	14.0	8.0	8.0
	Black	338	82.2	17.2	7.1	6.2	20.4
	Male	2,509	82.9***	17.4***	4.4	3.1	12.4**
	Female	526	89.4	7.4	5.7	3.2	8.4
Canine Central & South	White	2,200	77.3***	21.8***	3.5	1.5***	10.9***
	Hispanic	4,322	72.9	27.2	3.3	3.8	26.7
	Native American	129	67.4	31.0	3.9	3.1	14.0
	Black	382	81.9	19.4	3.7	3.9	18.1
	Male	5,772	74.8	24.8	3.4	3.4***	22.8***
	Female	1,460	74.4	25.8	3.6	1.3	14.1

NOTE: Asterisks indicate statistically significant chi-square associations across 4 racial groups and 2 gender groups. *** $p \leq .001$ ** $p \leq .01$ * $p \leq .05$

Tables 4.7 – 4.8 illustrate the wide variation in outcomes across racial/ethnic and gender groups at the department, division, bureau, and district/shift levels for 2008. It is important to reiterate, however, that the relationships reported in the previous tables are bivariate in nature and thus do not statistically control for other relevant legal and extralegal factors that might influence officer decision-making. *Therefore, the information provided in Tables 4.7 – 4.8 cannot determine whether or not differences in outcomes across racial/ethnic and gender groups are due to officer bias.*

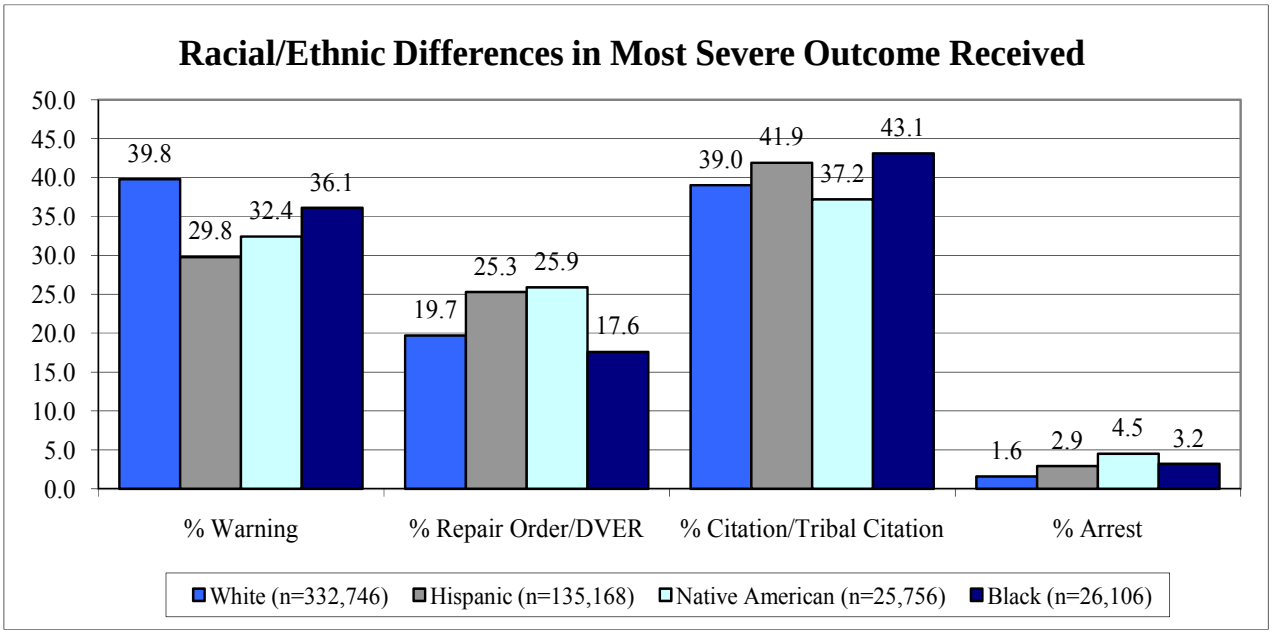
Racial/Ethnic Differences in Most Severe Outcome Received

As noted previously, a single traffic stop often results in multiple outcomes. In terms of official sanctions by DPS, it is important to consider traffic stop outcomes as rank ordered by severity. For the analysis reported in Figure 4.3, the categories of outcomes described are rank ordered and mutually exclusive. The rank ordering is as follows (from least severe to most severe):

- Level 1: Warning
- Level 2: Repair Order or DVER
- Level 3: Citation or Tribal Order
- Level 4: Any Arrest

Figure 4.3 below displays the total number of traffic stops for each racial/ethnic group and their percentages of the most severe consequences for traffic stops. As shown, racial/ethnic differences (all of which are statistically significant) are evident across the department for the most severe outcome received. Specifically, Hispanics were significantly less likely than other racial/ethnic groups to have a warning be the most severe outcome received. Hispanics and Native Americans were significantly more likely than Whites and Blacks to have repair orders or DVERs as the most severe outcome received. Hispanics and Blacks were significantly more likely than Whites and Native Americans to have a citation as the most severe outcome received. Finally, for the most severe outcome—arrest—Hispanics, Native Americans, and Blacks were all significantly more likely than Whites to have arrest as the most serious outcome received.

Figure 4.3: Racial/Ethnic Differences in Most Severe Outcome Received



It is plausible that racial/ethnic and gender differences in post-stop outcomes exist due to legal and extralegal reasons other than race, ethnicity, and gender. To explore these possibilities, more advanced statistical analyses that control for other legally relevant variables are presented below. The information reported in Tables 4.1 - 4.8 and Figures 4.1 – 4.3 is included in this report solely to provide details to DPS administrators regarding differences in post-stop outcomes at the department, division, bureau, and district/shift levels. Although this information will allow DPS administrators to identify potential problems and target specific districts/shifts for policy interventions, it should not be the sole information used to examine whether or not discriminatory practices exist.

MULTIVARIATE ANALYSES

A multivariate statistical model is one that takes many different factors into account when attempting to explain a particular behavior. Unlike a bivariate model, which simply assesses the relationship between two variables, a multivariate model examines many variables simultaneously, and therefore provides a more thorough and accurate interpretation of the data. In other words, the individual impact of one variable on the outcome can be measured while considering all of the other variables simultaneously.

When a multivariate analysis includes other likely factors that influence stop outcomes and disparity remains, then we can have more confidence in the possibility that racial bias is at work (Fridell, 2004). Importantly, however, it still cannot be said with certainty that racial disparity in stop outcomes reflects officer bias. Although multivariate analysis is a stronger analytical strategy than traffic stop comparisons to benchmark data or bivariate analysis, it is not without its limitations. The key weakness of multivariate statistical analysis is that it can only statistically control for those variables that are measured. This is called "specification error" or the error in a statistical model due to the inability to specify all of the factors that

might have an influence over the outcome (in this case, officers' behavior). Due to issues associated with specification error, the results from the multivariate models must be interpreted with caution. Researchers generally note the explanatory factors that are not (or could not be) measured, and speculate about their possible impact on the results. Despite these limitations, researchers can generally be more confident in the findings of multivariate models that examine traffic stop dispositions because at least some legal and extralegal factors that contribute to officer decision-making are statistically controlled.

Many factors other than drivers' race/ethnicity are likely to influence officers' decision making once a traffic stop has been made. For example, other driver characteristics, vehicle characteristics, stop characteristics, reasons for the stop, and other legal variables have all been hypothesized to influence post-stop outcomes. Although a number of these variables were already included in the KOTS data collection system, the DPS voluntarily included additional variables in the newly implemented TraCS electronic system to consider their ability to explain variation in post-stop outcomes.

Multivariate analyses allow the examination of the effects of each of these predictor variables, while controlling for the influence of the remaining variables. For example, the influence of drivers' race can be examined while holding constant the predictive power of drivers' age, reason for the stop, time of day, etc.[19] The following multivariate analyses examine the following specific variables for their influence over post-stop outcomes. New variables available in the TraCS data only are noted as such:

- Driver characteristics:
    - Race/Ethnicity: dichotomous variables – White, Hispanic, Native American, Black, Other; White is the excluded comparison category
    - Gender: 1=male
    - Age: in years
    - Demeanor: 1=uncooperative or combative. This is a TraCS-only variable.
    - County residency where stop occurred: 1=yes
    - Arizona residency: 1=yes
    - Undocumented alien status: 1=any undocumented alien, whether driver and/or passenger. This variable previously only captured drivers who were UDAs and has been modified in TraCS to collect information about any UDAs.

[19] Other characteristics are also believed to potentially influence officer decision making, including officer characteristics (e.g., sex, race, experience, education, assignment), organizational characteristics (e.g., number of officers assigned to district, % canine handlers assigned to area, % minority officers assigned to district, etc.), and community characteristics where the stop occurred (e.g., residential population, poverty, factors related to traffic patterns, etc.). The inclusion of community characteristics, organizational characteristics, and individual officer characteristics in the analyses introduces additional statistical complexity with the use of data at two levels of aggregation. Therefore, the application of a specialized statistical program called hierarchical linear and nonlinear modeling (HLM) would be required. Unfortunately, due to data limitations, the UC research team is currently unable to examine these possibilities. Specifically, the UC research team does not have access to employee demographic information and organizational demographic information. Analyses using DPS data from 2003 demonstrate that these variables do lend to an explanation of racial/ethnic disparities in post-stop outcomes (Engel, 2004, 2005). The community characteristics can only currently be assessed at the county level – with only 15 counties in the state of Arizona, there are too few areas to examine statistically in a hierarchical linear model.

- Vehicle characteristics:
  - Type of vehicle: dichotomous variables – cars, truck/tractor trailer, van/station wagon, and other; car is the excluded comparison category
  - Vehicle age: in years. This is a TraCS-only variable.
  - Vehicle condition: dichotomous (vehicles in poor condition vs. vehicles in excellent, good, or fair condition). This is a TraCS-only variable.

- Stop characteristics:
  - Time of day: 1=night
  - Day of the week: 1=weekend
  - Season: dichotomous variables – spring, summer, fall, winter; winter is excluded comparison category

- Legal variables:
  - Pre-stop indicators of criminal activity observed:[20] dichotomous variables – none, one type of indicator observed, 2 or more types of indicators observed. None is the excluded comparison category.
  - Multiple pre-stop violations observed: 1=two or more violations
  - Type of pre-stop violations observed: dichotomous variables – speeding, equipment, following distance, failure to stop, failure to yield, failure to properly use a turn signal, improper lane change, other moving violation and other miscellaneous reasons; speeding is the excluded comparison category
  - Reason for the stop: dichotomous variables – moving violations, non-moving violations, equipment violations, investigatory stop, externally generated information stop, and criminal offense; moving violations is the excluded comparison category.
  - Evidence found during a search: (evidence=1)
  - Whether vehicle impounded due to A.R.S. 28-3511: (1=yes) This variable is excluded from the search and seizure models because DPS policy requires a vehicle inventory search in all stops that result in a mandatory impound.

Understanding and Interpreting Multivariate Analyses

Tables 4.9 – 4.16 present the results of logistic regression models predicting warnings, repair orders, citations, arrests, searches and seizures during officer-initiated traffic stops in 2008. These models demonstrate what factors likely influence officer decision making when other factors are equal. The effects of drivers' race/ethnicity over the likelihood of being issued warnings, repair orders, citations, arrests or searches are isolated. A statistically significant finding on race/ethnicity would indicate that Hispanic, Native American, and/or Black motorists are significantly more likely to be given warnings, repair orders, citations, arrested, or searched compared to Whites in similar situations (e.g., traveling during the same times,

[20] The categories of pre-stop indicators of criminal activity included in the TRACS data collection system are: body language, driving behavior, passenger behavior, vehicle characteristics, and other. These categories were developed based on the focus group interviews the UCPI conducted with DPS officers in February 2008. Further discussion of these variables is provided in Section 5.

stopped for the same initial reasons, etc.). In addition, the Exp(b) is calculated and reported as a measure of the log odds – this is loosely translated into the number of times more likely drivers with the given characteristic are to receive the particular outcome compared to others.

For each of the models reported in Tables 4.9 – 4.16, several independent variables (described above) were included that could potentially influence officer actions. As shown in the left hand column of each table, the predictor variables include: 1) driver characteristics, 2) vehicle characteristics, 3) stop characteristics, and 4) legal variables. It is believed that each of these variables has the potential to influence officer behavior, and therefore must be statistically controlled to examine our variables of interest (i.e., drivers' race/ethnicity).

Each of the independent variables is assessed relative to their effect upon the post-stop outcome being examined. It is important to note, though, that some variables are excluded from the model for comparison purposes. For example, the drivers' race is captured in the model as Hispanic, Native American, Black, and Other. White is excluded from the model for comparison purposes. That is, the influence of the other race/ethnicity variables that are reported in the models is in comparison to Whites. Thus, the coefficients reported in the models should be interpreted as compared to Whites – that is, the likelihood of Black drivers being issued a citation compared to White drivers. The other dichotomous variables in the models are simply compared against their opposite (e.g., male drivers are compared to female drivers).

Tables 4.9 - 4.16 present the results of multivariate analyses examining the associations between drivers' characteristics and six individual post-stop outcomes (i.e., warnings, repair orders, citations, arrests, searches, and seizures). Each table presents three models associated with each of the individual outcomes.

- Model 1: This model includes all cases without missing data from the merged KOTS and TraCS data. The variables examined are nearly identical to those presented in the models in the Years 1 & 2 reports and are comparable to those results.[21]
- Model 2: This model includes only cases from the TraCS data and, again, examines the same variables used in the analyses of 2006 and 2007 data.[22] This model is created for comparison purposes to Model 3.
- Model 3: This model includes only cases from the TraCS data and examines the same variables as Model 2, but also includes the additional predictor variables recorded in the TraCS data collection system described above.[23] This allows for a direct

[21] State of vehicle registration, which was collected in KOTS, was not included in TRACS. This is the only variable that was used in the multivariate models presented in the Years 1 and 2 Reports that is not included for analysis in the current models.

[22] The seasonal variables included in Model 1 (spring, summer, fall) are excluded from Models 2 and 3 because these models are based on stops conducted only in the last three months of 2008, rather than the full year of data available in the merged KOTS and TRACS data.

[23] Although undocumented alien status was collected in the KOTS system it was not included in the multivariate analyses of previous reports due to the known problems associated with the variable (i.e., did not capture information about passengers, due to KOTS layout was not uniformly used across the department). Therefore, we have continued to exclude "undocumented alien" from the models that utilize KOTS data. With

comparison of the race effects on post-stop outcomes with and without the additional explanatory variables.

The first column in each model reported in Tables 4.9 – 4.16 displays the variable coefficient, or predicted log-odds, for each independent variable. The coefficient represents an additive expression of a particular variable. In the "coefficient" column, there are two things to examine: 1) the presence of an asterisk following the coefficient indicating a statistically significant relationship, and 2) the presence of a negative sign preceding the number. The asterisk reveals whether or not a significant relationship exists between the independent variable (e.g., male drivers) and the dependent variable (e.g., issuing a warning). If an asterisk is not present, the relationship is not considered statistically significant. Due to the extremely large sample size, the statistical significance of the relationships is assessed at the 0.001 level. The asterisks indicate that the relationships between variables are due to chance less than 0.1% of the time. The sign of the coefficient (i.e., positive or negative) indicates the direction of the relationship. For example, a positive sign on the "driver male" variable would indicate that male drivers are *more* likely than female drivers to receive a particular outcome, while a negative sign would indicate that males are *less* likely than females to receive a particular outcome.

Because the interpretation of log-odds is not intuitively straightforward, this type of coefficient is usually exponentiated to allow for interpretation in terms of odds (Liao, 1994). The second column—the odds ratio—represents this antilog transformation of the coefficient into the multiplicative odds of the outcome variable based on the predictor variable, all else being equal. In cases where the coefficient is negative, the odds ratio is inverted by dividing by 1 for ease of interpretation. The odds ratio indicates the <u>strength</u> of the relationship. For example, an odds ratio of 3.0 indicates that the presence of the variable (e.g., being a male driver) leads to three times the likelihood of receiving the outcome (e.g., receiving a citation). The strength of the relationship is one of the most important considerations. Even if the relationship between variables is statistically significant, it may not be substantively important. This is due to the large sample size – that is, there is such a large number of traffic stops, even the slightest differences might be considered statistically significant, but not substantively important. That is, the strength of the relationship may not be very large, and therefore, the odds ratio is important to consider when determining the amount of influence particular factors have over the post-stop outcomes.

<u>In summary:</u>

1) Check the sign in the coefficient column – if positive then the variable contributes positively to the outcome, if negative, the variable contributes negatively (e.g., positive sign indicates Hispanics are more likely to receive an outcome, minus sign indicates Hispanics are less likely to receive outcome).
2) If there is an asterisk following the coefficient, it is a statistically significant relationship (i.e., due to chance less than 0.1% of the time).

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the improvements made to the collection of this data field in TRACS, it is included in Model 3 along with the other additional variables collected in TRACS.

3) The odds ratio indicates the strength of the relationship – 1.5 indicates Hispanics are 1.5 times more likely to receive the outcome. As a rule of thumb, with a large sample (over 450,000 traffic stops), only odds ratios over 1.5 should be considered *substantively* important.

Multivariate Findings

Warnings

Table 4.9 reports results for three logistic regression models predicting whether or not drivers received warnings.[24] As described above, the first model includes all cases from the merged KOTS and TraCS data and is comparable to the models produced for the Years 1 & 2 reports. The second model includes only cases from the TraCS data and, again, examines the same variables used in the analyses of 2006 and 2007 data. This model is created for comparison purposes to Model 3, which includes only cases from the TraCS data and adds the new predictor variables available in the TraCS system to those examined in Model 2. Presenting the results in this manner allows for a direct comparison of the race effects on post-stop outcomes with and without the additional explanatory variables.

An examination of the Nagelkerke R-Square values shows that the explanatory power of the multivariate models is strongest in Model 3 (Nagelkerke R-Square = 0.262). The inclusion of the additional variables in TraCS has improved the explanatory power of the multivariate model predicting warnings. Specifically, about 26% of the variation in whether or not drivers receive warnings can be predicted with the group of variables included in Model 3, compared to about 18% for Model 1 and 21.5% for Model 2. The findings discussed below refer to the results presented in Model 3 unless otherwise noted.

Across all three multivariate models, the results show that, during officer-initiated traffic stops in 2008, Hispanic, Black, and drivers of other race/ethnicity were significantly *less* likely to receive warnings compared to Whites. The odds ratios of these coefficients indicate that all of these relationships, though statistically significant, are not particularly strong (odds ratios ranging from 1.1 to 1.3). Likewise, although gender, age, and county residency significantly predict warnings, their influence is relatively weak. Driver demeanor, on the other hand, shows a significant and substantive negative relationship with the likelihood of receiving warnings. Drivers who were uncooperative or combative were 4.4 times less likely to receive a warning compared to drivers who were cooperative. Drivers who were undocumented aliens or traveling with undocumented aliens were 1.5 times less likely to receive a warning compared to legal resident drivers

The results across all three multivariate models show the strongest predictors of whether or not drivers receive warnings were legal variables. First, drivers who were observed as

[24] Forty-two percent of drivers were issued warnings. Only 36.6% of drivers, however, were issued warnings as their most severe outcome. Three multivariate models exploring warnings as the most severe outcome received indicated no substantive differences from the models in Table 4.9 in the effects of race/ethnicity on the likelihood of receiving a warning. These results are not presented in tabular form, but are available from the authors upon request.

exhibiting multiple pre-stop indicators of possible criminal activity were 3.5 times more likely to receive a warning than drivers with no pre-stop indicators. Second, drivers stopped who were observed with particular violations prior to the stop were significantly more likely than drivers who were observed speeding prior to the stop to receive a warning. For example, drivers observed for following distance violations, failure to signal, and improper lane changes were 3.9, 2.5, and 2.4 times more likely to receive a warning than those who were observed speeding prior to the stop. Interestingly, the number of pre-stop violations observed has no statistically significant impact on the likelihood of receiving a warning. The primary reason for the stop showed the strongest effect on the likelihood of receiving a warning. For example, in Model 3, drivers stopped for criminal offenses or based on pre-existing information were 12.8 and 11.7 times less likely, respectively, to receive a warning compared to those stopped for moving violations. Finally, the seizure of evidence and impound of the vehicle due to A.R.S. 28-3511 were also negatively and substantively related to the likelihood of a driver receiving a warning.

Table 4.9: Multivariate Logistic Analyses Predicting WARNINGS During Officer-Initiated Traffic Stops in 2008

	MODEL 1 (n=532,502)		MODEL 2 (n=138,922)		MODEL 3 (n=138,902)	
Variables	**Coeff.**	**Odds ratio Exp(b) or 1/Exp(b)**	**Coeff.**	**Odds ratio Exp(b) or 1/Exp(b)**	**Coeff.**	**Odds Ratio Exp (b) or 1/Exp (b)**
Intercept	-0.31*		-0.20*		-0.31*	
Driver Characteristics						
Hispanic	-0.18*	1.20	-0.19*	1.21	-0.15*	1.16
Native American	0.03	--	-0.10*	1.11	-0.03	--
Black	-0.12*	1.13	-0.11*	1.12	-0.12*	1.13
Other Race	-0.27*	1.31	-0.27*	1.31	-0.29*	1.34
Male	-0.12*	1.13	-0.12*	1.13	-0.10*	1.11
Age	0.02*	1.02	0.01*	1.01	0.01*	1.01
Demeanor†	--	--	--	--	-1.49*	4.44
County resident	-0.15*	1.16	-0.13*	1.14	-0.16*	1.17
AZ resident	-0.07*	1.07	-0.05*	1.05	-0.04	--
Undocumented Alien Status	--	--	--	--	-0.42*	1.52
Vehicle Characteristics						
Truck/Tractor Trailer	-0.78*	2.18	-0.78*	2.17	-0.88*	2.41
Van/Station Wagon	0.04*	1.04	0.01	--	0.00	--
Other Vehicle Type	0.03	--	-0.09	--	-0.11	--
Vehicle Age†	--	--	--	--	-0.01*	1.01
Vehicle Condition†	--	--	--	--	-0.09	--
Stop Characteristics						
Night-time	0.28*	1.32	-0.78*	2.17	0.20*	1.22
Weekend	-0.01	--	0.01	--	-0.03	--
Spring	0.00	--	--	--	--	--
Summer	0.00	--	--	--	--	--
Fall	-0.01	--	--	--	--	--
Legal variables						
One pre-stop indicator of criminal activity†	--	--	--	--	0.06*	1.07
Multiple pre-stop indicators of crim. activity†	--	--	--	--	1.25*	3.48
Multiple pre-stop violations observed†	--	--	--	--	0.10	--
Pre-stop viol. observed: Equipment†	--	--	--	--	0.06	--
Pre-stop viol. observed: Following distance†	--	--	--	--	1.36*	3.91
Pre-stop viol. observed: Failure to stop†	--	--	--	--	0.25*	1.29
Pre-stop viol. observed: Failure to yield†	--	--	--	--	0.59*	1.80
Pre-stop viol. observed: Failure to signal†	--	--	--	--	0.92*	2.51
Pre-stop viol. observed: Improper lane chg.†	--	--	--	--	0.86*	2.36
Pre-stop viol. observed: other moving†	--	--	--	--	0.45*	1.57
Pre-stop viol. observed: other†	--	--	--	--	0.41*	1.51
Reason for stop: non-moving violation	0.03*	1.03	-0.05	--	-0.16*	1.18
Reason for stop: equipment violation	-1.82*	6.19	-2.10*	8.19	-1.96*	7.12
Reason for stop: investigation	-1.94*	6.96	-1.65*	5.19	-1.79*	5.97
Reason for stop: pre-existing information	-2.05*	7.73	-2.37*	10.67	-2.46*	11.70
Reason for stop: criminal offense	-2.65*	14.18	-2.40*	11.03	-2.55*	12.76
Evidence found during search	-0.73*	2.07	-0.92*	2.51	-0.92*	2.50
Vehicle Impounded due to A.R.S. 28-3511†	--	--	--	--	-2.13*	8.37
Model Chi-square	76813.07*		24234.70*		30050.18*	
Nagelkerke R Square	0.181		0.215		0.262	

NOTE: Asterisks indicate statistically significant relationships * $p \leq .001$. All TraCS-only variables are noted with a †.

Repair Orders

Table 4.10 reports results for three logistic regression models predicting whether or not drivers received repair orders.[25] Again, the first model includes all cases from the merged KOTS and TraCS data and is comparable to the models produced for the Years 1 & 2 reports. The second model includes only cases from the TraCS data and examines the same variables used in the analyses of 2006 and 2007 data. This model is created for comparison purposes to Model 3, which includes only cases from the TraCS data and adds the new predictor variables available in the TraCS system to those examined in Model 2.

An examination of the Nagelkerke R-Square values shows that the explanatory power of the multivariate models predicting repair orders is much stronger than the model predicting warnings. As with the warning models, the explanatory power is strongest in Model 3 (Nagelkerke R-Square = 0.722). Again, the inclusion of the additional variables in TraCS has improved the explanatory power of the multivariate model predicting repair orders. Specifically, over 72% of the variation in whether or not drivers receive repair orders can be predicted with the group of variables included in Model 3, compared to about 65% for Model 1 and 66% for Model 2. The findings discussed below refer to the results presented in Model 3 unless otherwise noted.

The strength of all three multivariate models predicting repair orders is driven primarily by the legal reason for the stop and, in the case of Model 3, the type of pre-stop traffic violations observed. As expected, in Models 1 and 2, drivers stopped for equipment violations were 132 and 137 times more likely, respectively, to receive a repair order compared to those stopped for moving violations. In Model 3, because of the inclusion of the variables measuring the various types of pre-stop violations observed, drivers stopped for equipment violations were 6.4 times more likely to be issued a repair order than those stopped for moving violations. Drivers who were observed with an equipment violation prior to the stop, however, were 50 times more likely to be issued a repair order than those who were observed for a speeding violation prior to the stop. Other legal variables significantly and positively related to the likelihood of being issued a repair order included other reasons for the stop. Specifically, drivers stopped for an investigatory stop or pre-existing information were 3.8 and 2.4 times more likely to be issued a repair order than drivers stopped for moving violations. Further, drivers whose vehicles were impounded were 8.3 times less likely to be issued a repair order than drivers whose vehicles were not impounded.

Examining the effects of vehicle and driver characteristics in Model 3 reveals other statistically significant relationships. Drivers of trucks/tractor trailers were 9.3 times more

[25] Nearly 19% of drivers (18.6%) were issued repair orders. Approximately 16.8% of drivers were issued repair orders as their most severe outcome. . Three multivariate models exploring repair orders as the most severe outcome received indicated only one substantive difference from the models in Table 4.10 in the effects of race/ethnicity on the likelihood of receiving a repair order. Specifically, when the models predict repair orders as the most severe outcome, the statistically significant positive relationship between Native American and repair order becomes not statistically significant. That is, there is no statistically significant difference in Native Americans' likelihood of receiving a repair order as the most severe traffic stop outcome when compared to Whites. These results are not presented in tabular form, but are available from the authors upon request.

likely to be issued repair orders compared to drivers of cars. In terms of driver characteristics, Hispanic and Black drivers were significantly less likely compared to Whites to be issued repair orders. The strength of these odds ratios (1.1 to 1.4), however, indicates that these relationships are not substantively important. In contrast, Native American drivers were approximately 2 times significantly more likely to be issued repair orders compared to Whites. Uncooperative or combative drivers were 2.2 times significantly less likely to be issued repair orders compared to cooperative drivers. Drivers who were undocumented aliens or traveling with undocumented aliens were 2.6 times less likely to be issued a repair order than legal resident drivers.

Table 4.10: Multivariate Logistic Analyses Predicting REPAIR ORDERS During Officer-Initiated Traffic Stops in 2008

	MODEL 1 (n=532,445)		MODEL 2 (n=138,865)		MODEL 3 (n=138,845)	
Variables	**Coeff.**	**Odds ratio Exp(b) or 1/Exp(b)**	**Coeff.**	**Odds ratio Exp(b) or 1/Exp(b)**	**Coeff.**	**Odds Ratio Exp (b) or 1/Exp (b)**
Intercept	-3.96		-3.95		-4.61	
Driver Characteristics						
Hispanic	-0.17*	1.18	-0.22*	1.25	-0.11*	1.12
Native American	0.48*	1.62	0.66*	1.94	0.68*	1.98
Black	-0.31*	1.36	-0.39*	1.48	-0.31*	1.36
Other Race	-0.23*	1.25	-0.18	--	-0.11	--
Male	-0.04	--	-0.01	--	-0.04	--
Age	0.01*	1.01	0.01*	1.01	0.01*	1.01
Demeanor†	--	--	--	--	-0.78*	2.18
County resident	-0.20*	1.22	0.12*	1.13	-0.08	--
AZ resident	0.05*	1.05	-0.04*	1.04	-0.01	--
Undocumented Alien Status	--	--	--	--	-0.95*	2.59
Vehicle Characteristics						
Truck/Tractor Trailer	-2.19*	8.92	-2.07*	7.90	-2.23*	9.33
Van/Station Wagon	-0.02	--	0.00	--	0.03	--
Other Vehicle Type	-0.61*	1.85	-0.19	--	-0.22	--
Vehicle Age†	--	--	--	--	0.02*	1.02
Vehicle Condition†	--	--	--	--	-0.22*	1.24
Stop Characteristics						
Night-time	0.45*	1.57	0.48*	1.62	0.50*	1.64
Weekend	0.10*	1.11	0.03	--	0.03	--
Spring	0.03	--	--	--	--	--
Summer	0.05	--	--	--	--	--
Fall	0.03	--	--	--	--	--
Legal variables						
One pre-stop indicator of criminal activity†	--	--	--	--	-0.58*	1.69
Multiple pre-stop indicators of crim. activity†	--	--	--	--	-0.49*	1.63
Multiple pre-stop violations observed†	--	--	--	--	0.26*	1.29
Pre-stop viol. observed: Equipment†	--	--	--	--	3.91*	49.79
Pre-stop viol. observed: Following distance†	--	--	--	--	0.49*	1.64
Pre-stop viol. observed: Failure to stop†	--	--	--	--	-0.01	--
Pre-stop viol. observed: Failure to yield†	--	--	--	--	-0.28	--
Pre-stop viol. observed: Failure to signal†	--	--	--	--	0.79*	2.20
Pre-stop viol. observed: Improper lane chg.†	--	--	--	--	0.06	--
Pre-stop viol. observed: other moving†	--	--	--	--	0.17	--
Pre-stop viol. observed: other†	--	--	--	--	1.20*	3.31
Reason for stop: non-moving violation	0.90*	2.46	0.73*	2.08	-0.37*	1.45
Reason for stop: equipment violation	4.89*	132.53	4.92*	137.17	1.86*	6.44
Reason for stop: investigation	1.69*	5.39	1.98*	7.21	1.32*	3.75
Reason for stop: pre-existing information	1.27*	3.57	2.21*	9.12	0.88*	2.41
Reason for stop: criminal offense	-2.10*	8.17	-2.32	10.20	-2.50	--
Evidence found during search	-1.39*	4.01	-1.18	3.25	0.81*	2.24
Vehicle Impounded due to A.R.S. 28-3511†	--	--	--	--	-2.12*	8.30
Model Chi-square	271709.41*		74658.18*		84505.77*	
Nagelkerke R Square	0.647		0.658		0.722	

NOTE: Asterisks indicate statistically significant relationships * $p \leq .001$. All TraCS-only variables are noted with a †.

Citations

Table 4.11 reports results for three logistic regression models predicting whether or not drivers were issued any citation.[26] An examination of the Nagelkerke R-Square values shows that the explanatory power of the multivariate models predicting citations is strongest in Model 3 (Nagelkerke R-Square = 0.216). Again, the inclusion of the additional variables in TraCS has improved the explanatory power of the multivariate model predicting repair orders. Specifically, 21.6% of the variation in whether or not drivers receive citations can be predicted with the group of variables included in Model 3, compared to 13-14% for Models 1 and 2. The findings discussed below refer to the results presented in Model 3 unless otherwise noted.

The strength of all three multivariate models predicting citations is driven by the legal variables. Drivers who were observed for multiple pre-stop violations were 2.3 times more likely to receive a citation than those with only one pre-stop violation observed. Drivers stopped for criminal offenses were 3.1 times more likely to be cited than those stopped for moving violations. Several of the specific pre-stop violations observed displayed a significant, negative effect on the likelihood of a citation. For example, drivers stopped who were observed for a following distance violation were 4.5 times less likely to receive a citation than those observed speeding prior to the stop. Drivers with contraband seized were 2.1 times more likely to receive a citation than those without contraband seized. The strongest predictor of whether a citation was issued was whether the vehicle was impounded in accordance with A.R.S. 28-3511, as drivers whose vehicles were impounded were 28 times more likely to receive a citation than those whose vehicles were not impounded.

Examining the effects of driver characteristics in Model 3 reveals that, although race/ethnicity variables were statistically significant, the strength of the individual odds ratios reveals that these are not substantively strong relationships. Specifically, Hispanic, Native American, Black, and drivers of other races were 1.2, 1.1, 1.2, and 1.4 times more likely to receive a citation than White drivers, respectively. The effect of driver demeanor, on the other hand, was statistically significant and a strong predictor of the likelihood of citation. Specifically, uncooperative or combative drivers were 3.8 times significantly more likely to be issued citations compared to cooperative drivers. Drivers who were undocumented aliens or traveling with undocumented aliens were 1.7 times more likely to be issued a citation than legal resident drivers.

[26] Over 40% of drivers (41.4%) were issued citations, while 40.1% of drivers were issued a citation as their most severe outcome. Multivariate models exploring citations as the most severe outcome indicated no substantive differences in the effects of race/ethnicity on the likelihood of receiving a citation. These results are not presented in tabular form, but are available from the authors upon request.

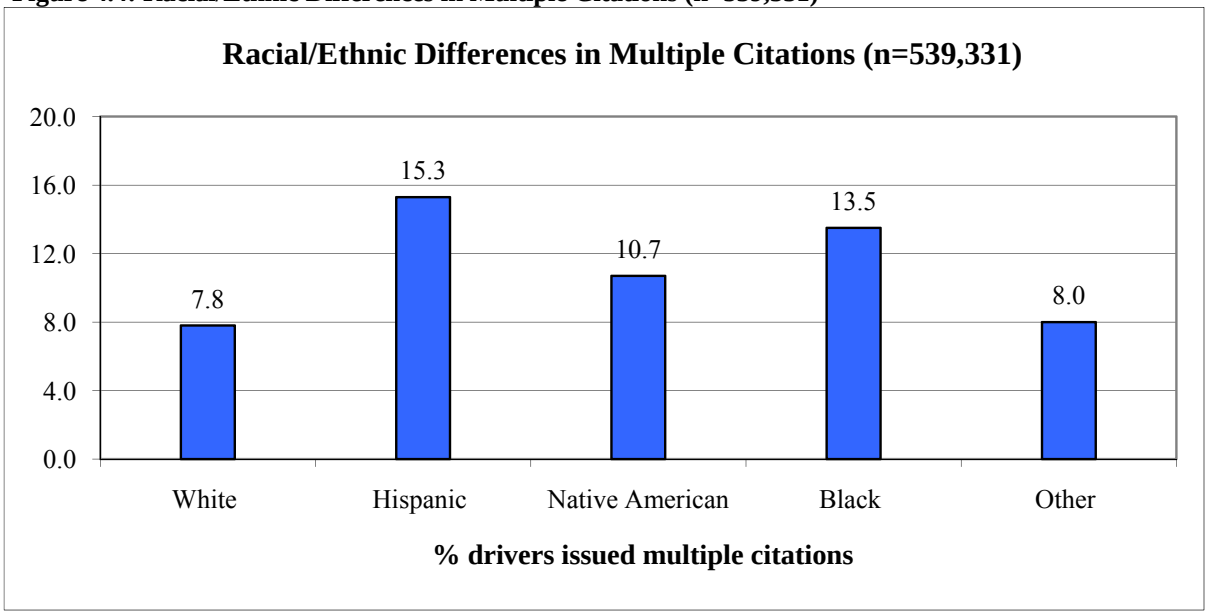
Table 4.11: Multivariate Logistic Analyses Predicting CITATIONS During Officer-Initiated Traffic Stops in 2008

	MODEL 1 (n=532,502)		MODEL 2 (n=138,922)		MODEL 3 (n=138,902)	
Variables	**Coeff.**	**Odds ratio Exp(b) or 1/Exp(b)**	**Coeff.**	**Odds ratio Exp(b) or 1/Exp(b)**	**Coeff.**	**Odds Ratio Exp (b) or 1/Exp (b)**
Intercept	0.43*		0.33*		0.42*	
Driver Characteristics						
Hispanic	0.26*	1.30	0.28*	1.32	0.19*	1.21
Native American	0.06*	1.06	0.18*	1.20	0.10*	1.11
Black	0.22*	1.24	0.22*	1.24	0.19*	1.21
Other Race	0.31*	1.37	0.31*	1.37	0.33*	1.40
Male	0.15*	1.17	0.13*	1.14	0.10*	1.11
Age	-0.02*	1.02	-0.02*	1.02	-0.02*	1.02
Demeanor †	--	--	--	--	1.32*	3.75
County resident	0.17*	1.19	0.15*	1.16	0.17*	1.18
AZ resident	0.14*	1.15	0.10*	1.10	0.06*	1.06
Undocumented Alien Status	--	--	--	--	0.53*	1.71
Vehicle Characteristics						
Truck/Tractor Trailer	-0.46*	1.58	-0.42*	1.53	-0.26*	1.29
Van/Station Wagon	-0.06*	1.06	-0.03	--	-0.02	--
Other Vehicle Type	-0.16*	1.17	0.03	--	0.54	--
Vehicle Age †	--	--	--	--	0.01*	1.01
Vehicle Condition †	--	--	--	--	0.37*	1.45
Stop Characteristics						
Night-time	-0.39*	1.48	-0.35	1.41	-0.33*	1.39
Weekend	0.01	--	0.06	--	0.05*	1.05
Spring	0.02	--	--	--	--	--
Summer	0.01	--	--	--	--	--
Fall	-0.01	--	--	--	--	--
Legal variables						
One pre-stop indicator of criminal activity	--	--	--	--	0.03	--
Multiple pre-stop indicators of criminal activity	--	--	--	--	-0.83*	2.29
Multiple pre-stop violations observed †	--	--	--	--	0.84*	2.31
Pre-stop viol. observed: Equipment †	--	--	--	--	-1.31*	3.71
Pre-stop viol. observed: Following distance †	--	--	--	--	-1.49*	4.45
Pre-stop viol. observed: Failure to stop †	--	--	--	--	-0.25*	1.29
Pre-stop viol. observed: Failure to yield †	--	--	--	--	-0.69*	1.99
Pre-stop viol. observed: Failure to signal †	--	--	--	--	-1.11*	3.02
Pre-stop viol. observed: Improper lane chg. †	--	--	--	--	-1.00*	2.72
Pre-stop viol. observed: other moving †	--	--	--	--	-0.45*	1.57
Pre-stop viol. observed: other †	--	--	--	--	-0.36*	1.43
Reason for stop: non-moving violation	-0.21*	1.23	-0.09*	1.10	0.01	--
Reason for stop: equipment violation	-1.41*	4.10	-1.33*	3.79	-0.46*	1.59
Reason for stop: investigation	-1.25*	3.50	-1.15*	3.15	-1.18*	3.27
Reason for stop: pre-existing information	-0.89*	2.43	-1.05*	2.85	-1.12*	3.06
Reason for stop: criminal offense	1.48*	4.39	1.21*	3.34	1.12*	3.06
Evidence found during search	1.27*	3.56	1.05*	2.85	0.76*	2.14
Vehicle Impounded due to A.R.S. 28-3511	--	--	--	--	3.32	27.79
Model Chi-square	58793.83		14179.94		24130.81	
Nagelkerke R Square	0.141		0.131		0.216	

NOTE: Asterisks indicate statistically significant relationships * $p \leq .001$. All TraCS-only variables are noted with a †.

Previous reports analyzing 2006 and 2007 data noted significant racial/ethnic differences in the likelihood of receiving *multiple* citations. In order to examine this possibility for 2008 data, the *number* of citations issued during a single traffic stop was examined. The number of citations issued during an individual traffic stop ranged from zero to eight citations. The majority of citizens stopped did not receive a citation (58.6%), followed by one citation (31.2%), two citations (7.3%), and three or more (2.8%). Collectively, 10.1% of drivers stopped by DPS officers were issued multiple citations. Figure 4.4 demonstrates racial/ethnic differences in the percentages of drivers receiving multiple citations, which replicates finding from both the Year 1 and Year 2 Reports (see Engel et al., 2007c; Engel et al., 2008a). Specifically, 15.3% of Hispanic drivers, 13.5% of Blacks, and 10.7% of Native Americans received multiple citations, compared to only 8.0% of Other minorities and 7.8% of Whites.

Figure 4.4: Racial/Ethnic Differences in Multiple Citations (n=539,331)



There are a number of possible explanations for the reported racial/ethnic disparities in multiple citations. It has been argued that Hispanic, Native American, and Black drivers – all members of racial/ethnic groups that have historically been victims of discrimination resulting in social and economic disparities – are more likely to drive vehicles that have equipment violations, have expired licenses, expired registrations, no insurance, etc. If true, it is disparities in wealth (correlated in our society with race/ethnicity) that increase the likelihood of receiving multiple citations during traffic stops with police. Alternatively, it could be argued that minority drivers are significantly more likely to be issued multiple citations because of police bias.

The improvements in the TraCS data collection system allows for a more thorough examination of these possibilities than in previous years' reports because of the additional information collected. An alternative analysis technique for modeling citations was employed using only data from the TraCS data collection system. Table 4.12 presents the results of a multivariate analysis using multinomial logistic regression. Multinomial logistic regression is an extension of binary logistic regression whereby the model estimates the effect of

predictor variables on a dependent variable with multiple response categories (0, 1, 2, 3 or more citations) instead of a dichotomous dependent variable (0=no citation, 1=at least one citation). Therefore, instead of predicting the likelihood of simply receiving a citation or not, multinomial logistic regression predicts the likelihood of receiving one, two, and 3 or more citations, each compared to the likelihood of receiving no citation (Liao, 1994).[27]

The citation models presented in Table 4.10 explain 23.6% of the variance in the number of citations issued compared to no citations. Each model represents a different number of citations: Model 1 = 1 citation, Model 2= 2 citations, Model 3 = 3 or more citations. Under Model 1, the likelihood of receiving one citation is influenced primarily by the legal reasons for the stop. Drivers whose vehicles were impounded and those stopped for criminal offenses were 6.4 and 3.0 times more likely, respectively, to receive one citation compared to drivers whose vehicles were not impounded and those stopped for moving violations. Drivers stopped who were observed for equipment or following distance violations prior to the stop were 3.6 and 4.7 times less likely to receive one citation compared to drivers that were observed for speeding violations prior to the stop. Although the coefficients for Hispanic, Black, and Other drivers are statistically significant, the size of these odds ratios (1.1 to 1.4) indicates that the race/ethnicity variables are not substantively important predictors of the likelihood of receiving one citation compared to no citation. Driver demeanor, however, is a statistically significant and strong predictor, as uncooperative or combative drivers were 3.1 times more likely to receive one citation than cooperative drivers.

Turning to Model 2, again, the strongest predictors of the likelihood of receiving two citations compared to none are legal variables. Drivers whose vehicles were impounded, those stopped for criminal offenses, and those with evidence seized were 20.3, 2.3, and 1.8 times more likely, respectively, to receive two citations compared to drivers whose vehicles were not impounded, those stopped for moving violations, and those with no evidence seized. Drivers stopped who were observed for multiple pre-stop violations were 4.9 times more likely to receive two citations compared to drivers observed for a single pre-stop violation. The coefficients for Hispanic, Native American, and Black are statistically significant, although the size of their odds ratios indicates that they are only marginally important. Specifically, Hispanics, Native Americans, and Blacks are 1.6, 1.4, and 1.5 times more likely, respectively, than Whites to receive two citations compared to none. Driver demeanor and undocumented alien status, however, both are strong predictors of the likelihood of receiving two citations compared to none. Uncooperative or combative drivers were 3.3 times more likely to receive two citations than cooperative drivers, while drivers who were undocumented aliens or traveling with undocumented aliens were 2.3 times more likely to receive two citations than legal residents.

[27] The dependent variable "Number of citations" is polytomous. That is, it includes a series of categories as possible outcomes (0 citations, 1 citation, 2 citations, and 3 or more citations). Although multinomial logistic regression predicts the likelihood of belonging to multiple categories of the dependent variable, it does not account for the ordered nature of those categories. Sequential response logit models and ordinal logistic models do account for the ordered nature of outcome categories and were also used to model the probability of citations (Liao, 1994). The results (not shown), however, did not differ significantly from those produced by multinomial logistic regression. The results from the multinomial logistic regression model are presented for ease of interpretation.

In Model 3, the strongest predictors of the probability of receiving three citations compared to none continue to be legal variables. Drivers whose vehicles were impounded were 51.5 times more likely to receive three of more citations compared to those who received none. Similarly, motorists those stopped for criminal offenses and those with evidence discovered during a search were 3.0 and 2.2 times more likely to receive three citations compared to drivers who were stopped for moving violations and those with no evidence seized. Drivers stopped who were observed for multiple pre-stop violations were 6.9 times more likely to receive three citations compared to drivers observed for a single pre-stop violation. The coefficients for Hispanic, Native American, and Black are statistically significant, although the size of their odds ratios indicates that only the Hispanic and Black effects are substantively important. Specifically, Hispanics and Blacks are both 1.8 times more likely than Whites to receive three citations compared to none. Driver demeanor and undocumented alien status are also both strong predictors of the likelihood of receiving three citations compared to none. Uncooperative or combative drivers were 3.4 times more likely to receive three citations than cooperative drivers, while drivers who were undocumented aliens or traveling with undocumented aliens were 3.3 times more likely to receive three citations than legal residents.

In summary, across the models, the strongest predictors of the number of citations issued to drivers were legal reasons. The impact of drivers' race/ethnicity increased as the number of citations increase. While Hispanic and Black drivers were only 1.1 times more likely than White motorists to receive one citation (substantively insignificant differences), they were 1.8 times more likely to receive three or more citations. Statistical models that exclude the additional explanatory variables available in TraCS suggest that Hispanic and Black drivers were 3.1 and 2.2 times more likely to receive three citations compared to White drivers. This is an important comparison, because it demonstrates that *as our data collection efforts improve (capturing more relevant legal and extralegal information that has historically been absent from racial profiling data collection efforts) the reported impact of race/ethnicity decreases substantially.* For example, rather than Black drivers being 3 times more likely than Whites to receive three or more citations, Black drivers are found to be only 1.8 times more likely once additional legal factors are considered, including drivers' demeanor, undocumented alien status, the number and types of pre-stop violations observed, and if the vehicle was impounded. *It is therefore likely that most of the racial/ethnic disparities reported in traffic citations can be explained by factors other than drivers' race/ethnicity.* As noted previously however, the multivariate models can only measure the influence of variables for which data is collected.

Table 4.12. Multinomial Logistic Analyses Predicting CITATIONS During Officer-Initiated Traffic Stops in 2008[28] (n=138,902)

	MODEL 1: ONE CITATION		MODEL 2: TWO CITATIONS		MODEL 3: 3 OR MORE CITATIONS	
Variables	**Coeff.**	**Odds ratio**	**Coeff.**	**Odds ratio**	**Coeff.**	**Odds ratio**
Intercept	0.39*		-2.27*		-4.20*	
Driver Characteristics						
Hispanic	0.12*	1.13	0.44*	1.56	0.57*	1.77
Native American	-0.27	--	0.32*	1.38	0.35*	1.42
Black	0.12*	1.13	0.40*	1.49	0.57*	1.77
Other Race	0.33*	1.39	0.24	--	0.38	1.46
Male	0.07*	1.07	0.20*	1.22	0.22*	1.24
Age	-0.14*	1.15	-0.02*	1.02	-0.02*	1.02
Demeanor †	1.12*	3.08	1.20*	3.31	1.23*	3.43
County resident	0.12*	1.12	0.33*	1.40	0.67*	1.96
AZ resident	0.04	--	0.24*	1.27	0.13	--
Undocumented Alien Status	0.40*	1.50	0.81*	2.26	1.20*	3.31
Vehicle Characteristics						
Truck/Tractor Trailer	-0.24*	1.27	-0.29*	1.33	-0.31	--
Van/Station Wagon	-0.02	--	-0.06	--	-0.12	--
Other Vehicle Type	0.03	--	0.07	--	0.16	--
Vehicle Age †	0.00	--	0.04*	1.04	0.05*	1.05
Vehicle Condition †	0.30*	1.35	0.35*	1.42	0.47*	1.60
Stop Characteristics						
Night-time	-0.36*	1.43	-0.23*	1.25	-0.27*	1.32
Weekend	0.05	--	0.02	--	-0.13	--
Spring	--	--	--	--	--	--
Summer	--	--	--	--	--	--
Fall	--	--	--	--	--	--
Legal variables						
One pre-stop indicator of criminal activity †	0.00	--	0.13*	1.14	0.35*	1.41
Multiple pre-stop indicators of crim. activity †	-0.86*	2.36	-0.80*	2.23	-0.64	--
Multiple pre-stop violations observed †	0.38*	1.46	1.60*	4.94	1.93*	6.89
Pre-stop viol. observed: Equipment †	-1.29*	3.62	-1.19*	3.28	-1.15*	3.17
Pre-stop viol. observed: Following distance †	-1.56*	4.74	-0.11*	1.11	-0.70*	2.02
Pre-stop viol. observed: Failure to stop †	0.30*	1.35	-0.11	--	0.43	--
Pre-stop viol. observed: Failure to yield †	-0.81*	2.24	-0.25	--	-0.01	--
Pre-stop viol. observed: Failure to signal †	-1.17*	3.22	-1.01	2.74	-0.62*	1.85
Pre-stop viol. observed: Improper lane chg. †	-1.02*	2.76	-0.88	2.40	-0.84	2.31
Pre-stop viol. observed: other moving †	-0.50*	1.64	-0.17	1.19	0.06	--
Pre-stop viol. observed: other †	-0.49*	1.63	0.08	--	0.17	--
Reason for stop: non-moving violation	-0.05	--	0.33*	1.39	0.56*	1.75
Reason for stop: equipment violation	-0.52*	1.68	-0.26	1.29	-0.21	--
Reason for stop: investigation	-1.05*	2.85	-1.57*	4.82	-2.02*	7.54
Reason for stop: pre-existing information	-0.92*	2.52	-1.40*	4.07	-1.66*	5.24
Reason for stop: criminal offense	1.10*	3.01	0.84*	2.32	1.09*	2.97
Evidence found during search	0.10	--	0.56*	1.76	0.80*	2.22
Vehicle Impounded due to A.R.S. 28-3511	1.86	6.40	3.01*	20.33	3.94*	51.52
Model Chi-square	30612.03					
Nagelkerke R Square	0.236					

[28] The excluded reference category is no citation.

Arrests

Table 4.13 reports results for four logistic regression models predicting whether or not drivers were arrested. As with the tables for warnings and repair orders, the first model includes all cases from the merged KOTS and TraCS data and is comparable to the models produced for the Years 1 & 2 reports. The second model includes only cases from the TraCS data and examines the same variables used in the analyses of 2006 and 2007 data. In addition to modeling the likelihood of "any arrest" in Models 1 – 3, Model 4 predicts the likelihood of "discretionary arrest" only (i.e., non-warrant, non-DUI arrests) using only TraCS data.

An examination of the Nagelkerke R-Square values for Models 1 – 3 shows that the explanatory power of the multivariate models predicting arrests is strongest in Model 3 (Nagelkerke R-Square = 0.237). Again, the inclusion of the additional variables in TraCS has improved the explanatory power of the multivariate model predicting arrests. Specifically, nearly 24% of the variation in whether or not drivers receive arrests can be predicted with the group of variables included in Model 3, compared to about 20% for Model 1 and 18% for Model 2. The findings discussed below refer to the results presented in Model 3 unless otherwise noted.

As was the case for the previous stop outcomes examined, the strength of all three multivariate models predicting arrests is driven primarily by legal variables. As expected, the strongest factor associated with arrest is the discovery of contraband; in Model 3, drivers with contraband were over 21 times more likely to be arrested compared to drivers without contraband. Similarly, drivers whose vehicles were impounded, those who were stopped for a criminal offense or based on pre-existing information, and those observed with multiple pre-stop indicators of possible criminal activity were 6.0, 5.4, 3.9 and 2.7 times more likely, respectively, to be arrested than drivers whose vehicles were not impounded, those stopped for a moving violation, and those with no pre-stop indicators of criminal activity. While these findings are intuitive, it is important to include these types of legal variables in the models predicting arrest so that the effects of other extralegal variables can be examined after these legal variables are statistically controlled.

Indeed, the strength of some of the race/ethnicity coefficients remains even after these legal variables are taken into consideration. Native American and Black drivers were significantly more likely to be arrested compared to White drivers given the same legal, vehicle, and stop characteristics. Specifically, Native American and Black drivers were 3.2 and 1.9 times more likely to be arrested, respectively, compared to Whites. The effect of being Hispanic, however, on the likelihood of arrest is not statistically significant in Model 3. Although in Models 1 and 2, Hispanic drivers were 1.6 times more likely to be arrested compared to Whites, once the additional variables recorded in TraCS are included in Model 3, this effect is reduced. Driver demeanor also shows a statistically significant effect on the likelihood of arrest as uncooperative or combative drivers were 3.6 times significantly more likely to be arrested compared to cooperative drivers.

As noted above, in addition to modeling the likelihood of "any arrest" we also examined a model that predicted discretionary arrests only (excluding warrant and DUI arrests). Two differences between Models 3 and 4 are notable. First, the effect of the Native American race variable on the likelihood of being arrested is diminished. Although the odds ratio indicates this is still a substantively important effect, Native Americans are 2.4 times more likely to be arrested for non-warrant, non-DUI arrests when compared to Whites. This indicates that the effect of this variable is attenuated by the exclusion of non-warrant, non-DUI arrests. This finding is not surprising given that previous reports and bivariate analyses of the 2008 TraCS data reveal that Native Americans are significantly more likely than all other racial/ethnic groups to be cited and/or arrested for DUI violations. The other effects for the race/ethnicity variables changed only slightly, with Hispanic and Other Race/Ethnicity remaining not statistically significant, and the odds ratio for Black increasing from 1.9 to 2.1.

The second notable difference between Models 3 and 4 is that the coefficient for seizure of evidence is considerably larger in Model 4. In other words, in cases of non-warrant, non-DUI arrests, evidence seized during a search was an even stronger predictor of arrest than in Model 3. Specifically, drivers with contraband were approximately 54 times more likely to be arrested compared to drivers without contraband.

Table 4.13: Multivariate Logistic Analyses Predicting ARRESTS During Officer-Initiated Traffic Stops in 2008

	MODEL 1 (n=532,445)		MODEL 2 (n=138,865)		MODEL 3 (n=138,845)		MODEL 4 (n=138,902)	
Variables	**Coeff.**	**Odds ratio Exp(b) or 1/Exp(b)**	**Coeff.**	**Odds ratio Exp(b) or 1/Exp(b)**	**Coeff.**	**Odds Ratio Exp (b) or 1/Exp (b)**	**Coeff.**	**Odds Ratio Exp (b) or 1/Exp (b)**
Intercept	-5.16*		-5.62*		-6.03*		-6.50*	
Driver Characteristics								
Hispanic	0.47*	1.60	0.46*	1.58	0.11	--	0.13	--
Native American	1.12*	3.07	1.24*	3.47	1.15*	3.15	0.88*	2.42
Black	0.56*	1.74	0.82*	2.27	0.65*	1.91	0.75*	2.12
Other Race	-0.12	--	-0.18	--	-0.13	--	-0.32	--
Male	0.60*	1.81	0.45*	1.56	0.36*	1.43	0.53*	1.70
Age	-0.01*	1.01	-0.01	--	-0.01*	1.01	-0.01*	1.01
Demeanor †	--	--	--	--	1.27*	3.55	0.89*	2.43
County resident	0.25*	1.28	-0.12	--	-0.23*	1.26	-0.44*	1.55
AZ resident	0.43*	1.54	0.41*	1.50	0.27*	1.31	-0.04	--
Undocumented Alien Status	--	--	--	--	-0.19	--	0.39	--
Vehicle Characteristics								
Truck/Tractor Trailer	-1.11*	3.04	-1.12	--	-0.93*	2.52	-0.89*	2.44
Van/Station Wagon	-0.19*	1.21	-0.03	--	0.00	--	0.03	--
Other Vehicle Type	0.11*	--	0.05	--	0.03	--	-0.05	--
Vehicle Age †	--	--	--	--	0.03*	1.03	0.01	--
Vehicle Condition †	--	--	--	--	0.16	--	0.20	--
Stop Characteristics								
Night-time	0.54*	1.71	0.17	--	0.05	--	-0.22	--
Weekend	0.24*	1.28	0.14	--	0.17	--	-0.11	--
Spring	0.30*	1.35	--	--	--	--	--	--
Summer	0.25*	1.28	--	--	--	--	--	--
Fall	-0.32*	1.37	--	--	--	--	--	--
Legal variables								
One pre-stop indic. of crim activ†	--	--	--	--	0.27*	1.31	0.14	--
Multiple pre-stop indics.of crim activ†	--	--	--	--	1.00*	2.71	0.97*	2.64
Multiple pre-stop violations observed†	--	--	--	--	-0.06	--	-0.04	--
Pre-stop viol. obsv: Equipment†	--	--	--	--	0.27	--	0.56	--
Pre-stop viol. obsv: Following dist.†	--	--	--	--	0.54*	1.72	0.70*	2.02
Pre-stop viol. obsv: Failure to stop†	--	--	--	--	0.69*	2.00	1.00*	2.73
Pre-stop viol. obsv: Failure to yield†	--	--	--	--	0.04	--	-0.06	--
Pre-stop viol. obsv: Failure to signal†	--	--	--	--	0.93*	2.54	0.80	--
Pre-stop viol. obsv: Improper lane	--	--	--	--	0.78*	2.19	0.23	--
Pre-stop viol. obsv: other moving †	--	--	--	--	0.30	--	-0.17	--
Pre-stop viol. obsv: other†	--	--	--	--	0.46	--	0.62*	1.86
Reason for stop: non-moving violation	0.28*	1.32	0.38*	1.46	0.07	--	-0.28	--
Reason for stop: equipment violation	-0.14*	1.15	0.27*	1.32	0.21	--	0.24	--
Reason for stop: investigation	0.96*	2.62	1.15*	3.16	0.78*	2.18	0.49	--
Reason for stop: pre-existing info.	1.79*	5.96	1.75*	5.74	1.37*	3.92	0.61	--
Reason for stop: criminal offense	2.05*	7.78	2.11*	8.27	1.69*	5.39	1.50*	4.48
Evidence found during search	4.02*	55.83	3.82*	45.58	3.06*	21.43	3.99*	53.86
Vehicle Impounded (ARS 28-3511)†	--	--	--	--	1.78*	5.95	0.65*	1.92
Model Chi-square	20085.47*		2774.02*		3692.20*		2079.37*	
Nagelkerke R Square	.204		.179		.237		.283	

NOTE: Asterisks indicate statistically significant relationships * $p \leq .001$. All TraCS-only variables are noted with a †.

Searches & Seizures

Table 4.14 reports results for four logistic regression models predicting whether or not drivers were searched. As with the tables for arrests, the first model includes all cases from the merged KOTS and TraCS data and is comparable to the models produced for the Years 1 & 2 reports. The second model includes only cases from the TraCS data and examines the same variables used in the analyses of 2006 and 2007 data. In addition to modeling the likelihood of "any search" in Models 1 – 3, Model 4 predicts the likelihood of "discretionary search" only (i.e., non-mandatory, non-consent searches) using only TraCS data. A multivariate model predicting consent searches is presented and discussed in Section 5.

An examination of the Nagelkerke R-Square values for Models 1 – 3 shows that none of the models are particularly strong but the explanatory power of the multivariate models predicting searches is strongest in Model 3 (Nagelkerke R-Square = 0.191). The inclusion of the additional variables in TraCS has improved the explanatory power of the multivariate model predicting searches. Specifically, over 19% of the variation in whether or not drivers are searched can be predicted with the group of variables included in Model 3, compared to only 10-11% for Models 1 and 2. The findings discussed below refer to the results presented in Model 3 unless otherwise noted.

A number of legal variables show statistically significant and substantively important effects on the likelihood of being searched. First, as expected, one of the strongest predictors of whether or not officers conducted a search is the presence of multiple pre-stop indicators of possible criminal activity. Specifically, when officers observed two or more indicators of criminal activity prior to the stop, the likelihood of a search was 6.2 times higher than in stops involving no pre-stop indicators of criminal activity. In addition, drivers who were stopped for criminal offenses, pre-existing information, or reasons of investigation were 8.3, 6.1 and 2.8 times significantly more likely to be searched than those stopped for moving violations. Similar to the findings in the arrest models, the influence of these legal variables is intuitive, but it is important to statistically control for them so that the effects of other extralegal variables can be examined.

The multivariate results in Model 3 indicate that racial/ethnic disparities exist in whether or not searches are conducted even after controlling for legal factors. Hispanic, Native American, and Black drivers were all significantly more likely to be searched during officer-initiated traffic stops compared to Whites. Specifically, Hispanic, Native American, and Black drivers were 2.4, 2.5, and 2.3 times more likely to be searched compared to Whites given the same vehicle, stop and legal characteristics. It is important to note, however, that the strength of the Hispanic and Black race/ethnicity variables is somewhat diminished by the inclusion of the additional variables recorded in TraCS.

Two other driver characteristics showed statistically significant effects on the likelihood of a search that were even stronger than the race/ethnicity effects. Both driver demeanor and undocumented alien status were positively and strongly related to whether or not a search was conducted. Specifically, uncooperative or combative drivers were 6.3 times more likely

to be searched than drivers who were cooperative. Drivers who were undocumented aliens themselves or traveling with undocumented aliens were 3.6 times more likely to be searched than legal resident drivers.

As noted above, in addition to modeling the likelihood of "any search" we also estimated Model 4, which predicts discretionary searches only. More fully described in Section 5, discretionary searches are those guided by case law and/or legal statutes (e.g., probable cause, Terry, canine alert) but not mandated by DPS policy (vehicle inventory, incident to arrest) or based on drivers' consent.

As in the model for any search, Model 4 shows that legal reasons for the stop are also strong predictors of the likelihood of discretionary searches. The presence of multiple pre-stop indicators is an even stronger predictor of discretionary search than of any search. Specifically, when officers observed two or more indicators of criminal activity prior to the stop, the odds of a discretionary search were 11.7 times higher than in stops involving no pre-stop indicators of criminal activity (as compared to an odds ratio of 6.2 for any search in Model 3).

Substantial differences are evident in the effects of the race/ethnicity variables between Models 3 and 4. First, the statistically significant effect of the Native American race variable on the likelihood of search in Model 3 disappears when only discretionary searches are considered in Model 4. Second, although Hispanics are 2.4 times more likely to be subject to any search, they are only 1.4 times more likely than Whites to be searched based on discretionary reasons. While this remains a statistically significant effect, it is less substantively important. Finally, Blacks are 2.3 times more likely to be subjected to any search than Whites, but 3.1 times more likely than Whites to be searched based on discretionary reasons.[29] These findings suggest that there are racial/ethnic differences in the types of searches conducted. Analyses examining racial/ethnic differences in searches are explored more fully in Section 5.

It is plausible that DPS officers, either overtly or subconsciously, hold different thresholds for discretionary searches for different racial/ethnic groups. For example, Smith and Alpert (2007) proposed a theory of police behavior, rooted in social–psychological research on stereotypes, which suggests that officers have unintentional but biased response to minority citizens. Specifically, they suggest that police may develop subconscious, cognitive scripts based on exposure to societal or media conceptions about particular groups, vicarious experiences, and their own personal contacts with groups that they repeatedly encounter in situations involving criminal activity (see also, Smith, Makarios, & Alpert, 2006). These scripts are easily recalled in individual stops and may cause officers to be more likely to be suspicious of specific minority group members. It has been argued that this differential

[29] A statistical model predicting discretionary searches (not shown) that excludes the additional explanatory variables available in TraCS shows Hispanic and Black drivers were 1.6 and 3.4 times more likely to be subject to a discretionary search compared to White drivers. As the size of the odds ratios decreases with the inclusion of the TraCS variables (shown in Model 4), this demonstrates that as our statistical models are able to include more relevant legal and extralegal information that has historically been absent from racial profiling data collection efforts the reported impact of race/ethnicity decreases.

assessment of suspicion therefore can affect police decision making and produce disparate outcomes among racial/ethnic groups. When applied to searches, the social conditioning theory would suggest that some of the racial/ethnic disparity in Type II searches could be due to officers relying on these cognitive scripts that unintentionally cause them to differentially assess the suspiciousness of stops with members of different racial/ethnic groups. The DPS has already recognized this possibility and accordingly specifically focused its 2009 Advanced Officer Training on this issue. All DPS officers were provided training on cultural considerations for policing, in general, and effective and culturally responsible criminal interdiction, more specifically. This training may have an effect on the observed racial/ethnic disparities in searches that could be observed in the 2009 data, which would be analyzed as part of a contract extension for a Year 4 report.

Table 4.14: Multivariate Logistic Analyses Predicting SEARCHES During Officer-Initiated Traffic Stops in 2008

	MODEL 1 (n=532,500)		MODEL 2 (n=138,920)		MODEL 3 (n=138,900)		MODEL 4 (n=138,902)	
Variables	**Coeff.**	**Odds ratio Exp(b) or 1/Exp(b)**	**Coeff.**	**Odds ratio Exp(b) or 1/Exp(b)**	**Coeff.**	**Odds Ratio Exp (b) or 1/Exp (b)**	**Coeff.**	**Odds Ratio Exp (b) or 1/Exp (b)**
Intercept	-3.40*		-3.58*		-4.22*		-5.59*	
Driver Characteristics								
Hispanic	1.09*	2.96	1.15*	3.16	0.88*	2.40	0.30*	1.35
Native American	0.91*	2.48	0.81*	2.25	0.90*	2.46	-0.39	--
Black	0.85*	2.34	0.93*	2.53	0.85*	2.34	1.14*	3.13
Other Race	-0.02	--	-0.10	--	-0.08	--	0.06	--
Male	0.65*	1.92	0.59*	1.81	0.47*	1.59	0.97*	2.64
Age	-0.02*	1.03	-0.22*	1.25	-0.22*	1.25	-0.02*	1.02
Demeanor†	--	--	--	--	1.83*	6.25	0.39	--
County resident	0.03	--	0.01	--	-0.07	--	-0.50*	1.65
AZ resident	0.19*	1.20	0.35*	1.42	0.29*	1.34	-0.13	--
Undocumented Alien Status	--	--	--	--	1.28*	3.58	-0.32	--
Vehicle Characteristics								
Truck/Tractor Trailer	-0.62*	1.87	-0.98*	2.66	-0.84*	2.33	-1.10*	3.00
Van/Station Wagon	-0.15*	1.16	-0.15*	1.17	-0.13*	1.14	-0.28	--
Other Vehicle Type	-0.23	--	-0.59*	1.80	-0.65*	1.91	-0.74	--
Vehicle Age†	--	--	--	--	0.05*	1.05	0.01	--
Vehicle Condition†	--	--	--	--	0.73*	2.06	0.58*	1.79
Stop Characteristics								
Night-time	0.35*	1.42	0.33*	1.39	0.26*	1.30	0.24	--
Weekend	0.08*	1.08	0.03	--	0.04	--	-0.13	--
Spring	0.09*	1.10	--	--	--	--	--	--
Summer	0.00	--	--	--	--	--	--	--
Fall	-0.05	--	--	--	--	--	--	--
Legal variables								
One pre-stop indic. of crim activ†	--	--	--	--	0.41*	1.51	0.48*	1.61
Multiple pre-stop indics.of crim activ†	--	--	--	--	1.82*	6.17	2.46*	11.69
Multiple pre-stop violations observed†	--	--	--	--	0.35*	1.42	0.19	--
Pre-stop viol. obsv: Equipment†	--	--	--	--	-0.09	--	0.03	--
Pre-stop viol. obsv: Following dist.†	--	--	--	--	0.66*	1.93	1.04*	2.83
Pre-stop viol. obsv: Failure to stop†	--	--	--	--	0.36*	1.43	0.38	--
Pre-stop viol. obsv: Failure to yield†	--	--	--	--	0.72*	2.05	-0.44	--
Pre-stop viol. obsv: Failure to signal†	--	--	--	--	0.17	--	-0.16	--
Pre-stop viol. obsv: Improper lane chg.†	--	--	--	--	0.98*	2.66	0.30	--
Pre-stop viol. obsv: other moving †	--	--	--	--	0.48*	1.62	0.19	--
Pre-stop viol. obsv: other†	--	--	--	--	0.31*	1.36	0.18	--
Reason for stop: non-moving violation	0.55*	1.73	0.52*	1.67	0.46*	1.58	0.21	--
Reason for stop: equipment violation	0.14*	1.15	0.00	--	0.26*	1.29	0.02	--
Reason for stop: investigation	1.12*	3.07	1.21*	3.35	1.03*	2.80	1.29*	3.62
Reason for stop: pre-existing info.	2.12*	8.31	1.94*	6.94	1.81*	6.10	1.72*	5.56
Reason for stop: criminal offense	2.30*	0.10	2.40*	10.99	2.12*	8.34	1.18*	3.26
Model Chi-square	18461.58*		4991.23*		9216.20*		1004.56	
Nagelkerke R Square	0.100		0.105		0.191		0.109	

Note: Asterisks indicate statistically significant relationships * $p \leq .001$. All TraCS-only variables are noted with a †.

Table 4.15 reports results for three logistic regression models predicting whether or not a search resulted in a seizure. As with previous tables, the first model includes all cases from the merged KOTS and TraCS data and is comparable to the models produced for the Years 1 & 2 reports. The second model includes only cases from the TraCS data and examines the same variables used in the analyses of 2006 and 2007 data. One difference between the seizure models and previous multivariate tables is that these analyses only include cases that resulted in a search. The model predicts the likelihood of a seizure given that a search occurred. Because the number of stops resulting in searches is significantly smaller than the total number of stops, the statistical significance of coefficients is evaluated at $p < .05$, $p < .01$, and $p < .001$. Ideally we would examine models that predict seizures based only on non-mandatory searches; given the small number of these types of searches in the TraCS data, however, these analyses are not possible at this time.
An examination of the Nagelkerke R-Square values for Models 1 – 3 shows that all of the models explain a minimal amount of the variance in seizures. Model 3, however, remains the strongest of the three (Nagelkerke R-Square = 0.096). The inclusion of the additional variables in TraCS has modestly improved the explanatory power of the multivariate model predicting seizures. Specifically, slightly less than 10% of the variation in whether or not searches result in a seizure can be predicted with the group of variables included in Model 3, compared to only 7.3% and 4.9% in Models 1 and 2, respectively.

The strongest predictor of whether a search resulted in contraband is the presence of multiple pre-stop indicators of possible criminal activity. Specifically, when officers observed two or more indicators of criminal activity prior to the stop, the likelihood of a seizure was 2.9 times higher than in stops involving no pre-stop indicators of criminal activity. In addition, drivers who were stopped for criminal offenses or pre-existing information were 1.8 times significantly more likely to be found with contraband during a search than those stopped for moving violations. Drivers observed for a failure to yield violation prior to the stop were 1.9 times more likely to be found with contraband than those observed for a speeding violation prior to the stop.

Turning to the effects of driver characteristics, Model 3 shows statistically significant effects of race/ethnicity, demeanor, and residency. Specifically, Hispanic drivers and drivers of Other races were both 1.8 times less likely to be discovered with contraband when compared to White drivers. Uncooperative or combative drivers were 1.5 times more likely to be found with contraband when compared to cooperative drivers. Drivers stopped in the county in which they reside and Arizona residents were 1.5 and 1.4 times less likely, respectively, to be found with contraband when compared to non-county and non-state residents. Note again, however, that the overall model explains a very small amount of the variance – therefore, there are multiple factors that explain the discovery of contraband that are not included in this model. As a result, the real impact of drivers' race/ethnicity on the likelihood of discovering contraband remains largely unknown.

Table 4.15: Multivariate Logistic Analyses Predicting SEIZURES During Officer-Initiated Traffic Stops in 2008

	MODEL 1 (n=28,634)		MODEL 2 (n=7,257)		MODEL 3 (n=7,254)	
Variables	**Coeff.**	**Odds ratio Exp(b) or 1/Exp(b)**	**Coeff.**	**Odds ratio Exp(b) or 1/Exp(b)**	**Coeff.**	**Odds Ratio Exp (b) or 1/Exp (b)**
Intercept	-0.61***		-0.52***		-0.75***	
Driver Characteristics						
Hispanic	-0.51***	1.67	-0.58***	1.78	-0.57***	1.77
Native American	-0.31***	1.37	-0.12	--	-0.12	--
Black	-0.03	--	-0.21	--	-0.22	--
Other Race	-0.12	--	-0.54*	1.72	-0.56*	1.76
Male	0.20***	1.23	0.25**	1.28	0.26**	1.30
Age	-0.01***	1.01	-0.02***	1.02	-0.02***	1.02
Demeanor†	--	--	--	--	0.40**	1.48
County resident	-0.39***	1.48	-0.46***	1.58	-0.41***	1.50
AZ resident	-0.32***	1.37	-0.40***	1.50	-0.34***	1.40
Undocumented Alien Status	--	--	--	--	-0.16	--
Vehicle Characteristics						
Truck/Tractor Trailer	-0.23**	1.25	0.20	--	0.25	--
Van/Station Wagon	0.12*	1.13	0.20*	1.22	0.16	--
Other Vehicle Type	-0.07	--	0.22	--	0.17	--
Vehicle Age†	--	--	--	--	-0.02*	1.02
Vehicle Condition†	--	--	--	--	0.25*	1.28
Stop Characteristics						
Night-time	0.11***	1.12	0.19**	1.21	0.23*	1.26
Weekend	-0.09*	1.09	0.02	--	0.02	--
Spring	0.02	--	--	--	--	--
Summer	-0.08	--	--	--	--	--
Fall	-0.18***	1.19	--	--	--	--
Legal variables						
One pre-stop indicator of criminal activity†	--	--	--	--	0.08	--
Multiple pre-stop indicators of crim. activity†	--	--	--	--	1.06***	2.89
Multiple pre-stop violations observed†	--	--	--	--	-0.06	--
Pre-stop viol. observed: Equipment†	--	--	--	--	0.19	--
Pre-stop viol. observed: Follow. distance†	--	--	--	--	0.21	--
Pre-stop viol. observed: Failure to stop†	--	--	--	--	0.29	--
Pre-stop viol. observed: Failure to yield†	--	--	--	--	0.62*	1.86
Pre-stop viol. observed: Failure to signal†	--	--	--	--	0.16	--
Pre-stop viol. observed: Improper lane chg.†	--	--	--	--	0.20	--
Pre-stop viol. observed: other moving†	--	--	--	--	-0.02	--
Pre-stop viol. observed: other†	--	--	--	--	0.13	--
Reason for stop: non-moving violation	-0.32***	1.37	-0.49*	1.63	-0.48**	1.62
Reason for stop: equipment violation	-0.24***	1.27	-0.39*	1.48	-0.40	--
Reason for stop: investigation	0.31**	1.37	0.26	--	0.20	--
Reason for stop: pre-existing information	0.51***	1.66	0.54*	1.71	0.60*	1.82
Reason for stop: criminal offense	0.73***	2.07	0.69*	1.99	0.59**	1.80
Model Chi-square	860.49*		323.02*		428.54*	
Nagelkerke R Square	.049		.073		.096	

Note: Asterisks indicate statistically significant relationships * $p < .05$, ** $p < .01$, *** $p < .001$. All TraCS-only variables are noted with a †.

Some have argued that while undocumented aliens are not contraband per se, they are still engaged in criminal activity (i.e., they are in the country illegally), and therefore should be counted as a "successful hit" for search rates. Based on this proposition, we have estimated a final multivariate logistic model using only TraCS data that predicts whether contraband *or* undocumented aliens are discovered given that a search is conducted. These results are displayed in Table 4.16.

The explanatory power of this model is similar to Model 3 presented in Table 4.15 above. Specifically, about 10% of the variance in whether searches result in the discovery of contraband or undocumented aliens is explained by the variables included in the model below. Like Model 3 above, the strongest predictor of the discovery of contraband or undocumented aliens is the observation of multiple pre-stop indicators of possible criminal activity. Specifically, when officers observed two or more indicators of criminal activity prior to the stop, the likelihood of a contraband seizure or discovery of undocumented aliens was 2.3 times higher than in stops involving no pre-stop indicators of criminal activity. Unlike Model 3 above, however, only one of the legal reasons for the stop is a statistically significant predictor of the discovery of contraband or undocumented aliens. Specifically, drivers stopped for non-moving violations were 1.5 times less likely to be found with contraband or undocumented aliens compared to those stopped for moving violations.

Turning to the effects of driver characteristics, Table 4.16 shows that, unlike the model based on contraband seizures only, Hispanic drivers are now 1.9 times *more* likely to be discovered with contraband or undocumented aliens when compared to White drivers. Uncooperative or combative drivers were 1.6 times more likely to be found with contraband or undocumented aliens when compared to cooperative drivers. Note again, however, that this is a statistically weak model overall, and the real impact of drivers' race/ethnicity on the likelihood of discovering contraband is largely unknown.

Table 4.16: Multivariate Logistic Analyses Predicting the Discovery of Contraband or UDAs During Officer-Initiated Traffic Stops that Resulted in Searches in 2008 (n=7,254)

Variables	Coeff.	Odds Ratio Exp (b) or 1/Exp (b)
Intercept	-1.00*	
Driver Characteristics		
Hispanic	0.64***	1.90
Native American	-0.12	--
Black	-0.17	--
Other Race	-0.28	--
Male	0.43*	1.53
Age	-0.02*	1.02
Demeanor†	0.47*	1.60
County resident	-0.04	--
AZ resident	-0.42*	1.51
Vehicle Characteristics		
Truck/Tractor Trailer	-0.09	--
Van/Station Wagon	0.11	--
Other Vehicle Type	0.08	--
Vehicle Age†	0.02***	1.02
Vehicle Condition†	0.25**	1.28
Stop Characteristics		
Night-time	0.10	--
Weekend	-0.03	--
Spring	--	--
Summer	--	--
Fall	--	--
Legal variables		
One pre-stop indicator of criminal activity†	0.17**	1.18
Multiple pre-stop indicators of crim. activity†	0.83***	2.30
Multiple pre-stop violations observed†	-0.06	--
Pre-stop viol. observed: Equipment†	0.16	--
Pre-stop viol. observed: Following distance†	0.08	--
Pre-stop viol. observed: Failure to stop†	0.34	--
Pre-stop viol. observed: Failure to yield†	0.15	--
Pre-stop viol. observed: Failure to signal†	-0.07	--
Pre-stop viol. observed: Improper lane chg.†	0.20*	1.22
Pre-stop viol. observed: other moving†	0.14	--
Pre-stop viol. observed: other†	0.14	--
Reason for stop: non-moving violation	-0.43**	1.54
Reason for stop: equipment violation	-0.29	--
Reason for stop: investigation	0.11	--
Reason for stop: pre-existing information	0.19	--
Reason for stop: criminal offense	0.26	--
Model Chi-square	527.13*	
Nagelkerke R Square	0.100	

Note: Asterisks indicate statistically significant relationships * $p < .05$, ** $p < .01$, *** $p < .001$. All TraCS-only variables are noted with a †.

The weak overall ability of these models to predict whether or not drivers are searched and contraband is found indicates that they are likely misspecified. Despite the interdiction-related variables included in TraCS (e.g., observation of pre-stop indicators of suspicion, presence of undocumented aliens, etc.), it is expected that there are still other factors central to explaining searches and seizures that have not been included in the data collection. Indeed, officers who participated in the focus group sessions indicated a number of factors, not included on the data collection form, that influence their decision to search or request consent to search as well as the likelihood of finding contraband. For example, while pre-stop indicators of suspicion are included in TraCS, indicators of possible criminal activity that are discovered *during* the stop are not. Officers participating in the focus group session emphasized the importance of considering multiple types of indicators and the totality of the circumstances in determining when to conduct a search. Focus group participants also indicated a number of reasons that searches may not produce contraband seizures including:

- Searches conducted due to policy or officer safety that officers have little or no discretion over conducting and generally do not expect to uncover contraband
- Drug traffickers' use of sophisticated hidden compartments
- Motorist admits illegal behavior or has trace amounts of contraband that officers cannot or do not record as contraband
- Officer inexperience or misinterpretation of cues of suspicion
- Criminal activity is not current (e.g., drugs have recently been delivered and are no longer in the vehicle)

Despite a small increase in the explanatory power of the search and seizure models once the TraCS variables are included, very few of the variables included in any of the statistical models can be considered strong predictors of these outcomes. Given the limited ability of the multivariate statistical models to provide a clear understanding of DPS searches and seizures, additional analyses examining these outcomes are discussed in Section 5.

SECTION SUMMARY

This summary highlights the findings regarding analyses of post stop outcomes for drivers stopped in 2008. When reviewing these results, it is important to remember that the bivariate analyses only consider two variables at a time (e.g., the race of the driver and the post-stop outcome). As a result, the interpretation of these findings should be made with caution and cannot determine the existence of racial bias. The multivariate analyses are better suited to make substantive claims about the results of the post-stop outcomes due to their consideration of more than one factor simultaneously. Nevertheless, the multivariate analyses are limited by the type and amount of data collected. Thus, multivariate analyses can demonstrate racial/ethnic disparities that exist after statistically controlling for other factors measured with these data that might influence officer decision making.

Bivariate Analyses – Differences in Outcomes across Types of Drivers

- At the department level, statistically significant racial/ethnic differences are evident for the most severe outcome received.

  - Hispanics were significantly less likely than other racial/ethnic groups to have a warning be the most severe outcome received.
  - Hispanics and Native Americans were significantly more likely than Whites and Blacks to have repair orders or DVERs as the most severe outcome received.
  - Hispanics and Blacks were significantly more likely than Whites and Native Americans to have a citation as the most severe outcome received
  - Hispanics, Native Americans, and Blacks were all significantly more likely than Whites to have arrest as the most serious outcome received.
- Hispanic drivers were the least likely to be issued warnings (35.9% of stops) compared to White (44.8%), Black (41.3%), and Native American (41.4%) drivers.
- Native Americans were the most likely to be issued repair orders (29.9% of stops) compared to Black (14.3%), White (17.2%), and Hispanic (21.7%) drivers.
- Blacks and Hispanics were the most likely to receive citations (45.2% and 43.9% of stops, respectively) compared to 39.7% of Native Americans and 39.9% of Whites.
- Hispanic, Native American and Black drivers were significantly more likely than White drivers to be arrested and searched.
  - Native Americans were the most likely to be arrested (4.5%), followed by Blacks (3.2%), Hispanics (2.9%), and Whites (1.6%).
  - Hispanics were the most likely to be searched (10.0% of stops), followed by Blacks (8.0%), Native Americans (7.7%), and Whites (3.3%).

Multivariate Analyses of Traffic Stop Outcomes

- Warnings
  - The strongest predictors of whether or not drivers receive warnings were legal variables, including: whether multiple pre-stop indicators of possible criminal activity were observed, the types of pre-stop traffic violations observed, and the legal reasons for the stop.
  - Drivers who were uncooperative or combative were 4.4 times less likely to receive a warning compared to drivers who were cooperative.
  - Hispanic, Black, and drivers of other race/ethnicity were significantly *less* likely compared to Whites to receive warnings, but these relationships are not substantively strong.

- Repair Orders
  - The strength of the models predicting repair orders is driven primarily by the reason for stop and type of pre-stop traffic violations observed. Drivers stopped for equipment violations or observed for a pre-stop equipment violation were substantially *more* likely to receive a repair order compared to those stopped for moving violations or observed for pre-stop speeding violations.
  - Hispanic and Black drivers were significantly less likely compared to Whites to be issued repair orders, but again these relationships are not substantively strong.
  - Native American drivers were approximately two times more likely to be issued repair orders compared to Whites.
  - Uncooperative or combative drivers were 2.2 times *less* likely to be issued repair orders compared to cooperative drivers.

  - Drivers who were undocumented aliens or traveling with undocumented aliens were 2.6 times *less* likely to be issued a repair order than legal resident drivers.

- Citations
  - The models predicting the likelihood of *any* citation are largely driven by legal variables (e.g., reason for stop, number of pre-stop violations, seizure of evidence and vehicle impound). The strength of the race/ethnicity variables indicate that these are not substantively strong predictors of the odds of receiving any citation.
  - Bivariate analyses indicated that Hispanics, Blacks and Native Americans were significantly more likely than Whites to be issued multiple citations. In order to disentangle the impact of race/ethnicity on the likelihood of receiving citations a multinomial logistic regression analysis compared the probability of receiving one, two, and three or more citations compared to none.
  - Across these models, the strongest predictors of the number of citations issued to drivers were legal variables (e.g., whether vehicle was impounded, driver stopped for a criminal offense, whether evidence seized, and # of pre-stop violations).
  - Uncooperative or combative drivers were more than 3 times more likely than cooperative drivers to receive one, two, and three citations compared to none.
  - The impact of drivers' race/ethnicity increased as the number of citations increased. Hispanic and Black drivers were only 1.1 times more likely than White motorists to receive one citation (substantively insignificant differences), but 1.8 times more likely to receive three or more citations compared to none.
    - Statistical models that exclude the additional explanatory variables available in TraCS suggest that Hispanic and Black drivers were 3.1 and 2.2 times more likely to receive three citations compared to White drivers.
    - This is an important comparison because it demonstrates that as racial profiling data collection efforts capture more relevant legal and extralegal information that has historically been absent (e.g. driver demeanor, undocumented alien status, the number and types of pre-stop violations observed) the reported impact of race/ethnicity decreases substantially.
    - It is likely that most of the racial/ethnic disparities reported in traffic citations can be explained by factors other than drivers' race/ethnicity.

- Arrests
  - The strongest factor associated with arrest is the discovery of contraband – drivers discovered with contraband were over 21 times *more* likely to be arrested compared to drivers without contraband. Vehicle impounds, reason for the stop, and the presence of multiple pre-stop indicators of possible criminal activity were also strong predictors of the likelihood of arrest.
  - More relevant for this study is the strength of the race coefficients after these legal variables (and other variables related to the stop, vehicle, and driver) are considered.
    - Native American and Black drivers were 3.2 and 1.9 times more likely to be arrested, respectively, compared to Whites. Once the additional variables recorded in TraCS are considered in the multivariate model, the effect of being Hispanic on the likelihood of arrest disappears.

  - Driver demeanor also shows a statistically significant effect on the likelihood of arrest as uncooperative or combative drivers were 3.6 times significantly more likely to be arrested compared to cooperative drivers.
  - Examining a model that predicts only non-warrant, non-DUI, discretionary arrests, the effect of the Native American race variable on the likelihood of being arrested is diminished. Although still a substantively important effect, Native Americans are 2.4 times more likely to be arrested for non-warrant, non-DUI arrests when compared to Whites (as compared to 3.2 times more likely for any arrest). This is likely due to the strong relationship between Native American drivers and the likelihood of being cited and/or arrested for DUI violations.

- Searches
  - The search models are relatively weak in predictive power, indicating that multiple additional factors predicting whether or not a search is conducted are not measured in these data. Despite this limitation, a number of legal variables show statistically significant and substantively important effects on the likelihood of being searched. For example, when officers observed two or more indicators of criminal activity prior to the stop, the likelihood of a search was 6.2 times higher than in stops involving no pre-stop indicators of criminal activity.
  - Hispanic, Native American, and Black drivers were 2.4, 2.5, and 2.3 times *more* likely to be searched compared to Whites, all else being equal.
    - The strength of the Hispanic and Black race/ethnicity variables is somewhat diminished by the inclusion of the additional variables recorded in TraCS.
  - Uncooperative or combative drivers were 6.3 times more likely to be searched, and undocumented aliens or those traveling with UDAs were 3.6 times more likely to be searched, when compared to cooperative drivers and legal residents.
  - When a model predicting discretionary searches (e.g., non-mandatory, non-consent) only is examined, substantial differences are evident in the effects of the race/ethnicity variables.
    - The effect of being Native American is no longer significant.
    - The effect of being Hispanic decreases from 2.4 times more likely to be subject to any search to 1.4 times more likely to be searched based on discretionary reasons.
    - While Blacks are 2.3 times more likely than Whites to be subjected to any search, they are 3.1 times more likely to be searched based on discretionary reasons.
    - These findings suggest that there are racial/ethnic differences in the types of searches, which is more fully explored in Section 5.

- Seizures
  - The multivariate models separately predicting contraband seizures and the discovery of contraband *or* the discovery of undocumented aliens explain only a minimal amount of variance. These weak statistical models indicate that multiple additional factors predicting whether or not contraband or undocumented aliens are discovered are not measured in these data. The strongest predictor of both outcomes is the presence of multiple pre-stop indicators of possible criminal

activity. Drivers observed with two or more indicators of criminal activity prior to the stop were 2.9 times more likely to have evidence seized and 2.3 times more likely to have evidence *or* UDAs discovered than those with no pre-stop indicators of criminal activity.

- Hispanic drivers and drivers of "Other" races were both 1.8 times less likely to be discovered with contraband when compared to White drivers, but Hispanics were 1.9 times *more* likely than White drivers to be found with contraband or UDAs.
- The small amount of variance explained indicates there are multiple factors that explain the discovery of contraband and/or undocumented aliens that are not included in these models. As a result, the real impact of drivers' race/ethnicity on the likelihood of discovering contraband remains largely unknown. Further examination of disparities in seizure rates will be explored using the outcome test in Section 5.

- Although some racial/ethnic disparities in traffic stop outcomes have been reported, the specific reasons for the racial/ethnic disparities cannot be fully determined with these data. Racial / ethnic differences in stop outcomes may (or may not) be explained by factors unmeasured by these data or officer bias toward specific minority groups. As noted previously, the multivariate models can only measure the influence of variables for which data is collected.

5. SEARCH & SEIZURE ANALYSES

OVERVIEW

The material presented in this section is focused specifically on searches conducted during officer-initiated traffic stops. As reported in Section 4, 5.4% of all member-initiated traffic stops during 2008 resulted in a search of the driver, vehicle or passenger.[30] Additionally, the results of the multivariate analysis in Section 4 indicate that after controlling for other relevant legal and extralegal factors captured on the data collection form, Hispanic, Black and Native American drivers are at least two times more likely than Whites to be searched. The purpose of the following analyses is to further examine searches and seizures conducted by DPS officers.

Section 5 begins with a description of searches and seizures at the department, division, bureau, and district/shift levels. This information is documented in Tables 5.1 – 5.4, as well as Figures 5.1 – 5.4. Thereafter, searches are categorized into three types and statistically examined. Type I searches involve little or no officer discretion. Type II searches are discretionary searches guided by case law or legal statutes. Type III searches are based solely on drivers' consent to request to search. Figure 5.5 reports the search rates for each of the three types of searches at the department and bureau level. Figure 5.6 and Table 5.5 document at the department and bureau level the racial/ethnic and gender differences in search rates by these three types of searches.

Finally, search success rates are explored in detail. Table 5.6 and Figure 5.7 report the search success rates by the reason for search at the department, division and bureau level. Search success rates for Type II searches are examined in Figures 5.8 – 5.9 and Table 5.7. Thereafter, an examination of consent searches (Type III) is provided. Table 5.8 provides a descriptive overview of the number of consent search requests, percent of search requests audio or video recorded, percent of consent requests refused, percent of search requests where driver signed form, and number of consent searches conducted. Racial and ethnic differences in requests for consent to search and consent refusal rates are examined in Figures 5.10 and 5.11. Table 5.9 reports the results of a multivariate analysis of Type III searches. Search success rates for Type III searches are examined in Figures 5.12 – 5.13 and Table 5.10. Figures 5.14 and 5.15 explore the search and search success rates based on different types of violations. Finally, Figures 5.16 – 5.19 provide an overview of search rates and search success rates for undocumented aliens. Section 5 concludes with a summary of the main findings.

As described in Section 2, the transition by DPS to the electronic TraCS data collection system in October 2008 provides more detailed information about searches than was previously collected in KOTS. Specifically, the TraCS search data differs from KOTS in that information regarding whether a search was performed, the search authority for that search,

[30] Only searches captured on the KOTS contact forms with drivers were included for analyses. It is assumed that passengers searched would be captured on these forms. If forms for passengers were included, there would be multiple searches included in the data base for a single traffic stop. The research team assumed that if a passenger is searched and contraband is found on that passenger, this information is captured on the drivers' contact data form. The TRACS data collection form specifically included data fields designed to capture information regarding passenger searches in addition to drivers and vehicles.

and whether contraband was seized during that search are now collected individually for each possible search target within a stop, rather than confounded into single data fields for all searches that occur during a single stop. Unfortunately, due to the statistical infrequency of searches and the availability of only three months of the TraCS data, analyses of this information are not available at this time.

DESCRIPTION OF SEARCHES AND SEIZURES

Searches

This section provides a descriptive overview of the searches conducted by DPS officers during traffic stops in 2008. Table 5.1 and Figure 5.1 describe the frequency of each reason for a search at the department, division, bureau, and district/shift level. Table 5.2 describes the frequency of pre-stop indicators of possible criminal activity during all stops and the percent of these stops that resulted in searches. Figure 5.2 displays the search targets involved in DPS searches during traffic stops.

Reasons for the Search

Table 5.1 reports the total number of traffic stops, the percentage of stops that result in a search, and the total number of searches at the department, division, bureau, and district/shift levels. This table also documents the percentage of searches for each reason indicated on the data collection forms (e.g., consent, incident to arrest, probable cause, Terry, vehicle inventory, plain view, warrant, and canine alert) by each organizational unit.[31]

As shown in Table 5.1, DPS officers conducted a total of 29,173 searches of drivers, vehicles, and/or passengers during officer-initiated traffic stops in 2008 (5.4% of the 539,344 officer-initiated traffic stops). Variation in these percentages is evident at the different organizational levels. Motorists stopped by the Criminal Investigations Division (21.1%) were approximately 4 times as likely to be searched compared to those stopped by the Highway Patrol Division (5.3%). It is important to note, however, that the overwhelming majority of searches were conducted by officers assigned to the Highway Patrol Division. At the bureau level, the Commercial Vehicle Bureau and the Northern Bureau conducted the smallest and largest percentages of searches (2.4% and 3.9%, respectively). At the district/shift level, the percent of traffic stops resulting in searches range from a low of 0.7% in District 17 to a high of 18.3% in the Canine District.

[31] Officers may have indicated that a search was conducted for multiple reasons. As a result, the sum of percentages across search categories reported in Table 5.1 may exceed 100%. The last column in Table 5.1 indicates the percentage of searches that were conducted based solely on drivers' consent. This column partially duplicates information provided in the "consent" column, but excludes searches that were conducted based on consent and any other (i.e., non-consent) reason.

Table 5.1: Reasons for 2008 Traffic Stop Searches – Statewide, Division, Bureaus, & Districts/Shifts

	Total # of Stops	% Stops resulting in Searches	Total # of Searches	% Consent	% Incident to Arrest	% Probable Cause	% Terry	% Vehicle Inventory	% Plain View	% Warrant	% Canine Alert	% Consent Only
DPS Statewide	539,344	5.4	29,173	14.4	38.1	10.9	10.5	56.2	2.4	0.1	2.1	11.8
Crim. Invest. Division	3,750	21.1	787	25.1	29.3	20.9	15.4	38.7	4.7	0.1	2.7	18.7
Highway Patrol Division	533,201	5.3	28,242	14.1	38.3	10.7	10.4	56.8	2.3	0.1	2.1	11.6
Northern Bureau	163,653	3.9	6,392	13.3	41.3	13.6	9.7	51.7	2.6	0.1	1.5	10.7
D1-Kingman	30,641	4.5	1,387	19.6	37.7	13.8	13.4	46.9	1.9	0.1	0.7	14.0
D2-Flagstaff	33,180	3.9	1,290	9.2	48.4	14.1	5.0	46.4	1.1	0.0	2.3	8.4
D3-Holbrook	38,959	4.1	1,591	12.0	40.6	13.2	6.2	51.6	2.4	0.2	2.1	10.1
D11-Globe	27,980	2.2	602	23.0	37.8	8.5	10.2	45.3	8.3	0.2	1.3	18.3
D12-Prescott	32,752	4.6	1,518	8.7	40.6	15.2	13.6	63.5	2.5	0.1	1.0	7.1
Metro West Bureau	80,971	7.3	5,918	4.6	42.8	7.6	11.4	70.1	1.6	0.0	0.6	3.2
Shift #1	33,688	4.8	1,609	4.0	42.4	10.9	8.5	64.8	1.3	0.0	0.1	3.2
Shift #2	32,600	7.6	2,481	5.3	34.9	7.1	9.9	72.6	1.4	0.0	1.1	3.6
Shift #3	14,442	12.6	1,815	4.2	54.2	5.5	16.1	71.6	2.0	0.1	0.2	2.5
Southern Bureau	167,702	4.9	8,172	14.7	31.9	10.3	10.5	60.9	3.1	0.1	1.4	11.6
D4-Yuma	44,810	3.2	1,413	15.0	32.9	19.4	19.0	52.2	3.4	0.1	3.6	9.8
D6-Casa Grande	43,960	5.2	2,281	19.9	22.4	6.9	11.1	59.2	5.7	0.0	0.8	15.8
D8-Tucson	47,830	6.4	3,072	10.1	35.1	8.2	7.1	67.8	1.3	0.1	0.8	8.9
D9-Sierra Vista	30,620	4.5	1,385	15.4	39.3	11.1	8.5	57.5	2.2	0.1	1.7	12.1
Comm. Vehicle Bureau	24,911	2.4	606	44.1	14.9	20.5	7.1	15.5	7.6	0.8	6.9	40.8
District 15	9,379	3.6	335	34.9	13.7	22.7	10.1	20.6	11.0	1.2	7.5	31.3
District 16	13,384	1.3	171	48.2	22.9	17.1	3.5	13.5	4.7	0.6	5.9	44.1
District 17	585	0.7	4	0.0	50.0	0.0	0.0	25.0	25.0	0.0	0.0	0.0
Metro East Bureau	533,201	7.5	7,132	19.3	41.1	10.2	10.3	49.0	1.4	0.2	4.3	16.9
Shift #1	13,847	5.6	771	4.0	44.9	7.0	20.9	64.3	1.2	0.0	0.3	3.4
Shift #2	25,143	6.5	1,628	3.1	47.0	5.3	10.2	70.1	1.0	0.1	0.1	2.3
Shift #3	19,511	8.7	1,696	2.6	62.7	6.8	16.0	59.0	1.7	0.0	0.2	1.4
Metro Motors	26,580	4.3	1,151	3.9	55.8	9.2	2.9	59.4	1.0	0.7	0.2	3.3
Canine	10,298	18.3	1,885	64.1	6.2	19.4	5.6	9.1	1.9	0.1	15.7	57.3
Canine North	3,035	11.7	356	54.8	8.7	41.3	13.8	4.5	2.0	0.0	30.1	42.1
Canine Central & South	7,232	21.1	1,523	66.5	5.5	14.2	3.7	10.3	1.9	0.1	12.3	61.0

As shown in Table 5.1 and graphically displayed in Figure 5.1, more than half of all searches performed across the department were vehicle inventory (56.2%). Over one-third of the searches were conducted incident to arrest (38.1%). Both of these types of searches are mandatory for officers to conduct; therefore, the overwhelming majority of searches conducted department-wide involve no officer discretion. Other less common reasons for searches included consent (14.4%) consent *only* (11.8%), probable cause (10.9%) and Terry (10.5%). The least common reasons for searches included plain view (2.4%), canine alert (2.1%), and search warrant (0.1%).

Figure 5.1: Reasons for 2008 Traffic Stop Searches (n=29,173)

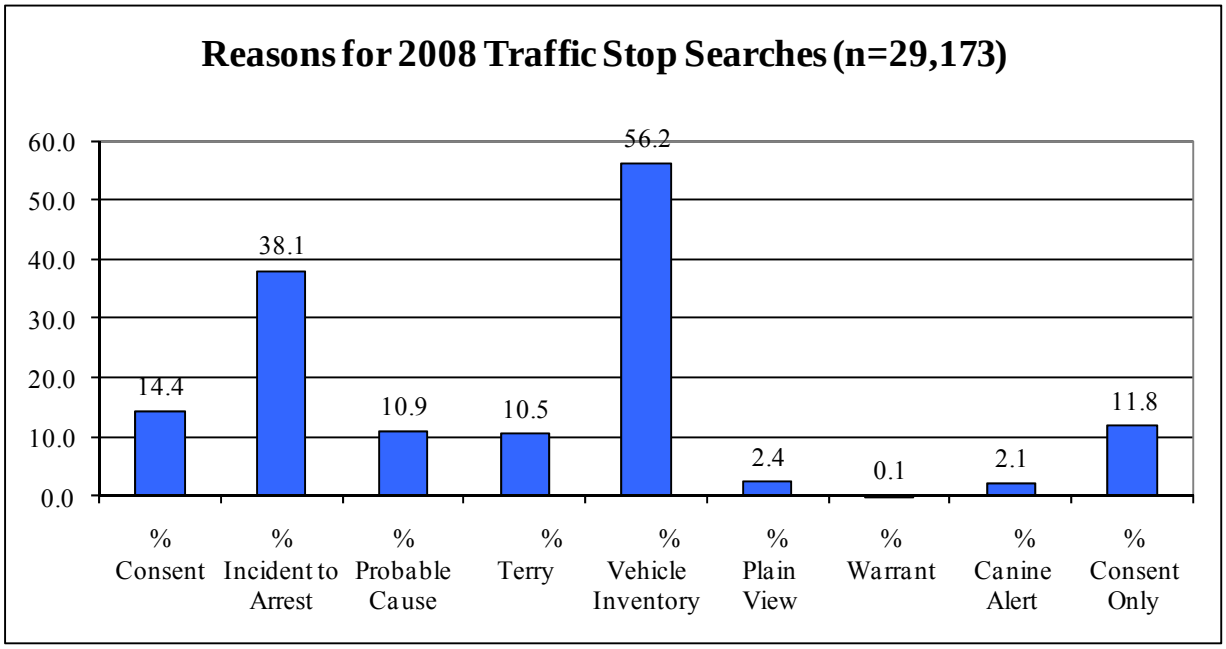


Table 5.1 above also illustrates the variation in the different reasons for searches across divisions, bureaus and district/shifts. For example, at the division level, consent was a more common reason for the Criminal Investigations Division (25.1%) compared to Highway Patrol (14.1%). At the bureau level, incident to arrest and vehicle inventory are the most common reasons for searches for all bureaus except the Commercial Vehicle Bureau, where the most common reason is consent (44.1%), followed closely by probable cause (20.5%). Table 5.1 provides a description of further variation at these lower organizational units.

Canine officers are examined separately in Table 5.1 due to the unique nature of their assignment. The differences between these and other officers are readily apparent. Consent is the most frequent reason for search by Canine officers; overall, 64.1% of searches are conducted for this reason, and over half (57.3%) are conducted solely for this reason. The next most common reasons for searches by Canine officers were probable cause (19.4%) and Canine alerts (15.7%). There were also some differences between canine handlers assigned to the North compared to those assigned in Central/South regions. Northern canine handlers were more likely to indicate probable cause, Terry, and canine alert as reasons for searches compared to Central/South handlers. In contrast, Central/South handlers were more likely to

indicate vehicle inventory, consent and only consent as reasons for searches compared to handlers assigned to the North. Differences between the squads were less substantive for searches conducted incident to arrest and those based on plain view or a warrant.

Pre-Stop Indicators of Possible Criminal Activity

One of the new data fields added to the TRACS data collection system was information regarding whether any indicators of possible criminal activity were observed prior to the stop. Pre-stop indicators of criminal activity were defined as those activities prescribed by the criminal code of the Arizona Revised Statutes (Title 13). Based on the 2008 focus groups conducted by the UCPI team with DPS officers heavily involved in criminal interdiction, the DPS and UCPI team collaborated to develop the following broad categories of indicators:

- None (the default category)
- Body language (Rigid posture, staring straight ahead, etc.)
- Driving behavior (Coasting, frequent lane changes, etc.)
- Passenger behavior (Overreaction to patrol car, furtive movements, etc.)
- Vehicle characteristics (Type, condition, modifications)
- Other (included to allow for the ever-changing nature of indicators of possible criminal activity)

Officers were instructed to mark all that apply. Therefore, the combined total of the percentages across categories in Table 5.2 may exceed 100%. Again, because this data field was only included in the TRACS system, the results presented in Table 5.2 are based only on the 139,389 stops conducted between October and December 2008.

At the department level, the overwhelming majority of stops (81.4%) did not involve pre-stop indicators of possible criminal activity. That is, the overwhelming majority of traffic stops are based on traffic law violations alone. Note, however, that wide variation exists for this variable. For example, 81.5% of stops by the Highway Patrol Division involved no pre-stop indicators of possible criminal activity compared to 67.1% of stops by Criminal Investigations Division officers. This is likely due to basic differences in the primary work assignments of officers assigned to these divisions. At the bureau level, the percent of stops that involved no pre-stop indicators ranged from a low of 73.5% in Metro East to a high of 85.8% in the Southern Bureau. At the district/shift level, the majority of these organizational units had 70% or more of their stops that involved no pre-stop indicators of possible criminal activity. Exceptions to this included: Metro West Shift 2 (63.8%), Metro West Shift 3 (53.1%), District 17 (68.5%), Metro East Shift 3 (66.4%), and the Canine District (55.7%). Within the Canine District, a large difference exists between the Canine North and Canine Central & South regarding the prevalence of no pre-stop indicators. Specifically, in only 16.1% of stops by Canine North officers were no pre-stop indicators observed, while in the Central & South Canine squads, over 72% of stops involved no pre-stop indicators observed.

At the department level, the most frequent type of pre-stop indicator of possible criminal activity was driving behavior (10.3%), followed by vehicle characteristics (5.7%), and other

indicators (2.8%). Body language of occupants and passenger behavior were infrequently recorded as observed pre-stop indicators of possible criminal activity.

Driving behavior was the most frequently recorded pre-stop indicator across the overwhelming majority of organizational units within DPS. For the districts within the Commercial Vehicle Bureau and the Canine squads, however, vehicle characteristics were the most common type of pre-stop indicator recorded. Body language and passenger behavior were infrequently recorded across most organizational units. Within the Canine District, however, body language was the second most common pre-stop indicator recorded by these officers.

As shown in Table 5.2, department-wide, only 9.2% of the stops with at least one pre-stop indicator of possible criminal activity resulted in a search. Again, there was wide variation at the division, bureau, and district/shift level. CID officers conducted searches in 25.6% of stops with at least one pre-stop indicator, while HPD officers conducted searches in only 9.0% of these stops. At the bureau level, the percent of stops with at least one pre-stop indicator that resulted in a search ranged from a low of 1.3% in the Commercial Vehicle Bureau to a high of 11.3% in the Metro East Bureau. At the district/shift level, the majority of these organizational units had less than 10% of their stops that involved at least one pre-stop indicator of possible criminal activity result in a search. Exceptions to this included: Holbrook (10.4%), Metro West Shift 1 (10.9%), Metro West Shift 3 (13.8%), Yuma (10.6%), Metro East Shift 3 (12.3), and the Canine District (19.6%). Within the Canine District, 12.9% of stops with at least one pre-stop indicator resulted in a search by Canine North officers, while 28.0% of these stops resulted in a search by Canine Central and South officers.

The overwhelming majority of stops that indicated indicators of possible criminal activity were observed involved only one type of indicator (96.1%). In the small percentage of stops (n=1,005) where the officer recorded having observed two or more indicators of possible criminal activity, 31.9% of these stops resulted in a search. Although the percentages of stops with multiple indicators that resulted in searches varied considerably, they must be interpreted with caution as, at the smaller organizational units, they are based on a fairly small number of stops. As a general trend across organizational units with enough stops to produce stable rates, stops with multiple pre-stop indicators tended to result in searches approximately 25-35% of the time.

It is important to note that this data field only captures indicators of possible criminal activity observed *prior* to the stop. Searches may have occurred subsequent to the stop based on these indicators and/or other indicators observed during the stop. Indeed, one of the most prevalent themes of the focus group interviews with DPS officers conducted in 2008 was the importance of an officer considering the totality of the circumstances in deciding whether or not to search. Conversely, some stops with pre-stop indicators may not have resulted in a search because officers determined that, while interviewing the vehicle's occupants and inspecting the vehicle in closer proximity, indicators that were initially suspicious were explained away and/or did not meet the legal standards to conduct a search.

Table 5.2: Pre-Stop Indicators of Possible Criminal Activity for 2008 Traffic Stops (TRACS only) – Statewide, Division, Bureaus, & Districts/Shifts (n=139,389)

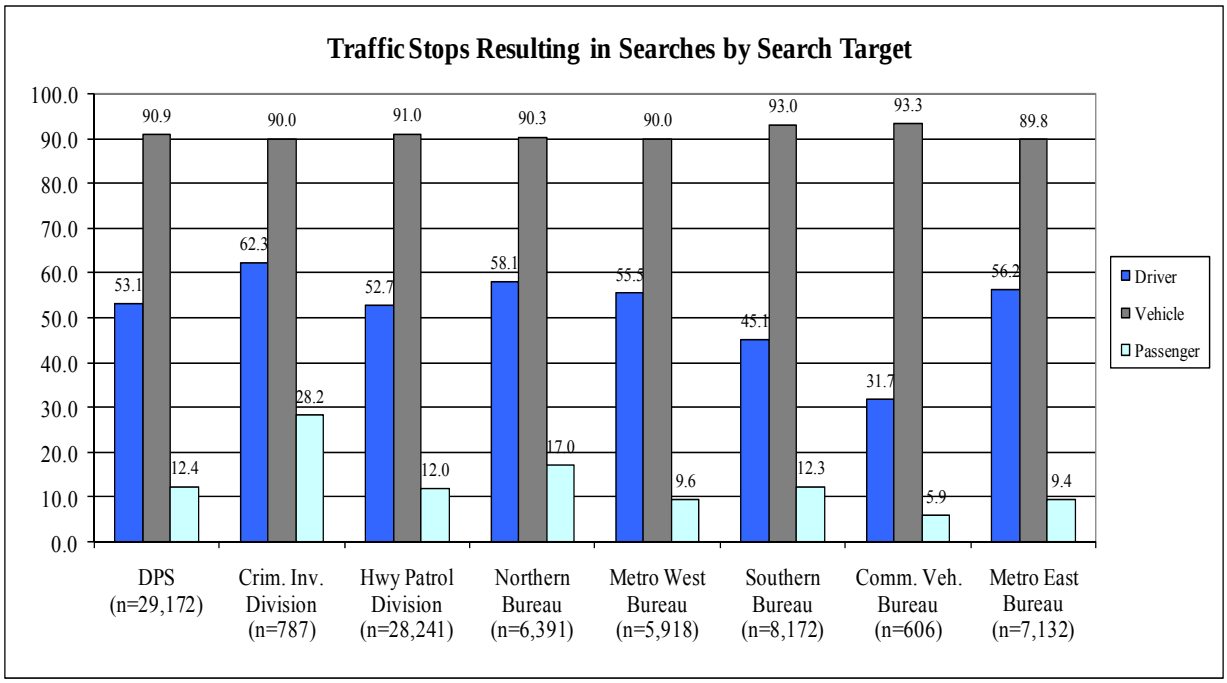
	Total # Stops	% None	% Body Language	% Driving Behavior	% Passenger Behavior	% Vehicle Chars.	% Other Indicators	# Stops w/Any Pre-Stop Indicators	% Stops w/ Any Indicators that resulted in Search	# Stops w/ Multiple Pre-Stop Indicators	% Stops w/ Multiple Indicators that resulted in Search
DPS Statewide	139,389	81.4	0.6	10.3	0.2	5.7	2.8	25,964	9.2	1,005	31.9
Crim. Invest. Division	1,008	67.1	1.5	18.8	0.8	5.7	8.3	332	25.6	15	26.7*
Highway Patrol Division	137,573	81.5	0.6	10.3	0.2	5.7	2.8	25,495	9.0	989	32.1
Northern Bureau	40,815	85.7	0.4	8.4	0.2	5.1	0.8	5,829	7.1	193	30.6
D1-Kingman	7,135	87.8	0.2	9.2	0.1	2.9	0.4	868	7.5	34	38.2
D2-Flagstaff	8,564	86.5	0.2	6.0	0.1	6.9	0.4	1,152	6.3	18	55.6*
D3-Holbrook	9,270	92.2	0.5	5.5	0.2	1.6	0.5	722	10.4	32	62.5
D11-Globe	7,406	89.3	0.0	8.3	0.1	1.6	0.6	789	5.2	3	0.0*
D12-Prescott	8,421	72.7	1.1	13.6	0.3	11.9	1.9	2,298	6.9	106	15.1
Metro West Bureau	21,518	73.9	0.1	14.1	0.1	5.8	6.2	5,623	11.1	44	34.1
Shift #1	8,853	93.0	0.0	2.6	0.1	3.1	1.3	624	10.9	3	33.3*
Shift #2	8,803	63.8	0.2	20.9	0.2	9.3	6.1	3,187	9.6	32	37.5
Shift #3	3,857	53.1	0.1	25.1	0.1	3.8	18.0	1,809	13.8	9	22.2*
Southern Bureau	43,860	85.8	0.3	9.0	0.1	3.7	1.6	6,229	8.1	182	32.4
D4-Yuma	10,664	92.7	0.1	4.1	0.0	2.5	0.7	774	10.6	11	36.4*
D6-Casa Grande	13,500	86.9	0.1	8.9	0.1	2.9	1.5	1,763	7.9	47	27.7
D8-Tucson	12,759	83.9	0.2	10.0	0.1	3.8	2.2	2,051	7.2	28	39.3*
D9-Sierra Vista	6,783	75.8	0.9	15.5	0.4	7.0	2.0	1,640	8.2	96	32.3
Comm. Vehicle Bureau	6,866	80.2	0.1	2.9	0.1	13.3	3.6	1,359	1.3	13	23.1*
District 15	3,153	85.4	0.2	3.3	0.2	7.4	3.8	460	2.0	9	33.3*
District 16	3,423	75.5	0.0	2.4	0.1	19.0	3.0	838	1.1	4	0.0*
District 17	181	68.5	0.0	6.1	0.0	13.8	11.6	57	0.0	0	0.0
Metro East Bureau	24,370	73.5	1.9	14.4	0.4	8.3	4.8	6,448	11.3	557	32.5
Shift #1	3,324	81.7	0.2	10.1	0.2	4.8	3.1	609	9.0	2	100.0*
Shift #2	6,757	74.6	0.4	13.5	0.1	6.7	5.6	1,718	8.4	60	11.7
Shift #3	4,970	66.4	0.1	24.8	0.2	5.8	3.1	1,669	12.3	12	16.7*
Metro Motors	6,556	81.3	0.2	10.9	0.2	2.2	5.6	1,228	6.8	26	42.3*
Canine	2,761	55.7	14.7	10.9	1.8	35.3	6.4	1,222	19.6	457	34.8
Canine North	814	16.1	19.0	12.4	1.2	77.9	1.7	683	12.9	189	31.7
Canine Central & South	1,947	72.3	12.9	10.2	2.0	17.5	8.4	539	28.0	268	36.9

* Interpret percentages with caution as they are based on less than 30 stops with multiple indicators recorded.

Search Target

Figure 5.2 below documents the percentages of drivers, vehicles, and passengers searched at the department, division, and bureau level. Searches frequently involve multiple targets; therefore, the cumulative percentages exceed 100%. At the department level, 53.1% of searches were conducted of drivers, 90.9% involved vehicles, and 12.4% were performed on passengers. These percentages are relatively consistent across divisions and bureaus, with the exception of the Commercial Vehicle Enforcement Bureau, where 93.3% of searches involved vehicles, but only 31.7% of searches were conducted of drivers.

Figure 5.2: Traffic Stops Resulting in Searches by Search Target



Seizures

Table 5.3 below reports the total number of seizures at the department, division, bureau, and district/shift levels, and further documents the types of evidence and/or contraband confiscated during searches conducted by DPS officers. In 2008, there were 5,287 seizures of contraband resulting from the 29,173 conducted searches during 539,344 officer-initiated traffic stops.

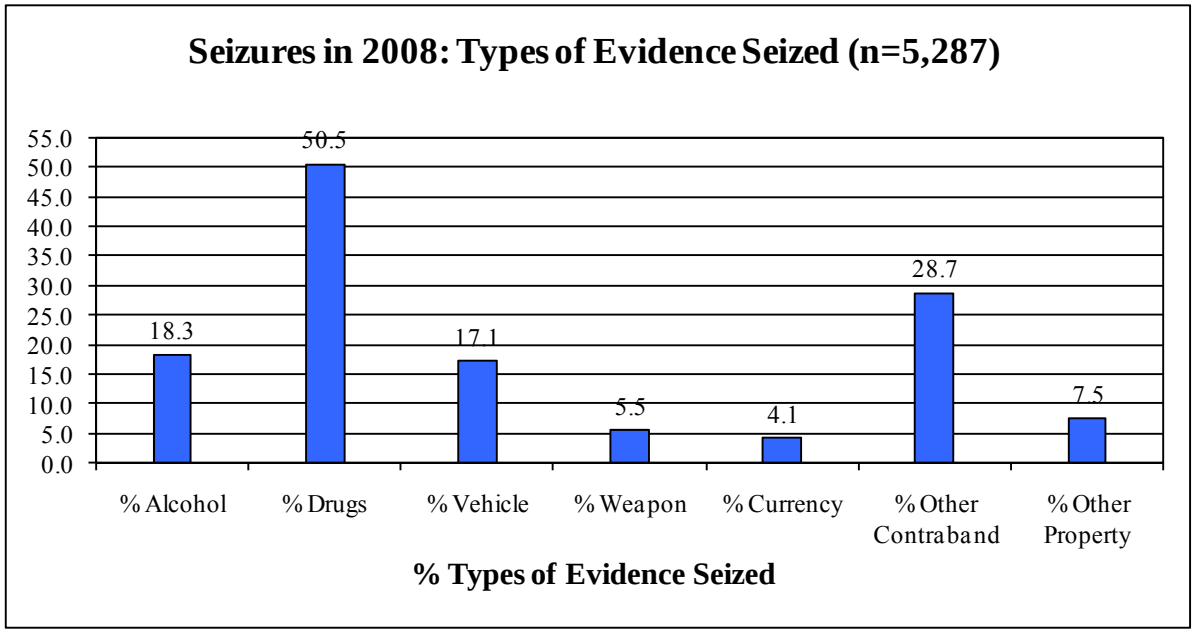
Table 5.3: 2008 Traffic Stop Seizures – Statewide, Division, Bureaus, & Districts/Shifts

	Total # of Seizures	% Alcohol	% Drugs	% Vehicle	% Weapon	% Currency	% Other Contraband	% Other Property
DPS Statewide	5,287	18.3	50.5	17.1	5.5	4.1	28.7	7.5
Criminal Investigations Division	274	21.5	59.1	5.8	7.7	3.6	29.6	5.5
Highway Patrol Division	4,991	18.0	50.1	17.8	5.3	4.2	28.6	7.6
Northern Bureau	1,456	23.4	52.7	14.1	4.3	3.5	29.3	7.0
D1-Kingman	305	17.7	54.1	5.6	5.2	2.3	29.5	11.8
D2-Flagstaff	325	21.2	49.5	24.3	1.8	1.2	21.2	2.2
D3-Holbrook	385	33.0	46.5	15.1	5.7	3.4	28.6	5.5
D11-Globe	101	17.8	62.4	11.9	4.0	1.0	38.6	5.0
D12-Prescott	339	21.2	58.7	11.8	4.1	7.7	34.8	9.7
Metro West	724	15.7	46.1	22.5	9.0	4.1	21.7	5.2
Shift #1	164	10.4	54.3	14.0	6.7	5.5	25.6	6.7
Shift #2	302	15.9	42.1	27.2	7.9	5.3	21.5	6.0
Shift #3	255	18.4	45.9	22.4	11.8	2.0	19.2	3.5
Southern Bureau	1,470	19.5	47.3	20.5	4.3	2.2	28.4	7.3
D4-Yuma	372	17.7	59.9	15.3	1.6	1.3	36.0	4.0
D6-Casa Grande	265	15.1	52.1	26.8	5.7	4.5	21.5	2.6
D8-Tucson	526	18.1	42.8	18.4	6.1	2.7	26.2	12.0
D9-Sierra Vista	300	28.0	35.0	24.3	3.3	0.7	29.3	6.3
Commercial Vehicle	164	14.0	28.0	7.3	4.9	7.3	28.7	34.8
District 15	92	16.3	18.5	6.5	7.6	4.3	20.7	50.0
District 16	43	7.0	39.5	4.7	0.0	7.0	46.5	16.3
District 17	0	--	--	--	--	--	--	--
Metro East	1,173	11.5	55.7	17.6	5.9	7.0	32.2	6.2
Shift #1	75	8.0	64.0	4.0	10.7	2.7	33.3	10.7
Shift #2	188	18.6	45.7	21.3	6.9	2.7	24.5	5.3
Shift #3	170	27.6	58.2	2.9	5.9	1.8	27.1	7.1
Metro Motors	208	13.5	50.0	24.5	8.2	2.9	25.5	1.9
Canine	532	3.6	59.4	20.1	3.9	12.4	39.1	7.3
Canine North	163	3.1	77.9	17.2	1.8	25.8	38.7	11.0
Canine Central & South	367	3.5	51.5	21.5	4.9	6.5	39.2	5.4

Note: Searches may produce seizures of multiple types of contraband; therefore the percentages across the categories may exceed 100%.

As reported in Table 5.3 and graphically displayed in Figure 5.3, across the department, the most frequent type of contraband seized was drugs (50.5%). Approximately 28.7% of searches resulted in seizures categorized as "other contraband,"[32] while alcohol and vehicles were seized in 18.3% and 17.1% of the seizures, respectively. Less common types of contraband seized were other property (7.5%), weapon (5.5%) and currency (4.1%). Table 5.2 also documents the differences in the types of evidence seized across bureaus and districts/shifts. The trends displayed at the department level are fairly consistent across the bureau and district/shift levels, with the exception of the Commercial Vehicle Bureau, where over one-third of the contraband seized was "other property."

Figure 5.3. Seizures in 2008: Types of Evidence Seized (n=5,287)



For searches resulting in the seizure of drugs, one of the new data fields included in TraCS also captures information regarding the quantity of drugs seized using the following categories: 1) personal use, 2) sale, and 3) transportation, with the option to select all that apply. The selection of categories is based on the threshold amounts set by Title 13 or, for sale only, packaging and other paraphernalia located during the search. Table 5.3 reports the number of stops with drug seizures and the drug seizure quantities at the department, division, and district/shift level. As shown in Table 5.4, department-wide, a total of 649 stops that occurred between October and December 2008 have information recorded for drug seizure amount. Because officers were instructed to select all categories of drug seizure amounts that applied, the sum of the percentages across categories exceeds 100%.

Department-wide, the overwhelming majority of drug seizures—85.6%—included personal use amounts, while 16.4% included quantities for sale and 16.4% included quantities for

[32] The specific types of contraband seized under this all inclusive "other" category are unknown to the UCPI research team. Given that it is the second most common type of contraband seized overall, it may be advisable to revise the TraCS data collection system to include a text field where officers may specify the type of contraband seized under this category.

transportation. At the division level, the Criminal Investigations Division seized a higher percentage of personal use quantities of drugs than the Highway Patrol Division (97.4% vs. 84.7%), while the HPD recorded higher percentages of drug seizures that resulted in sale or transportation quantities of drugs (17.1% and 17.2% for HPD vs. 7.7% and 5.1% for CID).

At the bureau level, the four geographic bureaus also recorded a majority of their drug seizures for personal use quantities of drugs, with a high of 93.0% in the Metro West Bureau and a low of 73.7% in the Metro East Bureau. Of the four geographic bureaus, the Northern, Metro West and Southern Bureaus recorded approximately 11-12% of their drug seizures for sale quantities of drugs and 10-13% of their drug seizures for transportation quantities of drugs. The Metro East Bureau, on the other hand, reported approximately 27% of their drug seizures resulted in sale or transportation quantities of drugs. It is important to note that the Metro East Bureau is organizationally responsible for the Canine District and the averages for this bureau are undoubtedly influenced by the Canine District's focus on criminal interdiction. Finally, the Commercial Vehicle Bureau recorded only 8 drug seizures in the TraCS system, which is too few cases to provide stable percentages for comparison purposes.

At the district level, the majority of districts recorded at least 88% or more of their drug seizures as personal use quantities. Exceptions to this include Kingman (82.8%), Casa Grande (73.1%), and the Canine District (49.4%). Again, the number of drug seizures recorded by District 16 in the Commercial Vehicle Bureau is too small to allow for a meaningful comparison of it to the other districts. Approximately half of the districts reported between 7% and 18% of their drug seizures as sale quantities of drugs, with exceptions on the low end for Tucson (3.0%), Metro West Shifts 1-3 (0.0%, 4.3%, and 3.4%) and Metro Motors (2.9%). Casa Grande and the Canine District reported 26.9% and 52.8%, respectively, of their drug seizures as sale quantities of drugs. Twelve districts recorded 13% or less of their drug seizures as transportation quantities of drugs, while the following districts recorded 20% or more of their drug seizures for transportation amounts of drugs: Kingman (20.7%), Casa Grande (23.1%), Sierra Vista (23.5%), and Canine District (53.9%). The squads within the Canine District recorded the highest percentages of drug seizures resulting in personal use, sale, and transportation quantities across the board, with little difference among the squads.

Table 5.4: Drug Seizure Amounts (TraCS Only) – Statewide, Division, Bureaus, & Districts/Shifts

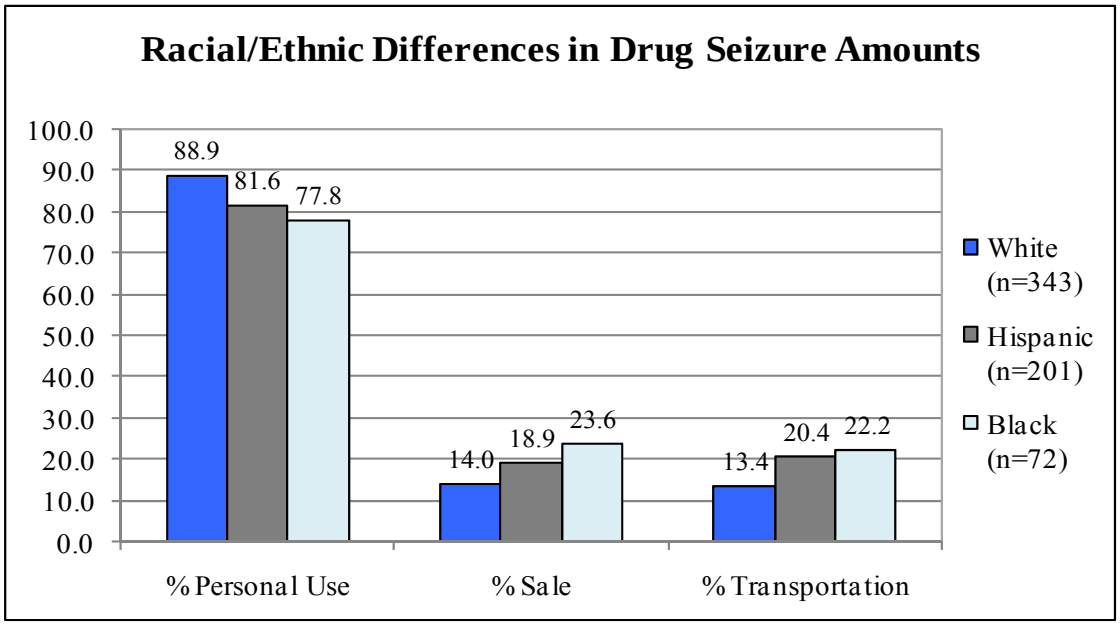
	Total # of Drug Seizures	% Personal Use	% Sale	% Transportation
DPS Statewide	649	85.6	16.4	16.4
Criminal Investigations Division	39	97.4	7.7	5.1
Highway Patrol Division	607	84.7	17.1	17.2
Northern Bureau	168	91.1	12.5	13.1
D1-Kingman	29	82.8	17.2	20.7
D2-Flagstaff	37	91.9	8.1	10.8
D3-Holbrook	39	89.7	15.4	12.8
D11-Globe	17*	94.1	11.8	11.8
D12-Prescott	46	95.7	10.9	10.9
Metro West	86	93.0	11.5	10.3
Shift #1	13*	92.3	7.7	7.7
Shift #2	44	90.9	15.6	17.8
Shift #3	29	96.6	6.9	0.0
Southern Bureau	160	89.4	11.9	10.6
D4-Yuma	50	88.0	14.0	10.0
D6-Casa Grande	26	73.1	26.9	23.1
D8-Tucson	66	97.0	3.0	3.0
D9-Sierra Vista	17*	88.2	17.6	23.5
Commercial Vehicle	8*	25.0	50.0	75.0
District 16	8*	25.0	50.0	75.0
Metro East	185	73.7	26.9	27.4
Shift #1	11*	100.0	0.0	0.0
Shift #2	23	91.3	4.3	8.7
Shift #3	29	96.6	3.4	0.0
Metro Motors	34	97.1	2.9	2.9
Canine	88	49.4	52.8	53.9
Canine North	36	48.6	51.4	54.1
Canine Central & South	52	50.0	53.8	53.8

Note: District 15 recorded no drug seizures during searches recorded in TraCS and is excluded from this table.
* 20 or fewer drug seizures recorded by this organizational unit; interpret percentages with caution.

When DPS officers were asked during the 2008 focus groups to offer possible explanations for the racial/ethnic disparity in search success rates, one of the possibilities discussed was that there were also racial/ethnic differences in the type and amount of drugs used and trafficked. Specifically, some participants suggested that, based on their experiences, searches of White motorists were more likely to result in personal use seizures, while searches of Hispanics were more likely to produce drug seizures of larger weight. This affects the search rates and search success rates because some officers may be more interested in large quantity seizures than personal use amounts. Although information regarding the specific type of drug seized is not available, the drug seizure amount data field allows for us to explore the possibility of racial/ethnic differences in personal use vs. sale or transportation. Figure 5.4 compares the percent of each quantity of drugs seized by race/ethnicity. There were too few stops with drug seizure amount information recorded for

Native Americans to provide stable comparisons for this analysis; therefore, this comparison is based only on Whites, Hispanics, and Blacks. The results indicate that Whites are most likely to have personal use amounts of drugs seized during searches resulting in drug seizures, while Hispanics and Blacks are more likely than Whites to have sale and transportation quantities of drugs seized. Specifically, 23.6% of seizures of sale quantities of drugs were from Black drivers, followed by 18.9% of Hispanics and 14.0% of Whites. These results, however, do not reach statistically significant levels. Statistically significant differences are evident for the racial/ethnic differences in transportations quantities of drugs seized, as Blacks (22.2%) and Hispanics (20.4%) are significantly more likely than Whites (13.4%) to have transportation quantities of drugs seized during searches that resulted in drug seizures.

Figure 5.4. Racial/Ethnic Differences in Drug Seizure Amounts



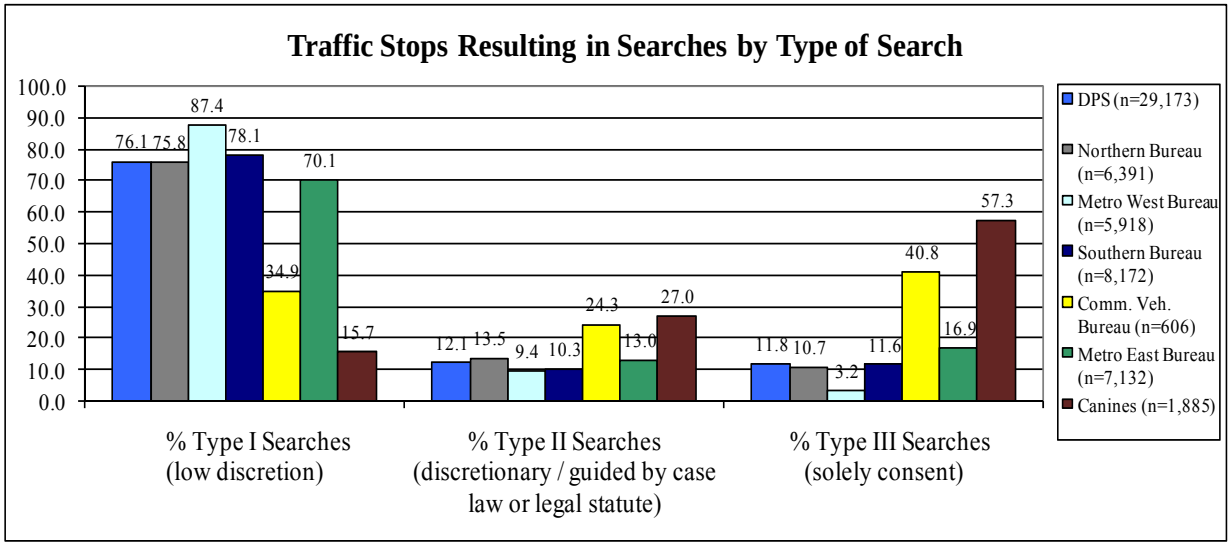
TYPES OF SEARCHES

While examining the specific reasons for a search is instructive, this information is more easily understood when collapsed into discrete categories, or types of searches. These types of searches, although based on different reasons, have similar characteristics that warrant them being considered collectively. For the analyses reported in Figures 5.5 – 5.6 and Table 5.5 below, searches were divided into three categories based on the presumed level of officer discretion. The first search category – Type I – includes searches that involve little or no officer discretion. Specifically, Type I searches include those that are required by DPS policy (e.g., incident to arrest, vehicle inventory) or otherwise involve very little officer discretion (e.g., plain view, warrant). The second search category – Type II – includes searches that are discretionary, yet guided by case law or legal statutes. Specifically, Type II searches include those based on probable cause, Terry, or canine alert. The third search category – Type III – includes searches based solely on drivers' consent to an

officer's request to search. If a search was based on multiple reasons, it was assigned to the search category with the least officer discretion (e.g., if a search is based on a canine alert [Type II] and consent [Type III], it was defined as a Type II search). Therefore, the analyses below examining the search rates for Type I, II, and III searches are mutually exclusive.[33]

Figure 5.5 below displays the number of total searches and the search rates for each of the three types of searches at the department and bureau level. At the department level, the majority of searches conducted were Type I (low discretion) searches (76.1%), while 12.1% were Type II (guided by case law/legal statute) and 11.8% were Type III (solely consent). Similar percentages of the three types of searches were reported for most of the bureaus as well. The Commercial Vehicle Bureau conducted over 40% of its searches based solely on consent and also performed a considerably larger percentage of Type II searches compared to the department average and other bureaus. In contrast to the departmental trend, the Canine District conducted only 15.7% of its searches due to low-discretion reasons, while over half of its searches were based solely on consent (57.3%). The remaining 27.0% of the Canine District's searches were Type II, which is also a larger percentage compared to the department and bureau averages.

Figure 5.5: Traffic Stops Resulting in Searches by Type of Search: Type I = low discretion, Type II = discretionary / guided by case law or legal statute, Type III = solely consent

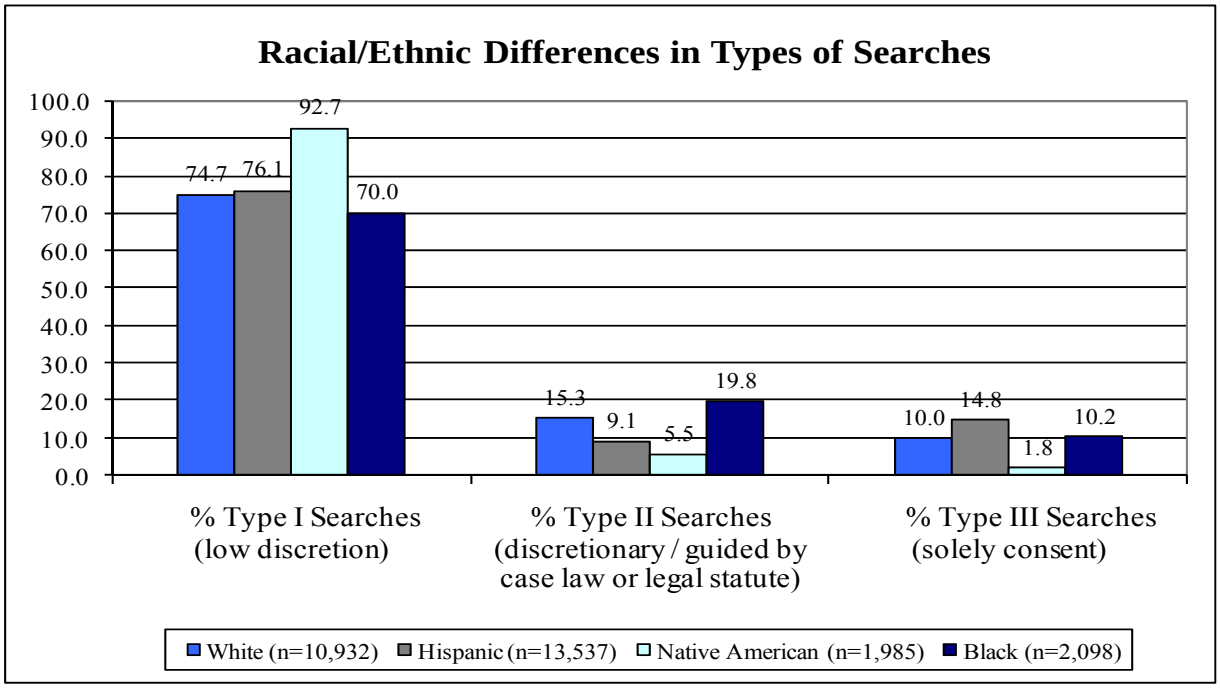


[33] These three types of searches were modified slightly from the categorization used for the Year 1 report based on discussions with DPS officials. It was indicated that some searches included as discretionary in Year 1 (e.g., plain view) in practice involve very little officer discretion. These searches where changed from Type II to Type I for this report, while Type III searches remain the same. Furthermore, in the new TRACS data collection system, there are 5 main types of search from which officers choose: consent, incident to arrest, probable cause, terry frisk, and vehicle inventory. Within probable cause searches, subcategories of searches include admission, canine alert, plain smell, plain view, and search warrant. Although plain view and warrant searches are originally collected as "probable cause" searches for data, based on the above-noted guidance from DPS regarding the actual amount of officer discretion typically involved in plain view and warrant searches, they have been changed to Type I searches.

While examining search rates across the types of searches is important, it is also instructive to consider differences in the types of search rates based on drivers' characteristics. Figure 5.6 and Table 5.5 below report the percentage of stops that resulted in each type of search across different types of drivers. Figure 5.6 graphically displays the racial/ethnic differences in the three types of search rates at the department level, while Table 5.5 reports the racial/ethnic and gender differences in the three types of search rates for drivers at the department and bureau level.

Both Table 5.5 and Figure 5.6 indicate that Blacks were least likely to be searched for Type I reasons (low discretion), while Native Americans were most likely to be searched for these reasons. For Type II searches, the opposite is true: Blacks were significantly more likely, and Native Americans significantly less likely to be subject to Type II searches. For both Type I and Type II searches, Whites and Hispanics had percentages in the middle of the two extremes. In the case of solely consent searches (Type III searches), Hispanic motorists were significantly more likely to be searched based on consent compared to other groups. As shown in Table 5.5, these patterns of racial/ethnic differences were fairly consistent for each of the bureaus and Canine District.

Figure 5.6: Racial/Ethnic Differences in Types of Searches: Type I = low discretion, Type II = discretionary / guided by case law or legal statute, Type III = solely consent



NOTE: Differences across the four racial/ethnic groups presented in this figure are statistically significant at $p \leq .001$

As shown in Table 5.5, gender differences in reasons for searches were also evident at the department level. Specifically, female drivers were significantly more likely to be searched for low discretion reasons (Type I) compared to male drivers, whereas male drivers were more often subjected to Type II and Type III searches. This pattern of

gender differences is also evident for each of the bureaus as well as the Canine District, although the gender differences are only statistically significant for Type I searches by the Commercial Vehicle Enforcement Bureau. As noted in Section 4, caution must be used when interpreting these findings. The findings presented are bivariate (i.e., they do not take into account other extralegal and legal factors that might have a significant influence over search decisions).

Table 5.5: Reasons for Search by Driver Characteristics for Department and Bureaus: Type I = low discretion, Type II = discretionary / guided by case law or legal statute, Type III = solely consent (p.1 of 2)

	Drivers	Total # of Searches	% Type I Searches	% Type II Searches	% Type III Searches
DPS	White	10,932	74.7***	15.3***	10.0***
	Hispanic	13,537	76.1	9.1	14.8
	Native American	1,985	92.7	5.5	1.8
	Black	2,098	70.0	19.8	10.2
	Male	23,720	74.2***	13.0***	12.8***
	Female	5,404	84.3	8.3	7.4
Northern Bureau	White	2,954	69.0***	18.5***	12.5***
	Hispanic	1,639	78.0	8.7	13.2
	Native American	1,416	93.9	4.9	1.3
	Black	257	52.9	26.8	20.2
	Male	5,272	74.4***	14.4***	11.2**
	Female	1,111	82.5	9.1	8.2
Metro West Bureau	White	2,075	82.2***	14.0***	3.9
	Hispanic	3,046	91.8	5.5	2.8
	Native American	74	95.9	2.7	1.4
	Black	607	93.4	13.3	3.3
	Male	4,751	86.7***	9.7	3.6***
	Female	1,157	90.5	8.0	1.5
Southern Bureau	White	2,663	78.6***	12.3***	9.1***
	Hispanic	4,659	77.8	8.4	13.8
	Native American	256	90.2	7.8	2.0
	Black	425	72.2	18.8	8.9
	Male	6,485	75.8***	11.5***	12.7***
	Female	1,677	86.8	6.0	7.2
Commercial Vehicle Enforcement Bureau	White	269	36.8*	26.4***	36.8**
	Hispanic	223	32.7	17.9	49.3
	Native American	4	100.0	0.0	0.0
	Black	75	28.0	40.0	32.0
	Male	590	33.9**	24.7	41.4
	Female	14	71.4	7.1	21.4

NOTE: Asterisks indicate statistically significant chi-square associations across 4 racial groups and 2 gender groups. *** $p \leq .001$ ** $p \leq .01$ * $p \leq .05$.

Table 5.5. Reasons for Search by Driver Characteristics for Department and Bureaus: Type I = low discretion, Type II = discretionary / guided by case law or legal statute, Type III = solely consent (p.2 of 2)

	Drivers	Total # of Searches	% Type I Searches	% Type II Searches	% Type III Searches
Metro East Bureau	White	2,698	77.4***	13.3***	9.2***
	Hispanic	3,420	63.1	11.7	25.3
	Native American	197	90.4	5.6	4.1
	Black	656	69.7	20.4	9.9
	Male	5,810	68.1***	13.8***	18.1***
	Female	1,308	79.0	9.5	11.5
Canine	White	378	12.2	36.8***	51.1***
	Hispanic	1,291	14.9	22.4	62.7
	Native American	22	31.8	36.4	31.8
	Black	138	16.7	44.2	39.1
	Male	1,632	15.9	26.4	57.7
	Female	249	14.5	30.9	54.6
Canine North	White	139	14.4**	46.8***	38.8***
	Hispanic	136	13.2	31.6	55.1
	Native American	4	75.0	25.0	0.0
	Black	69	13.0	59.4	27.5
	Male	312	13.1	43.2	42.9
	Female	44	20.5	43.2	36.4
Canine Central & South	White	239	10.9	31.0**	58.2*
	Hispanic	1,149	15.5	21.1	63.9
	Native American	18	22.2	38.9	38.9
	Black	69	20.3	29.0	50.7
	Male	1,315	16.5	27.9	61.4
	Female	204	13.2	22.1	58.8

NOTE: Asterisks indicate statistically significant chi-square associations across 4 racial groups and 2 gender groups.
*** $p \leq .001$ ** $p \leq .01$ * $p \leq .05$

SEARCH SUCCESS RATES

Although multivariate analyses are the most common form of testing for disparities in stop outcomes, more recently, the discussion regarding bias-based policing has also focused on examining outcomes in the form of search "hit rates." If drivers were searched strictly based on legal factors and suspicions unrelated to race, it has been argued that one would expect similar percentages of searches resulting in seizures across racial groups. This has been described as the "outcome test" (Knowles, Persico & Todd, 2001; Ayres, 2001). Originally applied by Becker (1957) to examine economic disparate treatment of minorities, the basic notion of the outcome test is to analyze whether outcomes are systematically different across groups. Ayres (2001) has argued that the "outcome test" can be used to successfully examine racial disparities in police practices, including searches. When applied to police searches, the outcome test is essentially a comparison of the successfulness of those searches – or a statistical comparison of the percentage of searches that result in seizures across racial/ethnic groups. This is also referred to as a statistical comparison of "search success rates" or "hit rates." Racial/ethnic comparisons of hit rates are calculated by dividing the number of searches in which officers seize some type of contraband (e.g., drugs, illegal weapons, etc.) by the number of total searches (Fridell, 2004; Ramirez et al., 2000).

As with other analytical techniques, limitations exist that limit the conclusions that can be drawn from the outcome test (Engel, 2008; Engel & Tillyer, 2008). The outcome test is only appropriate for an analysis of traffic stops that result in a discretionary search; therefore, mandatory and consent searches should not be considered. In addition, any racial/ethnic disparities in hit rates discovered using this method do not necessarily imply officer bias. Notwithstanding the limitations of the outcome test, it does provide an alternative method to assess post-stop outcomes. Nevertheless, it is recommended that no definitive conclusions about racial bias be drawn from these comparisons based on the limitations of this technique (for details, see Engel, 2008; Engel & Tillyer, 2008).

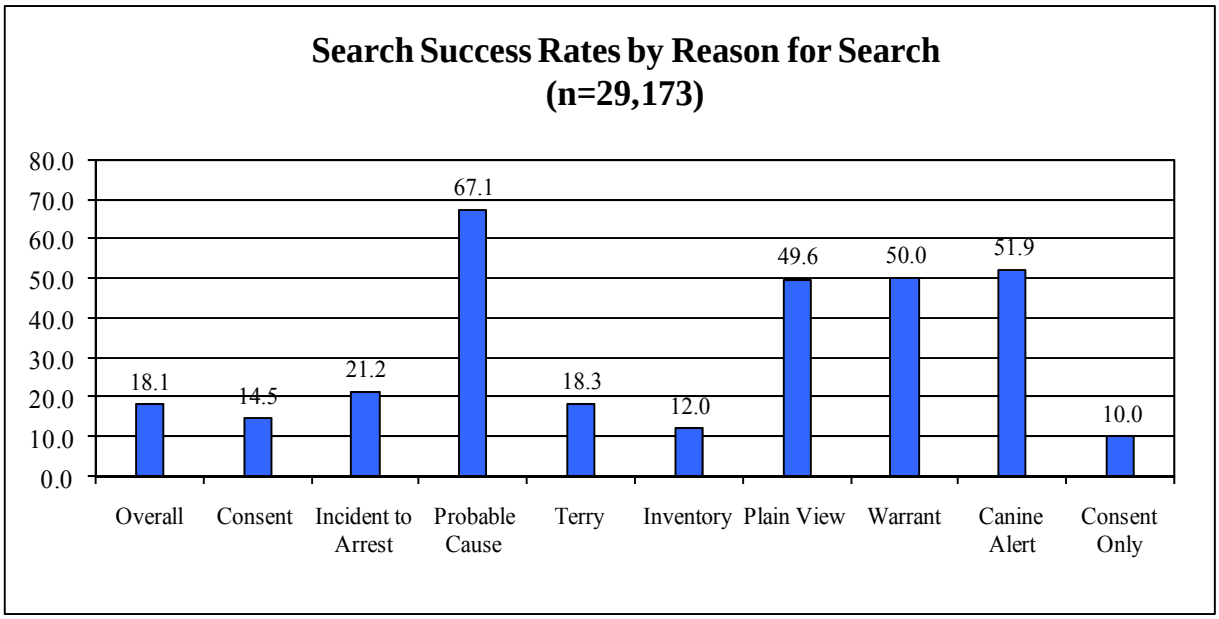
Search Success Rates by Reasons for Search

As noted above, based on DPS policies, officers have little discretion over some types of searches (e.g., vehicle inventories, searches incident to arrest, searches based on plain view or a preexisting warrant). Officers have limited discretion in these situations and, therefore, officer bias would likely play a limited role (if any) in observed racial/ethnic disparities in search decisions. Due to the mandatory nature of these searches, the likelihood of discovering contraband is not based on officer skill or criminal interdiction training. Furthermore, even within discretionary searches, it is likely that different reasons for searches might lead to varying rates of contraband seizures. Figure 5.7 and Table 5.6 explore this possibility. Specifically, Figure 5.7 illustrates the overall search success rate and the success rates for each specific type of search at the department level, while Table 5.6 reports the same information at the department, division, and bureau levels.

As shown in Figure 5.7 and Table 5.6, department-wide, the overall search success rate was 18.1% -- that is, 18.1% of all searches conducted during officer-initiated traffic stops resulted

in the discovery of contraband. This rate, however, varies dramatically across search types. Figure 5.7 documents the following range: 67.1% of probable cause searches result in seizures compared to only 10.0% of searches based solely on consent. Other than probable cause, searches that were the most likely to produce seizures of contraband included those based on canine alert (51.9%), warrant (50.0%), and plain view (49.6%). Across the department, searches based partially or solely on consent as well as vehicle inventories were least likely to be successful in terms of discovering contraband.

Figure 5.7: Search Success Rates by Reason for Search (n=29,173)



As documented in Table 5.6 below, these patterns remain relatively consistent across the divisions and bureaus within the department. Notable differences are evident within the Canine District. Canine handlers working in the North varied dramatically in their search success rates from those working in the Central/South. Across all types of searches, canine handlers assigned to the North squad were significantly more likely to report contraband seizures (45.8% of all searches) compared to handlers assigned to Central/South squads (24.1% of contraband seizures). This difference, however, is not as large as was observed in the 2007 data, when the Canine North overall search success rate was 49.3%, compared to 15.4% in the Central/South squads.

Because the search success rates vary by the reason for the search, it would seem likely that differences in search success rates within the Canine district could be due to disproportionate use of particular types of searches. However, when the search success rates are examined within search reason categories, it becomes clear that compared to handlers assigned to Central/South squads, handlers assigned to the North squad report more success in terms of contraband seizures during officer-initiated traffic stops across almost all search reasons, with the exception of the infrequently used vehicle inventory, plain view, and warrant searches. It is important to also note, however, that many of the gaps in search success rates between the Canine North and Canine Central/South squads have narrowed in 2008.

Specifically, the 2007 difference in probable cause search success rates was 82.2% for the North and 49.6% for the Central and South, while in 2008 the probable cause success rates are nearly identical at 76.2% for the North and 75.0% for the Central and South. In addition, for 2007 data, the canine alert success rate for the North squad was 75.7%, while the Central and South squads' success rate was only 41.2%. In 2008, however, this difference is not as dramatic, as 63.6% of the searches based on canine alerts resulted in seizures for North canine handlers, compared to 52.4% of searches based on canine alerts for Central and South canine handlers. The differences between the squads' consent and Terry search success rates, however, remain.

Table 5.6: 2008 Search Success Rates by Reasons for Search for Department, Division, and Bureau

	# of Searches	# of Seizures	Overall Search Success Rate	Consent Success Rate	Incident to Arrest Success Rate	Probable Cause Success Rate	Terry Success Rate	Inventory Success Rate	Plain View Success Rate	Warrant Success Rate	Canine Alert Success Rate	Consent Only Success Rate
DPS Statewide	29,173	5,287	18.1	14.5	21.2	67.1	18.3	12.0	49.6	50.0	51.9	10.0
Crim. Invest. Division	787	274	34.8	25.9	48.3	69.5	28.1	23.7	91.9	0.0*	61.9	19.7
Highway Patrol Division	28,242	4,991	17.7	14.0	20.6	67.0	18.0	11.8	47.0	51.7	51.9	9.6
Northern Bureau	6,392	1,456	22.8	19.0	25.0	75.3	22.7	14.1	54.2	83.3*	58.8	13.6
Metro West Bureau	5,918	724	12.2	13.5	16.3	51.1	9.5	9.5	53.2	50.0*	15.2*	7.9
Southern Bureau	8,172	1,470	18.0	11.4	27.1	66.3	22.0	13.0	31.2	60.0*	51.7	7.2
Comm. Veh. Enf. Bureau	606	164	27.1	14.6	35.6	60.5	51.2	7.4	45.7	40.0*	38.1*	12.6
Metro East Bureau	7,132	1,173	16.4	13.2	14.2	68.8	15.2	10.6	68.9	36.4*	55.6	8.9
Canine	1,885	532	28.2	12.4	63.8	75.3	42.9	39.5	86.1	100.0*	56.1	8.0
Canine North	356	163	45.8	25.1	90.3	76.2	59.2	18.8*	71.4*	--	63.6	18.0
Canine Central & South	1,523	367	24.1	9.9	53.6	75.0	28.6	41.7	89.7	100.0*	52.4	6.4

Note: Search success rates are measured as the percent of searches that resulted in a contraband seizure.
* Twenty or fewer searches conducted for this reason; interpret percentage with caution.

Type II (Discretionary) Search Success Rates by Race/Ethnicity & Gender

As noted previously, utilizing the outcome test to examine racial/ethnic disparities in search success rates requires that the analyses be limited to only non-consent discretionary searches. Therefore, information regarding the Type II (discretionary searches guided by case law or legal statutes) search success rates is further summarized below. Figure 5.8 displays the overall Type II search success rates across the department, bureaus, and canine squads. Department-wide, 44.9% of Type II searches were successful in recovering contraband. The search success rate across the bureau level is similar to or higher than the departmental average, with the exception of a noticeably lower success rates in the Metro West Bureau (23.0%). The Type II search success rates of the Canine squads lead the department. Although the Type II search success rate is highest for the Canine North squad (65.4%), the difference between the rates of the North and the Central & South squads is smaller this year than in previous years. Specifically, the 2008 success rate for the Central & South squads is 54.9%, approximately 10 percentage points lower than the North, whereas in 2007 the difference between the two was nearly 30 percentage points.

Figure 5.8: Type II (Discretionary) Search Success Rates by Organizational Unit

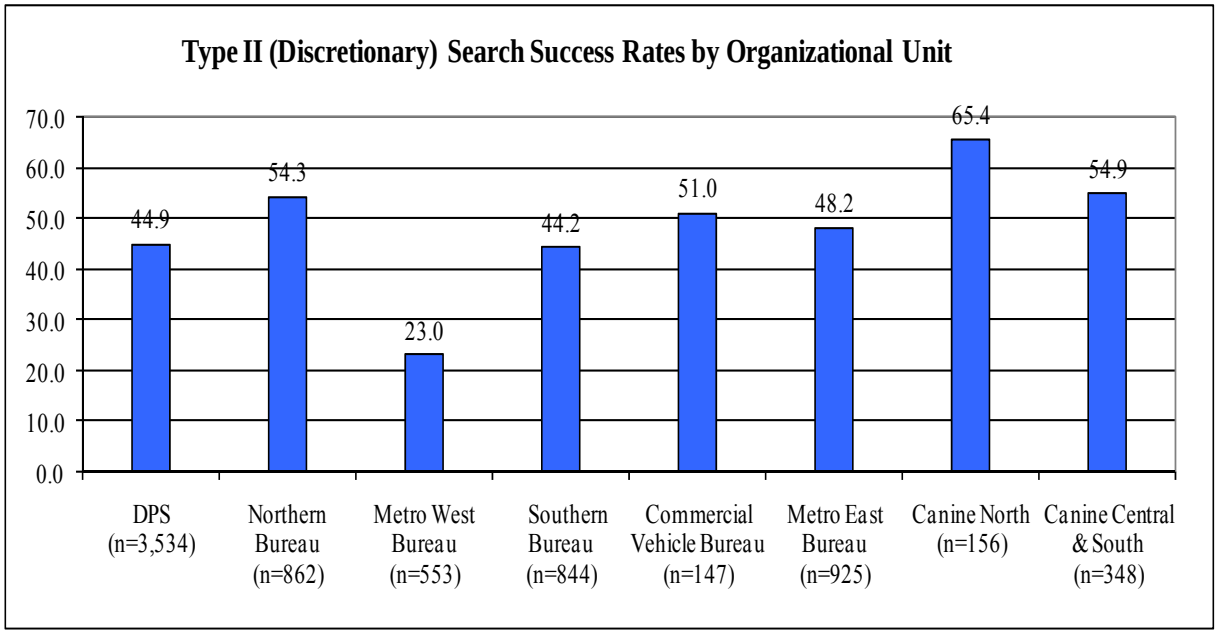
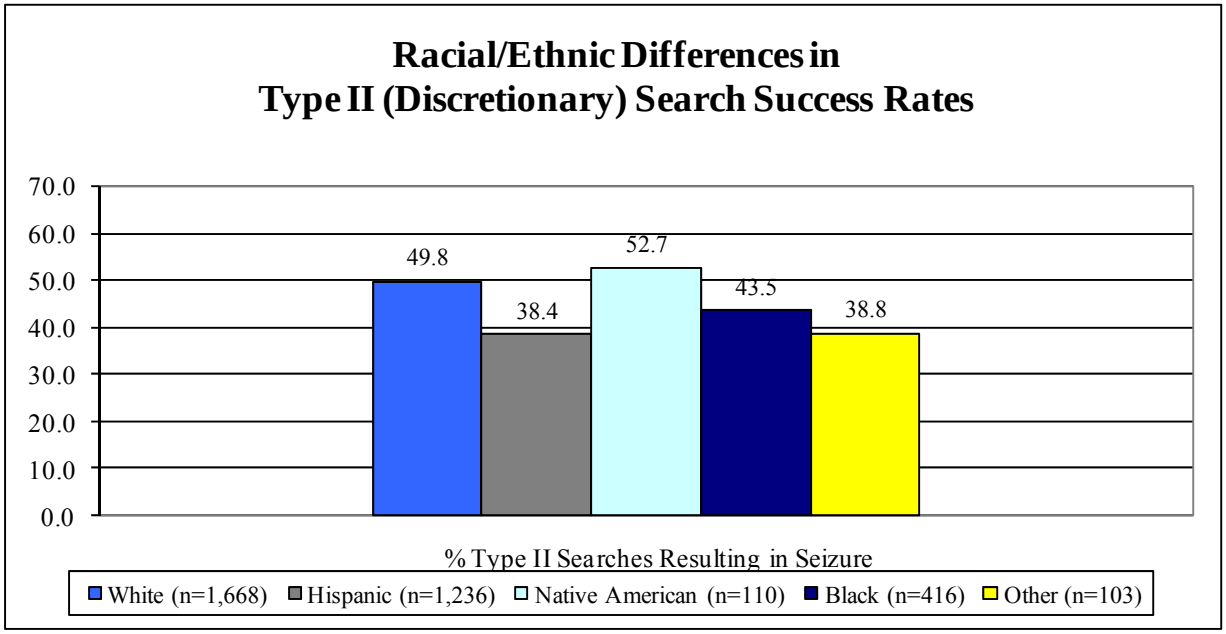


Figure 5.9 and Table 5.7 display the total number of Type II searches and the Type II search success rates based on drivers' characteristics. As shown, there were significant racial/ethnic differences in the Type II search success rates at the department and bureau level. Specifically, Type II (discretionary) searches of Hispanic drivers were the least likely to be successful in the discovery of contraband, compared to all other racial/ethnic groups. Native Americans, Blacks and Whites had higher and fairly similar search success rates, when compared to Hispanics and drivers of other races/ethnicities. Only 38.4% of Type II (discretionary) searches of Hispanics resulted in discoveries of contraband, compared to

52.7% for Native Americans, 49.8% for Whites, 43.5% of Black, and 38.8% of drivers of other races/ethnicities.

Figure 5.9: Racial/Ethnic Differences in Type II (Discretionary) Search Success Rates



NOTE: Differences across the five racial/ethnic groups presented in this figure are statistically significant at $p \leq .001$

As shown in Table 5.7 below, the Type II search success rates at the bureau level show similar statistically significant racial/ethnic differences for the Northern and Southern bureaus. For these two bureaus, discretionary search success rates of Hispanics were significantly lower than searches of Whites, Native Americans, and Blacks. Racial/ethnic differences in the Type II search success rates are evident in the Metro East, Metro West, and Commercial Vehicle Enforcement Bureau, as well as the Canine squads, but do not reach statistical significance.

Differences in Type II search success rates for male and female drivers are also shown in Table 5.7. At the department level, however, there are no statistically significant gender differences in the Type II search success rate. While small differences are evident at the department and bureau level, only in the Metro West Bureau are these gender differences statistically significant.

Table 5.7: Type II Search Success Rates by Driver Characteristics for Department, Bureaus, & Canines (p.1 of 2)

	Drivers	Total # of Searches	Total # of Type II Searches	Type II Search Success Rate
DPS	White	10,932	1,668	49.8***
	Hispanic	13,537	1,236	38.4
	Native American	1,985	110	52.7
	Black	2,098	416	43.5
	Male	23,720	3,087	44.5
	Female	5,404	447	47.2
Northern Bureau	White	2,954	547	60.7***
	Hispanic	1,639	143	36.4
	Native American	1,416	69	46.4
	Black	257	69	52.2
	Male	5,272	759	53.6
	Female	1,111	103	59.2
Metro West Bureau	White	2,075	290	25.9
	Hispanic	3,046	32	19.2
	Native American	74	1	50.0
	Black	607	17	21.0
	Male	4,751	460	20.9**
	Female	1,157	93	33.3
Southern Bureau	White	2,663	327	54.7***
	Hispanic	4,659	391	35.5
	Native American	256	20	70.0
	Black	425	80	41.2
	Male	6,485	743	44.1
	Female	1,677	101	44.6
Commercial Vehicle Enforcement Bureau	White	269	71	49.3
	Hispanic	223	40	45.0
	Nat. Amer.	4	0	0.0
	Black	75	30	63.3
	Male	590	146	51.4
	Female	14	1	0.0

NOTE: Asterisks indicate statistically significant chi-square associations across 4 racial groups and 2 gender groups. *** $p \leq .001$ ** $p \leq .01$ * $p \leq .05$

Table 5.7. Type II Search Success Rates by Driver Characteristics for Department, Bureaus, & Canines (p.2 of 2)

	Drivers	Total # of Searches	Total # of Type II Searches	Type II Search Success Rate
Metro East Bureau	White	2,698	360	48.3
	Hispanic	3,420	399	46.4
	Native American	197	11	63.6
	Black	656	134	51.5
	Male	5,810	801	49.2
	Female	1,308	124	48.1
Canine North	White	139	65	75.4
	Hispanic	136	43	39.5
	Native American	4	1	100.0
	Black	69	41	75.6
	Male	312	137	67.2
	Female	44	19	52.6
Canine Central & South	White	239	74	60.8
	Hispanic	1,149	242	53.3
	Native American	18	7	57.1
	Black	69	20	45.0
	Male	1,315	291	56.0
	Female	204	57	49.1

NOTE: Asterisks indicate statistically significant chi-square associations across 4 racial groups and 2 gender groups. *** $p \leq .001$ ** $p \leq .01$ * $p \leq .05$

Examining Consent Searches

A descriptive overview of the frequency of the use of consent searches is provided in Table 5.8 for the department, divisions, bureaus and canines. This information includes the number of consent search requests, percent of search requests audio or video recorded, percent of consent requests refused, percent of search requests where driver signed form, and number of consent searches conducted. Two of these variables—consent request recorded and driver signed form—are only included in the TRACS data collection system and are therefore based only on the 139,389 stops collected via TRACS.[34]

As shown in Table 5.8 there were a total of 4,787 consent searches requested (0.9% of all stops). At the department level, 37.5% of the search requests were recorded by audio or video equipment. Of the 4,787 consent searches requests, 12.6% of motorists refused. When consent search requests were granted by drivers, officers obtained a signature from the driver of the vehicle on a consent search form in the overwhelming majority of these stops (89.9%). At the division level, officers assigned to the Criminal Investigations Division requested consent to search in 5.9% of stops, whereas Highway Patrol Division officers requested consent to search in just 0.9% of stops. Officers in the CID recorded their search requests with audio or visual recording equipment more often than officers in the HPD (61.1% and 36.1% respectively). The use of audio or visual recording equipment also varied considerably at the bureau level. In the Metro East Bureau searches were recorded in 44.4% of encounters, compared to just 9.4% of searches recorded in the Metro West Bureau. At the bureau level, the percent of consent search refusals ranged from 25.9% of searches refused in the Metro West Bureau to 5.4% of searches refused in the Commercial Vehicle Enforcement Bureau. At the bureau level, officers obtained signed consent forms for the vast majority of contacts across all bureaus, with the highest percentage being in the Metro East Bureau (92.7%) and the lowest percentage in the Metro West Bureau (75.3%).

Table 5.8 also displays the descriptive statistics regarding consent search requests and searches for the Canine District and its squads. Canine officers requested consent to search in 13.0% of their stops. Approximately half of all consent search requests within the Canine District were recorded by audio or video equipment. The percent of recordings, however, varied considerably between the Northern Canine squad and the Central & South squads, as over 88% of the search requests made by Canine North officers were recorded, while only 37.8% of consent requests were recorded by Central and South Canine officers. This difference may be due to variation in the availability of equipment. A considerable difference between the Canine squads is also evident in the percent of search requests that are refused. Canine officers assigned to the Central and South squads had only 4.3% of their search requests refused, while drivers stopped by officers assigned to the Canine North squad refused requests to search over 26% of the time. This may be due to the squads' differences in proximity to the Mexican border as some focus group participants in early 2008 suggested that those with experience with law enforcement in other countries, particularly

[34] With the exception of the Canine District, at the district level, a considerably smaller number of consent searches were requested. Due to the fact that two of the variables presented in Table 5.8 were available for only 3 months of data, this table does not provide these descriptive statistics at the district level (with the exception of the Canine District). This analysis should be available at the district level in the Year 4 report.

undocumented aliens, seemed to be less likely to refuse consent to search. Finally, the entire Canine District, regardless of squad, had an extremely high percent of consent search forms that were signed by drivers.

Table 5.8: Descriptive Statistics for Consent Search Requests, Refusals, and Searches Conducted -- Department, Division, Bureau, & Canines

	% of Stops Resulting in Consent Request	# of Consent Search Requests	% Search Requests Audio or Video Recorded*	% Consent Requests Refused	% Consent Requests where Driver Signed Form*	# of Consent Searches Conducted
DPS Statewide	0.9	4,787	37.5	12.6	89.9	4,205
Crim. Invest. Division	5.9	220	61.1	10.9	84.4	197
Highway Patrol Division	0.9	4,549	36.1	12.7	90.4	3,992
Northern Bureau	0.6	968	33.3	12.8	91.5	855
Metro West Bureau	0.5	382	9.4	25.9	75.3	281
Southern Bureau	0.8	1,320	38.7	10.6	92.0	1,199
Comm. Veh. Enf. Bureau	1.1	282	20.0	5.4	86.8	268
Metro East Bureau	1.7	1,591	44.4	12.5	92.7	1,384
Canine	13.0	1,336	50.4	8.8	96.2	1,206
Canine North	8.9	269	88.4	26.8	91.4	195
Canine Central & South	14.7	1,066	37.8	4.3	97.4	1,010

*Based only on 139,389 stops collected via TRACS electronic system.

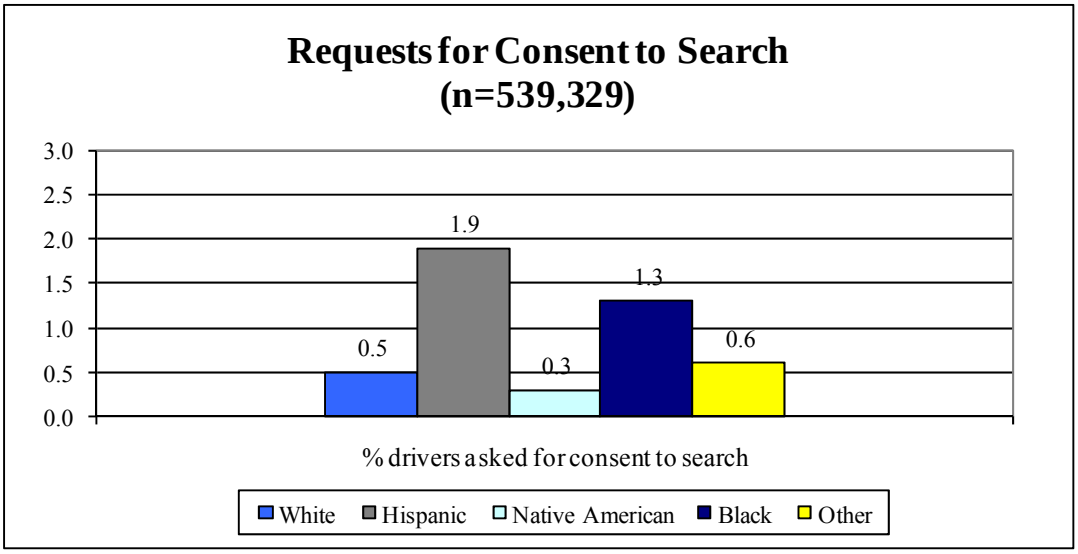
As demonstrated earlier, consent search success rates are the least successful type of search in terms of producing seizures of contraband. Examining whether these success rates vary by race/ethnicity, however, is complex. As noted above, it is ill-advised to utilize the outcome test to assess racial/ethnic bias in consent searches, because ultimately it is the citizen, not the officer who has final discretion over whether or not these types of searches are conducted. Citizens always have the right to refuse. As such, the underlying assumptions of the outcome test that officers have full discretion over whether or not to conduct searches is violated. Despite these limitations, DPS administrators have requested such comparisons for internal purposes; therefore, following an examination of racial/ethnic differences in requests for consent and refusals to consent, racial/ethnic differences in search success rates for Type III (solely consent) searches are provided with the above noted caveats.

Of the 539,329 officer-initiated traffic stops with valid race information, 0.9% of drivers (n=4,773) were asked for consent to search.[35] As demonstrated in Figure 5.10 below, an examination of the drivers' race/ethnicity indicates that certain racial/ethnic groups were significantly more likely than others to be asked for consent to search. Specifically, 1.9% of Hispanic drivers and 1.3% of Black drivers were asked for consent to search, compared to

[35] For KOTS data, the number of drivers asked for consent was estimated by summing the number of consent searches conducted and the number of search refusals. In TRACS, a data field was included to specifically capture whether consent to search was requested.

only 0.5% of White drivers. Native American (0.3%) and drivers of other races (0.6%) also showed significantly lower rates of being asked for consent to search.

Figure 5.10: Requests for Consent to Search (n=539,329)

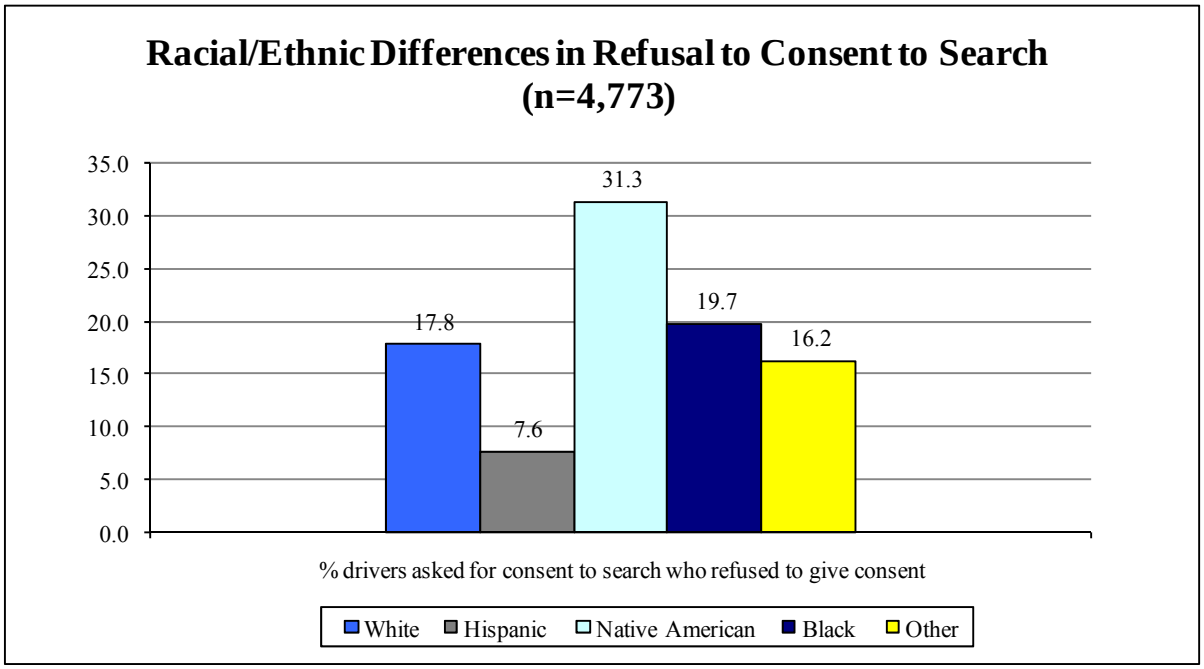


NOTE: Differences across the racial/ethnic groups presented in this figure are statistically significant at $p \leq .001$

Of the 4,773 drivers with valid race information who were asked for consent to search, 602 (12.6%) refused to give consent. Again, as documented in Figure 5.11 below, the percentage of refusals varied significantly across racial/ethnic groups. Hispanic drivers were significantly less likely to refuse to give consent when asked, compared to all other racial/ethnic groups. In summary, compared to other racial/ethnic groups, Hispanic motorists were significantly more likely to be asked for consent to search and significantly less likely to refuse to give consent when asked. Specifically, only 7.6% of Hispanic drivers asked for consent to search refused to give consent, compared to 17.8% and 19.7%, respectively, of White and Black drivers who were asked for consent and refused. The reverse is true for Native American drivers. Native American motorists were significantly less likely to be asked for consent (0.3%) and significantly more likely to refuse to give consent when asked (31.3%) than all other racial/ethnic groups. It is important to note, however, that only 67 Native Americans were asked for consent and this percentage should be interpreted with caution based on the small number of cases.

Again, these findings are consistent with the perceptions of the focus group participants, who agreed that the rates for granting consent vary somewhat across racial/ethnic groups. Nearly all the focus group participants that commented on this topic indicated that they believed Hispanics, particularly Mexican nationals, are less likely than other racial/ethnic groups to refuse officers' requests for consent. Participants indicated that the primary reason for these differences was experiences with law enforcement in Mexico, where motorists can be searched without the same legal standards.

Figure 5.11: Racial/Ethnic Differences in Refusal to Consent to Search (n=4,773)



NOTE: Differences across the racial/ethnic groups presented in this figure are statistically significant at $p \leq .001$

To more fully explore the racial/ethnic disparities evident in consent search rates, Table 5.9 below presents three multivariate models predicting consent searches. As with the multivariate analyses of stop outcomes in Section 4, Table 5.9 first presents a model that includes all cases from the merged KOTS and TRACS data. Models 2 and 3 include only cases from the TRACS data; Model 2 examines the same variables used in the analyses of 2006 and 2007 data, while Model 3 includes the additional predictor variables included for collection in the TRACS system. This allows for a direct comparison of the race effects on consent searches with and without the additional explanatory variables.

Like the models predicting any search presented in Section 4, the models for Type III searches presented in Table 5.9 are also weak in predictive power. An examination of the Nagelkerke R-Square values for Models 1 – 3 shows that none of the models are particularly strong but the explanatory power of the multivariate models predicting consent-only searches is strongest in Model 3 (Nagelkerke R-Square = 0.148). The inclusion of the additional variables in TraCS has improved the explanatory power of the multivariate model predicting Type III searches. Specifically, nearly 15% of the variation in whether or not drivers are searched can be predicted with the group of variables included in Model 3, compared to approximately 9% for Models 1 and 2. The findings discussed below refer to the results presented in Model 3 unless otherwise noted.

Although this model is weak, the results do suggest that statistically significant racial/ethnic disparities exist in whether or not consent searches are conducted. Comparing the effects of the race/ethnicity variables between Models 2 and 3, the odds ratios in Model 3 show that the inclusion of additional variables available in TraCS has somewhat attenuated the effects of being Hispanic or Black. Nonetheless, Hispanic and Black drivers were 3.3 and 2.0 times

more likely to be searched based on consent compared to Whites given the same vehicle, stop, and legal characteristics that can be measured with these data. In addition, Native American were 6.5 times less likely to be searched based on consent, but this effect is only significant at $p<.01$. One additional driver characteristic that significantly predicts the likelihood of a consent search is county residency, as residents of the counties they were stopped in were 3.1 times less likely than non-county residents to be searched based on consent.

The strongest predictor of whether or not a consent search is conducted is the presence of multiple pre-stop indicators of possible criminal activity. Specifically, when officers observed two or more indicators of criminal activity prior to the stop, the likelihood of a consent search was 11.5 times higher than in stops involving no pre-stop indicators of criminal activity. Drivers who were observed for following distance or lane change violations prior to the stop were 3.3 and 2.6 times more likely to be searched based on consent than those observed for speeding violations prior to the stop. Finally, drivers stopped for nonmoving violations were 2.3 times more likely to be searched based on consent compared to those stopped for moving violations.

More importantly, however, the weak overall ability of this model to predict the likelihood of consent searches indicates that this model is likely misspecified. That is, other factors more central to explaining whether or not drivers are searched based on consent have likely not been included in the data collection. First and foremost, this analysis is unable to model the effect of refusal to consent, which we know varies by race/ethnicity based on the analyses presented in Figure 5.11. Specifically, Hispanics were the least likely to refuse consent, while Native Americans were the most likely to refuse consent when requested. Additionally, officers who participated in the focus group sessions indicated a number of factors that influence their decision to request consent to search, only some of which are included on the redesigned data collection form. For example, while pre-stop indicators of suspicion are included in TraCS, indicators of possible criminal activity that are discovered *during* the stop are not. Officers participating in the focus group session emphasized the importance of considering multiple types of indicators and the totality of the circumstances in determining when to request consent to search.

Table 5.9: Multivariate Logistic Analyses Predicting TYPE III (Consent Only) SEARCHES During Officer-Initiated Traffic Stops in 2008

	MODEL 1 (n=532,502)		MODEL 2 (n=138,922)		MODEL 3 (n=138,902)	
Variables	**Coeff.**	**Odds ratio Exp(b) or 1/Exp(b)**	**Coeff.**	**Odds ratio Exp(b) or 1/Exp(b)**	**Coeff.**	**Odds Ratio Exp (b) or 1/Exp (b)**
Intercept	-5.07*		-5.18*		-5.87*	
Driver Characteristics						
Hispanic	1.33*	3.80	1.37*	3.93	1.20*	3.32
Native American	-0.73*	2.07	-1.96	--	-1.87	--
Black	0.79*	2.21	0.82*	2.27	0.70*	2.01
Other Race	-0.01	--	-0.07	--	0.01	--
Male	0.85*	2.34	0.70*	2.02	0.60*	1.81
Age	-0.02*	1.02	-0.02*	1.02	0.01*	1.01
Demeanor †	--	--	--	--	-0.45	--
County resident	-0.97*	2.64	-1.13*	3.11	-1.12*	3.08
AZ resident	-0.42*	1.53	-0.36*	1.44	-0.34*	1.40
Undocumented Alien Status	--	--	--	--	-0.43	--
Vehicle Characteristics						
Truck/Tractor Trailer	0.32*	1.38	0.02	--	0.15	--
Van/Station Wagon	-0.25*	1.28	-0.11	--	-0.14	--
Other Vehicle Type	0.02	--	-0.78	--	-0.85	--
Vehicle Age †	--	--	--	--	0.05	1.05
Vehicle Condition †	--	--	--	--	0.03	--
Stop Characteristics						
Night-time	-0.21*	1.24	-0.38*	1.47	-0.32*	1.37
Weekend	-0.12	--	-0.31	--	-0.28	--
Spring	0.13	--	--	--	--	--
Summer	-0.09	--	--	--	--	--
Fall	-0.15	--	--	--	--	--
Legal variables						
One pre-stop indicator of criminal activity	--	--	--	--	0.42*	1.52
Multiple pre-stop indicators of criminal activity	--	--	--	--	2.44*	11.50
Multiple pre-stop violations observed †	--	--	--	--	-0.05	--
Pre-stop viol. observed: Equipment †	--	--	--	--	0.04	--
Pre-stop viol. observed: Following distance †	--	--	--	--	1.20*	3.30
Pre-stop viol. observed: Failure to stop †	--	--	--	--	-0.66	--
Pre-stop viol. observed: Failure to yield †	--	--	--	--	-0.70	--
Pre-stop viol. observed: Failure to signal †	--	--	--	--	0.56	--
Pre-stop viol. observed: Improper lane chg. †	--	--	--	--	0.96*	2.60
Pre-stop viol. observed: other moving †	--	--	--	--	-0.17	--
Pre-stop viol. observed: other †	--	--	--	--	-0.21	--
Reason for stop: non-moving violation	-0.33*	1.40	0.44*	1.55	0.83*	2.30
Reason for stop: equipment violation	-0.10	--	-0.11	--	0.07	--
Reason for stop: investigation	-0.18	--	-0.01	--	0.43	--
Reason for stop: pre-existing information	-0.79*	2.21	-0.08	--	0.26	--
Reason for stop: criminal offense	-0.64	--	-0.03	--	-0.19	--
Model Chi-square	3666.56*		727.72*		1199.65*	
Nagelkerke R Square	.093		.090		.148	

NOTE: Asterisks indicate statistically significant relationships * $p \leq .001$. All TRACS-only variables are noted with a †.

As noted previously, the inclusion of consent searches in outcome test analyses is especially problematic because, as with mandatory searches, the decision of whether or not to search is not entirely based on the officers' decision (Fridell, 2004; Engel, 2008). Although officers initially decide whom to *request* a consent search from, ultimately it is citizens, not officers, who decide whether or not consent searches are conducted. Citizens have the right to refuse search requests, and if the officer has no probable cause to conduct the search, their denial of the police request must be honored. As demonstrated in Figure 5.11, rates of refusal are *not* equivalent across racial/ethnic groups. Hispanic drivers, in particular, are more likely to give consent when requested compared to other racial / ethnic groups. Despite these limitations, DPS administrators requested analyses of consent search success rates by race and gender for purposes of internal comparisons. These rates are provided below. It is important to note, however, because of the limitations described above, *no definitive conclusions about racial bias should be drawn from these comparisons*.

Figure 5.12 below displays the overall Type III (consent only) search success rates across the department, bureaus, and canine squads. Department-wide, 10.0% of consent-only searches were successful in recovering contraband. The search success rates at the bureau level ranged from a low of 7.2% in the Southern Bureau to a high of 13.6% in the Northern Bureau. The Type III search success rate of the Canine North squad leads the department at 18.0%.

Figure 5.12: Type III (Consent Only) Search Success Rates by Organizational Unit

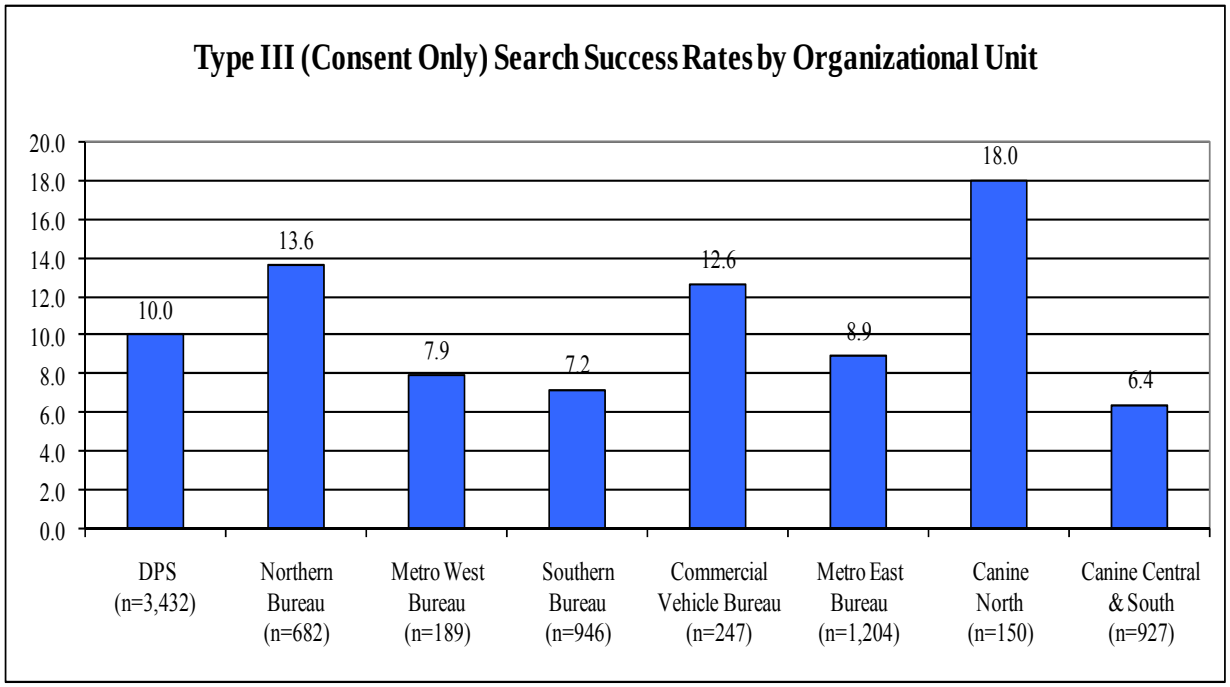
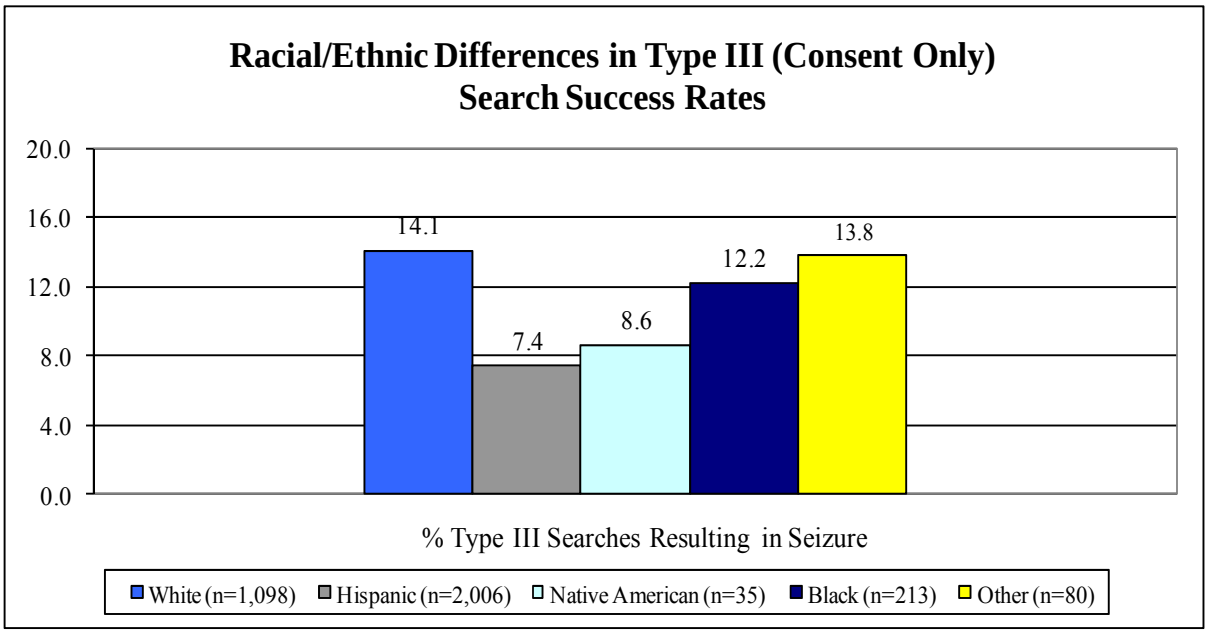


Figure 5.13 and Table 5.10 display the total number of Type III (consent only) search success rates based on drivers' characteristics. As shown, there were significant racial/ethnic differences in the Type III search success rates at the department and bureau level.

Specifically, department-wide, Type III (consent only) searches of White drivers (14.1%) were the most likely to be successful in the discovery of contraband, compared to all other racial/ethnic groups. The Type III search success rate for drivers of other races/ethnicities (13.8%), however, is nearly as high as that for Whites, and is followed closely by Blacks as well (12.2%). Consent only searches of Hispanics (7.4%), on the other hand, were the least likely to be successful in terms of recovering contraband. At the bureau level, racial/ethnic differences in Type III search success rates are statistically significant in the Northern, Southern, and Metro East Bureaus. While the search success rates for other bureaus also indicate racial/ethnic differences, these differences may not reach statistical significance due to the small numbers of consent searches for some racial/ethnic groups at the bureau level.

Figure 5.13: Racial/Ethnic Differences in Type III (Consent Only) Search Success Rates



NOTE: Differences across the racial/ethnic groups presented in this figure are statistically significant at $p \leq .001$

Table 5.10 below presents the total number of searches based on both consent only and any consent (i.e., consent and some other reason). The first column notes the total number of all searches for each racial/ethnic group. The second and third columns include the total number of searches based only on consent, and the search success rate for those searches (findings described above), while the fourth and fifth columns include the total number of searches based on any consent and the search success rates for those searches. For searches based on any consent, the overall search success rates are higher across all racial groups compared to searches based solely on consent. Searches of Hispanics based on any consent are still significantly less likely to produce seizures of contraband (10.8%) than searches of Whites (19.8%), Native Americans (18.4%), or Blacks (18.1%). As shown in Table 5.10, these racial/ethnic differences in search success rates based on any consent are also statistically significant in three of the five bureaus and the Canine North squad.

Table 5.10: Type III Search Success Rates by Driver Characteristics for Department, Bureaus, & Canines (p.1 of 2)

	Drivers	Total # of Searches	Total # of Consent Only Searches	Consent Only Search Success Rate	Total # of Any Consent Searches	Any Consent Search Success Rate
DPS	White	10,932	1,098	14.1***	1,387	19.8***
	Hispanic	13,537	2,006	7.4	2,372	10.8
	Native American	1,985	35	8.6	49	18.4
	Black	2,098	213	12.2	282	18.1
	Male	23,720	3,033	9.6*	3,680	13.9**
	Female	5,404	399	13.3	503	18.7
Northern Bureau	White	2,954	369	16.3*	481	23.5***
	Hispanic	1,639	217	8.3	260	10.8
	Native American	1,416	18	0.0	24	8.3
	Black	257	52	17.3	60	20.0
	Male	5,272	591	12.0**	742	17.7**
	Female	1,111	91	24.2	110	28.2
Metro West Bureau	White	2,075	80	12.5	115	16.5
	Hispanic	3,046	84	4.8	120	11.7
	Native American	74	1	0.0	1	0.0
	Black	607	20	5.0	30	10.0
	Male	4,751	172	6.4*	244	11.9*
	Female	1,157	17	23.5	30	26.7
Southern Bureau	White	2,663	243	10.7*	313	16.6***
	Hispanic	4,659	643	5.4	793	8.7
	Native American	256	5	20.0	9	33.3
	Black	425	38	10.5	57	14.0
	Male	6,485	825	7.4	1,030	11.2
	Female	1,677	121	5.8	166	12.7
Commercial Vehicle Enforcement Bureau	White	269	99	16.2	106	17.0
	Hispanic	223	110	10.9	117	12.0
	Native American	4	0	--	0	--
	Black	75	24	4.2	30	16.7
	Male	590	244	12.7	263	14.4
	Female	14	3	0.0	3	0.0

NOTE: Asterisks indicate statistically significant chi-square associations across 4 racial groups and 2 gender groups. *** $p \leq .001$ ** $p \leq .01$ * $p \leq .05$

Table 5.10: Type III Search Success Rates by Driver Characteristics for Department, Bureaus, & Canines (p.2 of 2)

	Drivers	Total # of Searches	Total # of Consent Only Searches	Consent Only Search Success Rate	Total # of Any Consent Searches	Any Consent Search Success Rate
Metro East Bureau	White	2,698	249	12.9*	296	18.2***
	Hispanic	3,420	864	7.4	965	10.9
	Native American	197	8	12.5	11	27.3
	Black	656	65	13.8	86	22.1
	Male	5,810	1,053	8.4	1,206	12.7
	Female	1,308	151	12.6	171	17.0
Canine North	White	139	54	16.7	65	21.5***
	Hispanic	136	75	16.0	97	19.6
	Native American	4	0	--	1	100.0
	Black	69	19	31.6	29	51.7
	Male	312	134	14.2***	173	22.0**
	Female	44	16	50.0	22	50.0
Canine Central & South	White	239	139	9.4	151	15.2
	Hispanic	1,149	734	5.9	800	9.1
	Native American	18	7	0.0	7	0.0
	Black	69	35	8.6	40	10.0
	Male	1,315	807	6.6	883	10.1
	Female	204	120	5.0	127	8.7

NOTE: Asterisks indicate statistically significant chi-square associations across 4 racial groups and 2 gender groups. *** $p \leq .001$ ** $p \leq .01$ * $p \leq .05$

Understanding Racial/Ethnic Disparities in Searches and Seizures

There are a number of legitimate factors that may explain the racial/ethnic disparities reported in the findings regarding search and seizure rates. Unfortunately, the KOTS data collection design did not allow for examination of some of the most intuitive explanations. For example, the differences in search rates may be due to socio-economic status rather than race/ethnicity per se. Drivers' socio-economic status, however, is not captured on the traffic stop forms. The closest proxy indicator of wealth routinely collected – age of vehicle – was also not previously captured on the form. In addition, the behavior of the driver (e.g., demeanor, compliance with officer requests, suspicious indicators, misstatement of facts / lying to officers, etc.) was not systematically captured. Therefore, any conclusions regarding racial/ethnic disparities in searches and seizures based on the bivariate and outcome test analyses must be tempered. The redesigned data collection form in the TRACS system in use for the last quarter of data collected in 2008 does include data fields for vehicle condition, demeanor, and pre-stop indicators of suspicion. These fields will allow for a more thorough analysis of search and seizure rates in the future.

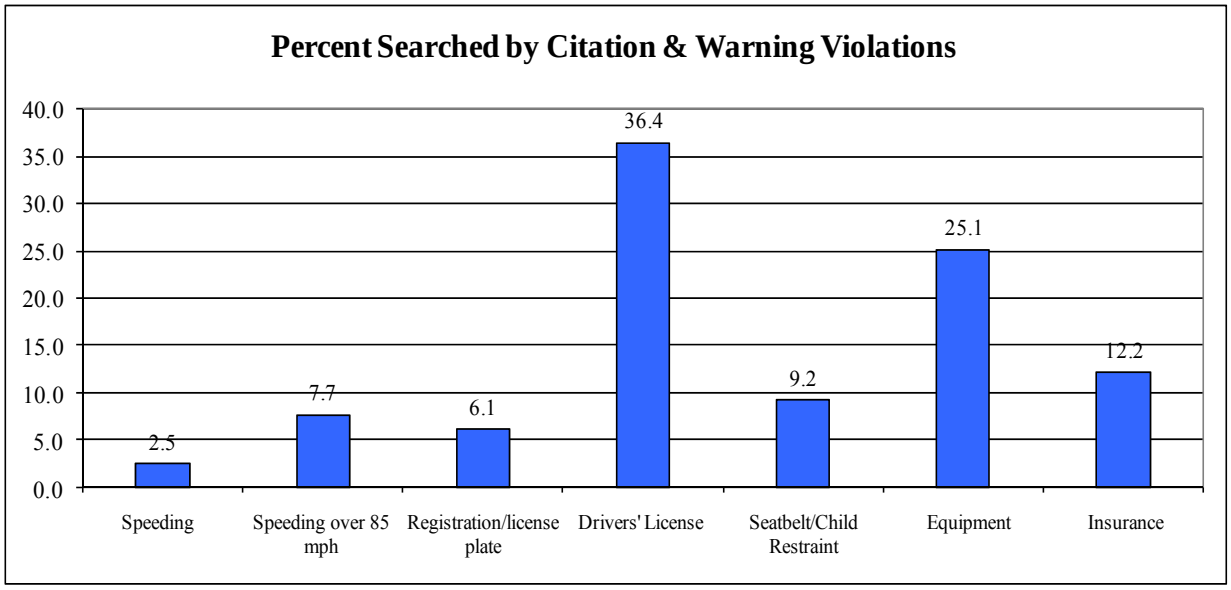
In the interim, in an effort to better understand factors that influence whether or not drivers are searched and whether searches are successful in recovering contraband, additional analyses based on the data currently available in KOTS were performed. Some of the possible explanations noted above can be partially examined by analyzing search and seizure rates across types of violations. Similar to the findings from the *Year 2 Report*, an examination of the types of violations for which drivers were issued citations between January and September 2008 reveals statistically significant racial/ethnic differences in types of violations. Most notably:

- Whites were significantly more likely to be issued citations for speeding violations, compared to Hispanics, Native Americans, and Blacks.
- Black drivers were significantly more likely than other racial/ethnic groups to be issued citations for speeding over 85 mph, and for violations related to vehicle registration and/or license plate.
- Alternatively, Hispanic drivers were significantly more likely than other racial/ethnic groups to be issued citations for violations related to drivers' license, seat belts/child restraints, required equipment, and insurance.
- Native Americans were significantly more likely than other racial/ethnic groups to be issued citations for DUI or reckless/aggressive driving violations.

Therefore, if particular types of violations are more likely to prompt officers to search vehicles, and these types of violations also differ systematically by race/ethnicity, then racial/ethnic disparities in search and seizure rates may be partially accounted for by alternative factors. The following analyses examine search and seizure rates by the types of violations for which citations were issued.

Figure 5.14 shows the percent of drivers searched by the types of violations for which they were cited or warned.[36] As shown, significant differences in search rates exist. Specifically, drivers who were cited or warned for violations related to drivers' license, equipment, insurance, and to a lesser degree seatbelt/child restraint, were significantly more likely to be searched compared to drivers who were cited or warned for speeding, speeding over 85 mph, and registration violations. For example, 36.4% of stops that resulted in a citation or warning for a drivers' license violation resulted in searches, compared to only 2.5% of stops that resulted in a citation or warning for speeding. As noted above, crosstabulations of type of violation and race/ethnicity analyses showed that Hispanics were significantly more likely than Whites to be cited for drivers' license, equipment, insurance, and seatbelt/child restraint violations. These results suggest that racial/ethnic disparities in search rates may be related to the reason for the stop and the type of violation for which they were cited or warned, which in turn may be related to socioeconomic status.

Figure 5.14: Percent Searched by Citation and Warning Violations



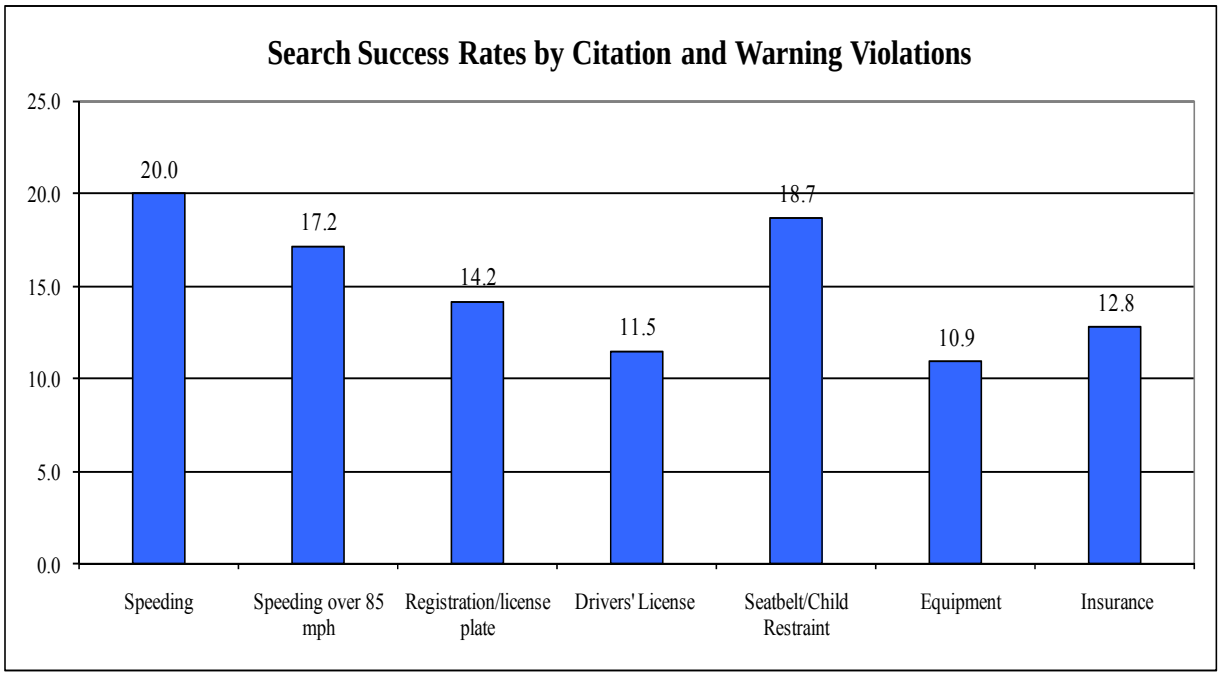
NOTE: Differences across the violation types presented in this figure are statistically significant at $p \leq .001$

Figure 5.15 shows the search success rates (i.e., the percent of searches resulting in discovery of contraband) by the types of violations for which drivers were cited or warned. As shown, significant differences in search success rates exist across violation types. Specifically, stops that resulted in a citation or warning for violations related to drivers' license, equipment, and insurance were significantly *less* likely to result in contraband seizures (11.5%, 10.9%, and 12.8%, respectively) compared to searches during stops of drivers who were cited or warned for violations related to speeding, speeding in excess of 85 mph, registration, and seatbelts (range = 14% to 20%). As noted above, Hispanic drivers were significantly more likely to be cited for violations related to drivers' license, equipment, and insurance, the three lowest search success rates. Hispanics, however, were also more likely to be cited for violations

[36] The overwhelming majority of stops based on DUI or drug offense violations resulted in a search (88% of DUIs and 97% of drug offenses). Indeed, a citation for a drug offense violation is presumably contingent upon a search being conducted. Therefore, these two types of violations were excluded from these analyses.

related to seatbelts, which has the second highest search success rate. Therefore, the evidence is mixed on whether differences in violation types may partially account for racial/ethnic disparities in search success rates.

Figure 5.15: Search Success Rates by Citation and Warning Violations



NOTE: Differences across the violation types presented in this figure are statistically significant at $p \leq .001$

Undocumented Aliens

Focus groups with DPS officers and sergeants, as well as troopers from other state police agencies, have suggested that racial/ethnic disparities in search success rates may be partially explained by a number of factors. For example, officers from the DPS as well as other jurisdictions have suggested that, in particular, Hispanic hit rates might be lower than White hit rates for the following reasons: 1) the misinterpretation of cues of suspicion by officers, 2) a lack of officer training specific to Hispanic citizens, 3) a possible language barrier between officers and Hispanic motorists, 4) possible documentation issues on traffic stop forms that do not account for issues regarding searches of Hispanics, 5) specific types of vehicle characteristics associated with Hispanic motorists, and 6) the extensive and effective use of hidden compartments by this ethnic group (Engel et al., 2007b, Engel et al., 2008a, 2008b).

One of these reasons – possible documentation problems associated with traffic stop forms that do not account for issues regarding searches and seizures of Hispanic undocumented aliens – can be partially examined empirically with data collected by DPS. DPS officers and troopers in other jurisdictions have suggested that some Hispanic motorists are more likely to display cues of nervousness and deception because they are illegal immigrants. These cues

of suspicion are perhaps misinterpreted by officers, resulting in searches of Hispanic motorists that are less productive in terms of contraband seizures. Officers in other jurisdictions have requested that undocumented aliens be captured on the traffic stop forms to account for this possibility.

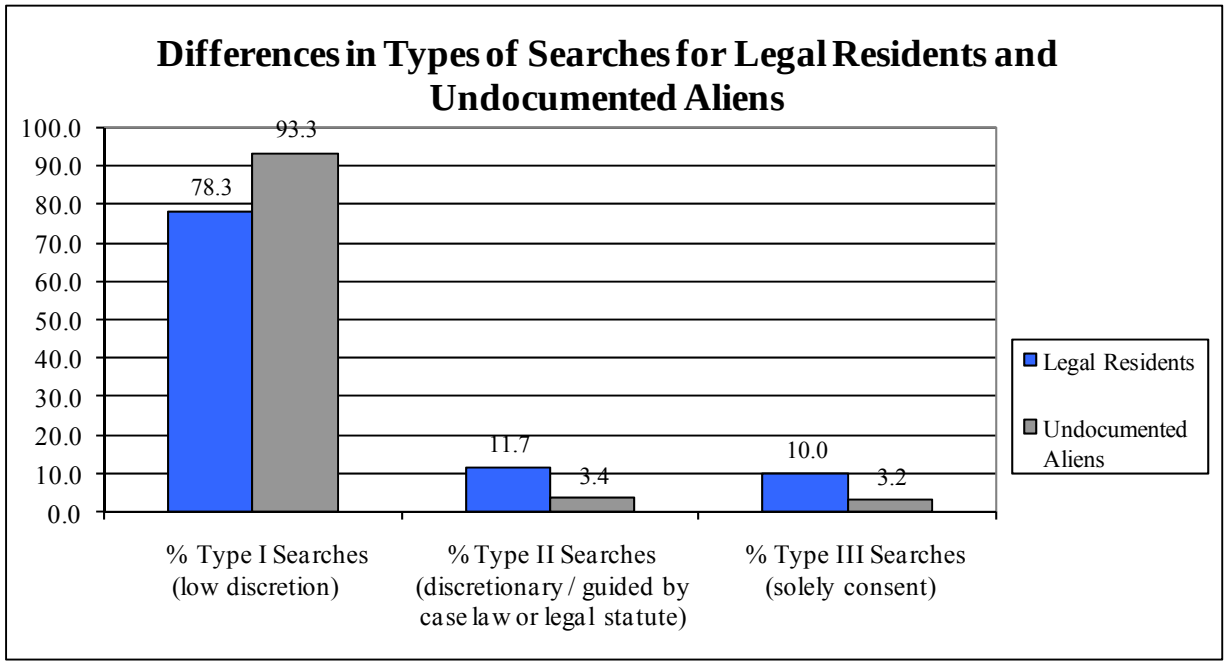
On the DPS traffic stop form, there is a place to indicate if the person stopped is considered by the officer to be an undocumented alien. For the KOTS data collection system, this information was limited to data collected specifically on the driver, and not passengers.[37] For the TraCS system in use during the last three months of the 2008 data collection, this information is collected for the driver and/or any passengers. Examining the percentages of undocumented aliens in the two datasets reveals that only 0.5% of the stops recorded in KOTS were considered to be of drivers who were undocumented aliens, while 2.7% of the stops recorded in TraCS involved a driver and/or passenger that had undocumented status. The redesigned TraCS data collection now in use is presumed to be offering a more accurate representation of the frequency with which undocumented aliens are encountered by DPS officers. Therefore, if officers across the country are correct in their assessment that Hispanic hit rates are significantly lower than other racial groups partially because Hispanic motorists demonstrate cues of suspicion due to nervousness surrounding immigration status rather than other illegal activity (but are subsequently searched by officers with no contraband found, resulting in a lower hit rate), analyses of these data should lend some support to this hypothesis.

Because of the known issues with the undocumented alien data field in use with the KOTS system, the following analyses utilize data recorded in the TraCS system only. Of the 139,389 officer-initiated traffic stops conducted between October and December 2008, 3,710 (2.7%) of the drivers and/or passengers in stopped vehicles were considered by officers to be undocumented aliens. The majority of stops with the UDA field indicated involved a Hispanic driver (68.8%). Of these 3,710 stops with undocumented aliens, 1,020 (27.5%) involved a search of the driver, passenger, or vehicle, compared to only 4.6% of drivers with legal resident status.

The reasons for searches conducted when undocumented aliens were noted are compared to the reasons for searches of involving legal residents in Figure 5.16 below. As demonstrated, drivers involved in stops with undocumented aliens (either as a passenger or themselves) were more likely to be searched for low discretion reasons (93.3% of all searches) compared to legal residents (78.3% of all searches). In contrast, stops with undocumented aliens were less likely to result in a search for discretionary reasons (3.4% of all searches) compared to stops with legal residents (11.7% of all searches). Likewise, searches based solely on consent represented 3.2% of the searches during stops with undocumented aliens, compared to 10.0% of stops with searches of legal residents.

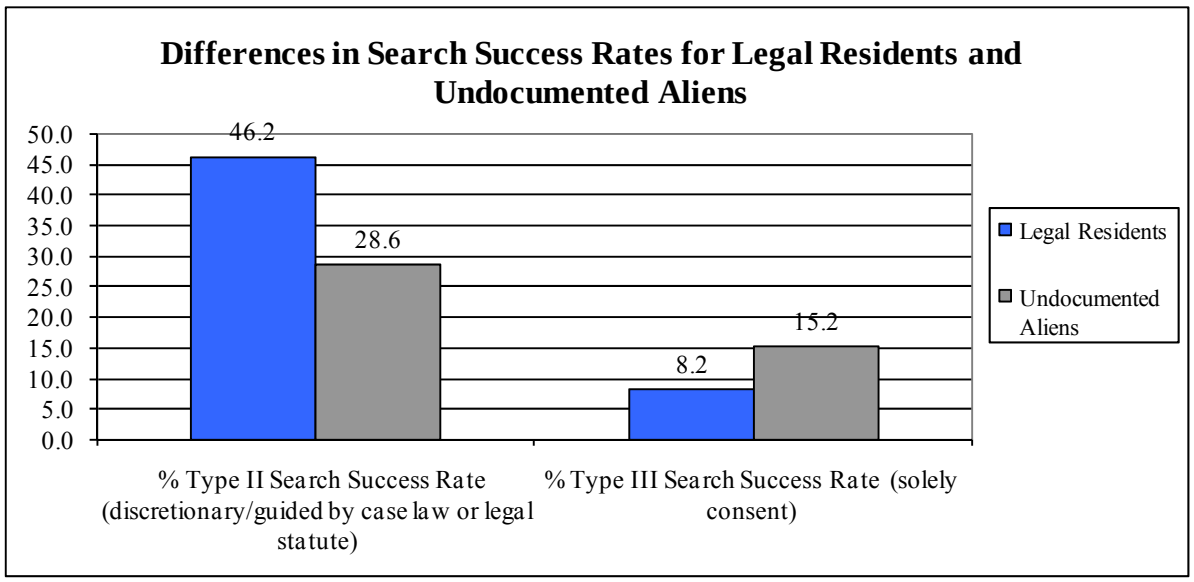
[37] Furthermore, during the focus group sessions with DPS officers and sergeants, participants' comments suggested that the use of the UDA data field in the KOTS system was not uniform across the department. Because of the layout of the form, many officers indicated they thought they had to choose between a racial category and the UDA box. This confusion likely resulted in this field being underutilized on the KOTS form even for drivers suspected to be undocumented aliens.

Figure 5.16: Differences in Types of Searches for Legal Residents and Undocumented Aliens



When discretionary searches are examined directly, searches involving undocumented aliens (whether as the driver or passenger) are less likely to produce seizures of contraband compared to searches with legal residents. Specifically, 28.6% of the discretionary searches involving undocumented aliens resulted in contraband seizures, compared to 46.2% of discretionary searches involving legal residents. For Type III (consent only) searches, searches involving undocumented aliens are more likely to produce seizures of contraband. Specifically, 15.2% of consent only searches involving undocumented aliens resulted in seizures of contraband, compared to 8.2% of consent searches involving legal residents. These differences are documented in Figure 5.17 below. Note, however, that the Type II and III search success rates for searches involving undocumented aliens are based on a small number of searches conducted for these reasons (n=35 Type II searches of UDAs, n=33 Type III searches of UDAs).

Figure 5.17: Differences in Search Success Rates for Legal Residents and Undocumented Aliens



It can be argued that while undocumented aliens are not contraband per se, they are still engaged in criminal activity (i.e., they are in the country illegally), and therefore should be counted as a "successful hit" for search rates. The overall search success rate for searches recorded in TraCS increases from 17.0% to 29.1% when the discovery of undocumented aliens (either the driver or passenger) is included as another form of criminal activity discovered. Analyses examining the differences in racial/ethnic search success rates when the discovery of undocumented aliens is included as criminal activity discovered are displayed in Figures 5.18 and 5.19. As shown in Figure 5.18, when UDAs and contraband seizure are included in the counts for search success rates, the Type II (discretionary) search success rates for Hispanic drivers increased from 36.0% to 44.8%; this rate, however, remains statistically significantly different from the rate of Whites. Figure 5.19 shows that the consent only search success rate for Hispanic drivers increases from 6.5% to 12.7% when considering the discovery of contraband and/or undocumented aliens. The difference between the Type III search success rates of Whites and Hispanics is not statistically significant when criminal activity related to undocumented aliens is considered. Also of note in Figure 5.19 is that the Type III search success rate for Blacks also increases when the discovery of undocumented aliens is considered along with contraband seizures from 4.8% for contraband seizures only to 9.5% for the discovery of contraband or undocumented aliens. This would suggest that at least some undocumented aliens are being smuggled by Black drivers. It is possible the search success rates of Hispanics when undocumented aliens are counted as another form of criminal activity will increase further when information regarding undocumented alien passengers is available for a full year of data.[38]

[38] It is possible that some officers consider undocumented alien passengers as an "other" form of contraband on the data collection form, but as noted in footnote 33, the actual content of the "other" category is not known to the UC research team.

Figure 5.18: Racial/Ethnic Differences in Type II Seizure and Seizure with UDA Rates

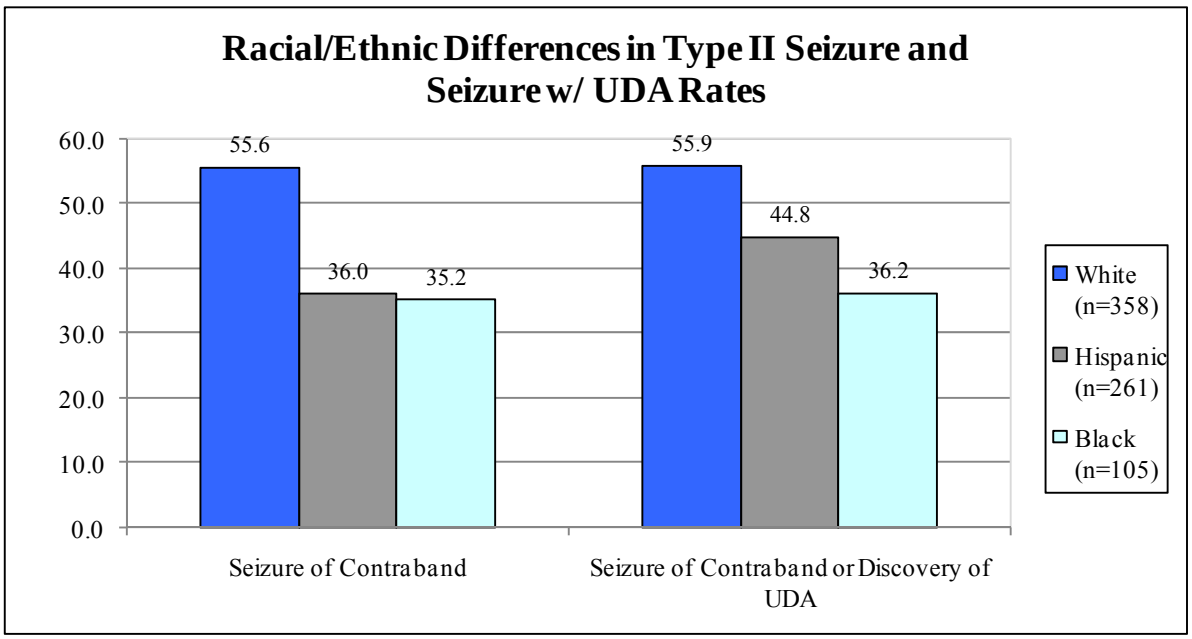
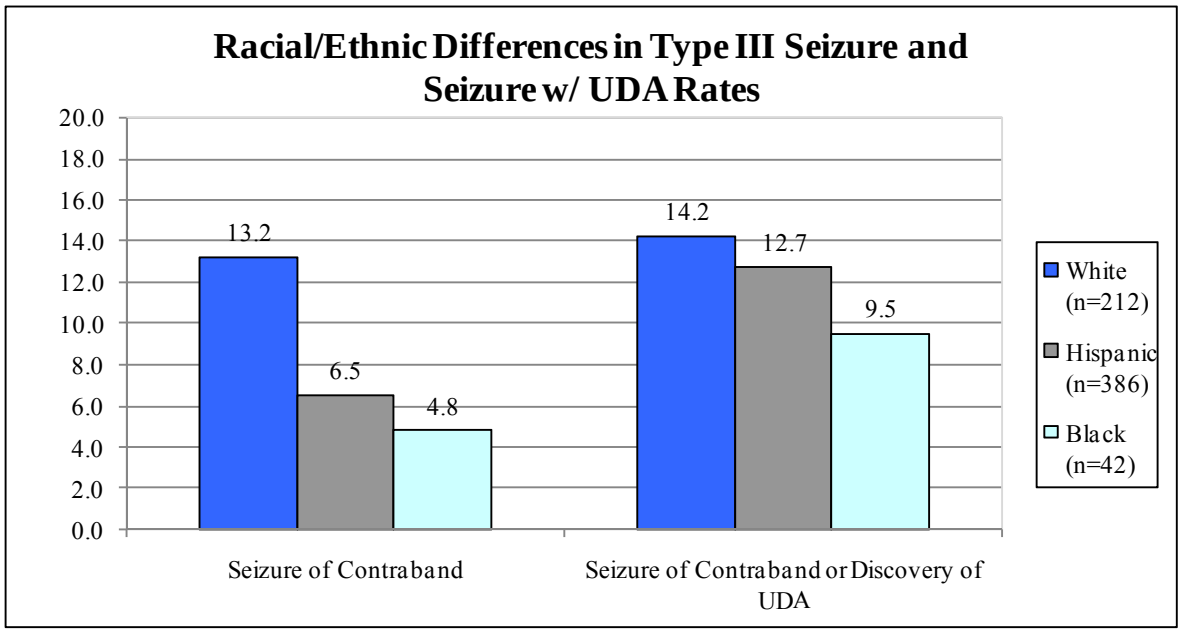


Figure 5.19: Racial/Ethnic Differences in Type III Seizure and Seizure with UDA Rates



In summary, stops involving undocumented aliens (the majority of which involved a Hispanic driver) were significantly more likely to result in a search and somewhat less likely to be found in possession of contraband when searched for discretionary reasons but more likely to be found with contraband when searches were based on consent only. When undocumented aliens are counted as criminal activity in the same manner as the discovery of contraband is, the Type II (discretionary) search success rate for Hispanic motorists increases by 8.8%, but still remain about 11% below the Type II search success rate for White motorists. Likewise, the Type III (consent only) search success rate for Hispanic motorists

increases by 6.2% when considering contraband seizures and/or the discovery of undocumented aliens, a percentage that is not significantly different from the Type III search success rate for White motorists.

SECTION SUMMARY

- ***Description of Searches and Seizures***
  - Department-wide in 2008, DPS officers conducted 29,173 searches of drivers, vehicles, and/or passengers during officer-initiated traffic stops.
  - Vehicle inventory (56.2%) and incident to arrest (38.1%) were the most common reasons for searches, followed by consent (14.4%), consent only (11.8%), probable cause (10.9%), and Terry (10.5%).
  - At the department level, 53.1% of searches were conducted of drivers, 90.9% involved vehicles, and 12.4% were performed on passengers.
  - Department-wide in 2008, DPS officers successfully seized contraband during 5,287 of 29,173 searches. The most frequent type of contraband seized was drugs (50.5%), followed by other contraband (28.7%), alcohol (18.3%), and vehicles (17.1%).
    - Information recorded in TraCS for October – December 2008 shows that the overwhelming majority of drug seizures—85.6%—included personal use amounts, while 16.4% included quantities for sale and 16.4% included quantities for transportation.
    - Racial/ethnic differences in drug seizure amounts were evident as Whites were most likely to have personal use amounts of drugs seized during searches resulting in drug seizures, while Hispanics and Blacks were more likely than Whites to have sale and transportation quantities of drugs seized.

- ***Types of Searches***
  - At the department level, the majority of searches conducted were Type I (low discretion) searches (76.1%), while 12.1% were Type II (guided by case law/legal statute) and 11.8% were Type III (solely consent), respectively.
    - The Commercial Vehicle Enforcement Bureau and Canine District conducted a considerably larger percentage of Type II and Type III searches compared to the department average and other bureaus.
  - Analyses based on the type of search indicate statistically significant racial and ethnic disparities in searches across all three search type categories:
    - Blacks were least likely to be searched for Type I reasons, while Native Americans were most likely to be searched for these reasons.
    - For Type II searches, Blacks were significantly more likely, and Native Americans significantly less likely, to be subject to Type II searches.
    - For Type III (solely consent) searches, Hispanics were significantly more likely to be searched compared to Whites and Native Americans.

- ***Search Success Rates***
  - The overall search success rate was 18.1%, but varied by the reason for search:

  - Searches based partially (14.5%) or solely (10.0%) on consent as well as vehicle inventories (12.0%) were least likely to be successful in terms of discovering contraband.
  - Searches most likely to produce seizures of contraband include those based on probable cause (67.1%), canine alerts (51.9%), warrant (50.0%), and plain view (49.6%).
  - Within the Canine District, canine handlers assigned to the North squad were significantly more likely to report contraband seizures (45.8%) compared to handlers assigned to Central/South squads (24.1%). This was consistent across most types of searches. Some of the gaps, however, in specific search success rates (e.g., probable cause, canine alert) between the Canine North and Canine Central and South squads have narrowed in 2008.
  - Furthermore, in a large majority of searches that were conducted for low-discretion reasons the likelihood of discovering contraband is not based on officer skill or criminal interdiction training.

- ***Type II (discretionary) Searches***
  - The overall Type II search success rate for DPS was 44.9%, but success rates varied significantly by race/ethnicity:
    - Type II searches of Hispanic drivers (38.4%) were the least likely to be successful in the discovery of contraband, compared to Native Americans (52.7%), Whites (49.8%), Blacks (43.5%), and drivers of other races/ethnicities (38.8%).

- ***Type III (solely consent) Searches***
  - Analyses of consent searches revealed racial/ethnic differences in those asked for consent to search as well as refusals to consent:
    - Specifically, Hispanics were significantly more likely than other racial/ethnic groups to be asked for consent to search and significantly less likely than members of other racial/ethnic groups to refuse consent to search.

  - Multivariate models predicting Type III searches indicated that, although the predictive power of the models is weak, there are statistically significant racial/ethnic disparities in whether or not consent searches are conducted.
    - Hispanic and Black drivers were 3.3 and 2.0 times more likely to be searched based on consent compared to Whites given the same vehicle, stop, and legal characteristics. These strength of these relationships is slightly diminished by the inclusion of additional explanatory variables available in TraCS.
    - The strongest predictor of whether or not a consent search is conducted is the presence of multiple pre-stop indicators of possible criminal activity. When officers observed two or more of these indicators, the likelihood of a consent search was 11.5 times higher than in stops involving no pre-stop indicators.
    - The weak overall ability of these models to predict the likelihood of consent searches indicates that this model is likely misspecified. That is, other factors (e.g., refusal to consent, post-stop indicators of suspicion) likely more central

to explaining whether or not drivers are searched based on consent have not been measured.

- Because consent searches are not solely dependent on officer's discretion (i.e., a citizen may refuse), analyses of consent search success rates are not recommended. They were, however, conducted, at the request of DPS administrators.
  - Results indicated racial/ethnic differences:
    - Type III searches of White drivers (14.1%) were the most likely to be successful in the discovery of contraband, followed by drivers of other races/ethnicities (13.8%), and Blacks (12.2%).
    - Consent only searches of Hispanics (7.4%) were the least likely to be successful in terms of recovering contraband.

- One possible explanation for racial/ethnic disparities in search and seizure rates is differences in types of violations. That is, if particular types of violations are more likely to prompt officers to search vehicles, and these types of violations also differ systematically by race/ethnicity, then racial/ethnic disparities in search and seizure rates may be partially accounted for by alternative factors. The analysis show some support for this hypothesis.

- Stops involving undocumented aliens (the majority of which involved a Hispanic driver) were significantly more likely to result in a search than stops involving legal residents. Compared to searches involving legal residents, Type II searches involving undocumented aliens were less likely to produce seizures of contraband while Type III searches involving undocumented aliens were more likely to produce seizures of contraband.
  - When undocumented aliens are included as a "form of contraband," both the Type II and Type III search success rates for Hispanic motorists increase. They still remain lower than the search success rates for Whites, but this difference is not statistically significant for Type III searches.

- The information presented in this section cannot determine the legality of and/or the presence of discrimination in individual searches conducted by DPS officers.

- As noted above, caution must be used when interpreting the findings in this section for two reasons:
  - Tests of statistical significance are influenced by sample size. For large samples, smaller differences are more likely to be reported as statistically significant. The strength of these relationships, however, may not be substantively meaningful despite their statistical significance.
  - The majority of the findings presented above are bivariate in nature (i.e., they do not take into account other extralegal and legal factors that might have a significant influence over search decisions).

6. CONCLUSIONS AND RECOMMENDATIONS

OVERVIEW

This report documents the findings from statistical analyses of data collected during all officer-initiated traffic stops conducted by the Arizona Department of Public Safety from January 1, 2008 through December 31, 2008, which represent the third year of data analysis for the *Traffic Stop Data Analysis Study*. As noted throughout this report, it is impossible with these data to determine the motivating factors behind traffic stops conducted by individual DPS officers. Rather, this data collection effort and subsequent data analyses can only examine patterns and trends in traffic stops and post-stop outcomes to determine if racial disparities exist after considering a host of additional legal and extralegal factors that might influence officer decision making. While it cannot be determined if DPS officers are engaging in the behavior commonly referred to as "racial profiling," analyses can demonstrate if patterns of racial disparities exist in stop and post-stop outcomes that warrant further scrutiny.

This conclusion section first provides a review of the major findings in this report, which can be generally examined as three separate, but related issues: 1) the initial stopping decision, 2) post-stop outcomes received by motorists (e.g., warnings, repair orders, citations, arrests, and searches), and 3) specific examinations of searches and seizures. Following the review of findings, several recommendations related to data collection, policy and training are provided to DPS administrators based on these analyses.

THE INITIAL STOP

From January 1, 2008 – December 31, 2008, there were 539,344 valid member-initiated traffic stops recorded by DPS officers. Department-wide, approximately 61.9% of the drivers stopped were White, while 25.2% were Hispanic, 4.9% Black, 4.8% Native American, and 3.3% Other (Asian, Middle Eastern, other or unknown). The rate of stops for particular racial and ethnic groups varied dramatically across divisions, bureaus, and districts/shifts. Some variation, however, is to be expected given residential patterns related to race/ethnicity, along with racial/ethnic differences in travel patterns on interstates, highways, and major thoroughfares. The percentages of drivers stopped within particular racial/ethnic categories are consistent with those identified in the *Year 1* and *Year 2 Reports*.

Ultimately, a group's representation in traffic stops is only meaningful when compared to the same group's "expected" representation in traffic stops, based on external data such as a group's census population. Unfortunately, all available external benchmarks are flawed, which limits the level of confidence in the results of these comparisons. Internal benchmarking – which compares the racial/ethnic breakdown of traffic stops across officers assigned to the same, assignments, shifts, and districts – is also difficult with these data because of the small numbers of officers that have such similarities. In addition, data quality issues with previous years of DPS traffic stop data led the UCPI research team to conclude that internal comparisons through trend analysis would not be advisable either. Therefore, no department-wide conclusions can be drawn as to whether racial/ethnic disparities in stopping

behavior exist. Instead, this report focuses on whether racial/ethnic disparities are evident in post-stop outcomes.

POST-STOP OUTCOMES

Warnings and citations were the most frequent stop outcomes for drivers in 2008 (42.0% and 41.4%, respectively). In addition, 18.6% were issued repair orders. Occurring rarely were the most serious stop outcomes – specifically, arrests (1.8% of drivers stopped), warrant arrests (0.5%), and searches of the drivers, occupants, or vehicles (5.4% of the stops). Slightly more than 5% of drivers were issued DVERs. Stops resulting in field interviews and tribal orders were statistically infrequent events across the department, and were not examined in detail within this report.

Analyses of post-stop outcomes are an important consideration of any data collection effort because the potential exists for differential treatment based on the drivers' characteristics *after* the initial stop has been made. As reported in Sections 5 & 6, bivariate and multivariate analyses of post-stop outcomes examined racial/ethnic differences in warnings, repair orders, citations, arrests, searches and, seizures of contraband. Multivariate analyses were modeled to understand the independent effect of drivers' racial/ethnic backgrounds in relation to these post-stop outcomes after taking into account other legal and extralegal factors known to influence officer decision making. Separate multivariate models estimated for the final three months of 2008 data allowed for an initial examination of stop outcomes factoring in the influence of the additional variables collected in the TraCS data collection system.

Results from the multivariate analyses demonstrated that, even after controlling for other explanatory factors (e.g., other driver characteristics, vehicle characteristics, stop characteristics, and legal variables), racial/ethnic disparities exist for warnings, repair orders, citations, arrests, and searches. The substantive importance of these race/ethnicity effects, however, varies by stop outcome.

- **Warnings**
  - The strongest predictors of whether or not drivers receive warnings were legal variables, including: whether multiple pre-stop indicators of possible criminal activity were observed, the types of pre-stop traffic violations observed, and the legal reasons for the stop.
  - Hispanic, Black, and drivers of other race/ethnicity were significantly *less* likely compared to Whites to receive warnings, but these relationships are substantively weak (odds ratios ranging from 1.1 to 1.3).

- **Repair Orders**
  - The strength of the models predicting repair orders is driven primarily by the reason for stop and type of pre-stop traffic violations observed (e.g., primary reason for stop was equipment violation or driver observed for a pre-stop equipment violation).
  - Hispanic and Black drivers were significantly *less* likely compared to Whites to be issued repair orders, but again, these relationships are substantively

unimportant (odds ratios ranging from 1.1 to 1.4). Native American driver were approximately two times significantly *more* likely to be issued repair orders compared to Whites.

- **Citations**
  - The models predicting the likelihood of *any* citation are largely driven by legal variables (e.g., reason for stop, number of pre-stop violations, seizure of evidence, and vehicle impound). The strength of the race/ethnicity variables indicate that these are *not* substantively strong predictors of the odds of receiving *any* citation.
  - Bivariate analyses indicated that Hispanics, Blacks and Native Americans were significantly more likely than Whites to be issued multiple citations.
  - Therefore, a multinomial logistic regression analysis compared the probability of receiving one, two, and three or more citations compared to none. Across these models, the strongest predictors of the number of citations issued to drivers were also legal variables.
  - The impact of drivers' race/ethnicity increased as the number of citations increased. For example, Hispanic and Black drivers were each only 1.1 times more likely than White motorists to receive one citation (substantively insignificant differences), but 1.8 times more likely to receive three or more citations compared to none.
    - Statistical models that *exclude* the additional explanatory variables available in the TraCS system suggest that Hispanic and Black drivers were 3.1 and 2.2 times more likely to receive three citations compared to White drivers. This comparison demonstrates that as racial profiling data collection efforts capture more relevant legal and extralegal information like those included in the TraCS system, the reported impact of race/ethnicity decreases substantially.

- **Arrests**
  - Drivers with contraband were over 21 times *more* likely to be arrested compared to drivers without contraband. Vehicle impound, reason for the stop, and the presence of multiple pre-stop indicators of possible criminal activity were also strong predictors of the likelihood of arrest.
  - Despite the strength of these legal variables and driver demeanor, Native American and Black drivers were still 3.2 and 1.9 times *more* likely than Whites to be arrested, respectively. Once the additional variables recorded in TraCS are considered in the multivariate model, the effect of being Hispanic on the likelihood of arrest diminishes entirely. That is, Hispanics were equally likely to be arrested when compared to Whites.
  - Examining a model that predicts discretionary arrests only (non-warrant, non-DUI), the effect of the Native American race variable on the likelihood of being arrested is somewhat diminished, although it remains a substantively important predictor.

- **Searches**
  - Although the search models are weak in predictive power, a number of legal variables show statistically significant and substantively important effects on the

likelihood of being searched, particularly the observation of two or more indicators of criminal activity prior to the stop.
  - Nevertheless, Hispanic, Native American, and Black drivers were 2.4, 2.5, and 2.3 times *more* likely to be searched compared to Whites after controlling for other legal and extra legal variables.
    - The strength of the Hispanic and Black race/ethnicity variables is somewhat diminished by the inclusion of the additional variables recorded in TraCS.
  - Uncooperative or combative drivers were 6.3 times more likely to be searched, and undocumented aliens or those traveling with UDAs were 3.6 times more likely to be searched, when compared to cooperative drivers and legal residents.
  - When a model predicting discretionary searches (e.g., non-mandatory, non-consent) only is examined, substantial differences are evident in the effects of the race/ethnicity variables: 1) Native American is no longer significant, 2) Hispanic decreases from 2.4 times more likely to be subject to any search to 1.4 times more likely to be searched based on discretionary reasons, and 3) while Blacks are 2.3 times more likely than Whites to be subjected to any search, they are 3.1 times more likely to be searched based on discretionary reasons.
    - These findings suggest that there are racial/ethnic differences in the types of searches.

- **Seizures**
  - The multivariate models separately predicting seizures and the discovery of contraband *or* the discovery of undocumented aliens explain a minimal amount of variance. The strongest predictor of both outcomes is the presence of multiple pre-stop indicators of possible criminal activity.
  - Hispanic drivers and drivers of Other races were both 1.8 times less likely to be discovered with contraband when compared to White drivers, but Hispanics were 1.9 times *more* likely than White drivers to be found with contraband or UDAs.
  - The small amount of variance explained indicates there are multiple factors that explain the discovery of contraband and/or undocumented aliens that are not included in these models.

In summary, racial and ethnic disparities in traffic stop outcomes were found even after taking into consideration other legal and extra-legal factors known to influence police decision making during traffic stops. The substantive importance of these findings is greatest for stops resulting in arrests and searches, and less so for stops resulting in warnings, repair orders, and citations. In comparison to findings reported in the *Year 1* and *Year 2 Reports* (based on data from 2006 and 2007), the bivariate and multivariate results based on data from 2008 are similar. The inclusion of the additional explanatory variables collected in the TraCS system (e.g., pre-stop indicators of possible criminal activity, number and type of pre-stop violations, driver demeanor, whether vehicle impounded), however, improved the explanatory power of the multivariate statistical models and, in some cases, reduced the strength of the impact of race/ethnicity on citations, arrests, and searches. This suggests that as racial profiling data collection efforts capture more relevant legal and extralegal information that has historically been unavailable, the previously reported impact of race/ethnicity is likely to diminish. Simply put, as we become better at measuring the

relevant information, the reported level of bias is reduced significantly. This does not mean that DPS officers have changed their behavior; rather social science techniques are now better able to predict their behavior with the end result of these better traffic stop data measures being that fewer racial/ethnic disparities in traffic stop outcomes are evident.

The reasons for the remaining racial/ethnic disparities reported for traffic stop outcomes cannot be directly determined with these data. Racial / ethnic differences in stop outcomes may (or may not) be explained by factors unmeasured by these data or officer bias toward specific minority groups. The multivariate models can only measure the influence of variables for which data is collected. In addition, no statistical models can measure officers' intent or individual prejudices. Therefore, it is the conclusion of this report that some racial/ethnic disparities in traffic stop outcomes continue, but the reasons for these disparities remain unknown.

SEARCHES & SEIZURES

Although the legal reasons for the stop and presence of multiple pre-stop indicators of possible criminal activity were the strongest predictors of decisions to search, some differences in the likelihood of conducting searches are still attributable to drivers' characteristics (most notably, drivers' race and ethnicity). Therefore, additional analyses were conducted to better understand the racial/ethnic disparities in officers' search decisions during traffic stops.

Across the DPS in 2008, officers reported 29,173 searches of drivers, vehicles, and/or passengers during officer-initiated traffic stops. At the department level, the overwhelming majority of stops (81.4%) did not involve pre-stop indicators of possible criminal activity. When these indicators were noted, however, approximately 9% of stops with at least one pre-stop indicator of possible criminal activity resulted in a search, while 31.9% of stops with two or more observed indicators resulted in a search.

At the department level, the majority of searches conducted were Type I (low discretion) searches (76.1%), while 12.1% were Type II (guided by case law/legal statute) and 11.8% were Type III (solely consent), respectively. Analyses based on the type of search indicated statistically significant racial and ethnic disparities in searches across all three search type categories. Black drivers were *least* likely to be searched for low discretion reasons (Type I), while Native Americans were *most* likely to be searched for these reasons. For Type II searches, the opposite is true; Blacks were significantly more likely, and Native Americans significantly less likely, to be subject to Type II searches. In the case of solely consent searches (Type III searches), Hispanic motorists were significantly more likely to be searched based on consent compared to all other racial/ethnic groups.

Of the 29,173 searches, DPS officers successfully seized contraband during 5,287 searches; thus, the overall search success rate is 18.1%. The most frequent type of contraband seized was drugs (50.5%), followed by other contraband (28.7%), alcohol (18.3%), and vehicles (17.1%). Information recorded in TraCS for October – December 2008 shows that the overwhelming majority of drug seizures—85.6%—included personal use amounts, while

16.4% included quantities for sale and 16.4% included quantities for transportation. Furthermore, racial/ethnic differences in drug seizure amounts were evident as Whites were most likely to have personal use amounts of drugs seized during searches resulting in drug seizures, while Hispanics and Blacks were significantly more likely than Whites to have sale and transportation quantities of drugs seized.

Across the department, search success rates (percent of searches that resulted in the discovery of contraband) varied considerably by the reason for the search. Probable cause, canine alert, warrant, and plain view searches were the most likely to be successful in recovering contraband (ranging from 50%-67%), while vehicle inventories and searches based solely or partially on consent were the least likely to result in the discovery of contraband (10%-15%). As noted above, over three-quarters of the searches department-wide were conducted for low-discretion reasons. In these situations, the likelihood of discovering contraband is largely not related to officer skill or criminal interdiction training.

Search success rates also varied by organizational unit. Of particular importance were the differences in the rates of contraband seizures between canine handlers assigned to the North squad versus those assigned to the Central and South squads. Across all types of searches, canine handlers assigned to the North squad were significantly more likely to report contraband seizures compared to handlers assigned to Central/South squads. This overall gap, however, has narrowed in 2008 compared to 2006 and 2007, as have the squads' search success rates for probable cause and canine alert searches.

The overall Type II (discretionary / guided by legal statue and case law) search success rate for DPS was 44.9%, but success rates varied significantly by race/ethnicity. Type II searches of Native American and White drivers resulted in the seizure of contraband in approximately half of those searches, while only 38.4% of Type II searches of Hispanics resulted in contraband seizures.

Analyses of consent searches revealed racial/ethnic differences in those asked for consent to search as well as refusals to consent. Hispanics were significantly more likely than other racial/ethnic groups to be asked for consent to search and significantly less likely than members of other racial/ethnic groups to refuse consent to search. Not surprisingly, multivariate models predicting Type III searches also indicated that there were statistically significant racial/ethnic disparities in whether or not consent searches are conducted as Hispanic and Black drivers were 3.3 and 2.0 times more likely to be searched based on consent compared to Whites given the same vehicle, stop, and legal characteristics. The strength of these relationships is slightly diminished by the inclusion of additional explanatory variables available in TraCS. The strongest predictor of whether or not a consent search is conducted is the presence of multiple pre-stop indicators of possible criminal activity. Like the previous multivariate search models, the weak overall ability of these models to predict the likelihood of consent searches indicates that this model is likely misspecified (i.e., it does not include other relevant explanatory factors, including refusal to consent, post-stop indicators of suspicion, etc.).

Because consent searches are not solely dependent on officer's discretion (i.e., a citizen may refuse), outcome test analyses of consent search success rates are not recommended. They were, however, conducted, at the request of DPS administrators. The results indicated that Type III searches of White drivers (14.1%) were the most likely to be successful in the discovery of contraband, followed by drivers of other races/ethnicities (13.8%), and Blacks (12.2%). Consent only searches of Hispanics (7.4%) were the least likely to be successful in terms of recovering contraband.

Stops involving undocumented aliens (the majority of which involved a Hispanic driver) were significantly more likely to result in a search than stops involving legal residents. Compared to searches involving legal residents, Type II searches involving undocumented aliens were less likely to produce seizures of contraband while Type III searches involving undocumented aliens were more likely to produce seizures of contraband. When undocumented aliens are considered as another type of criminal activity discovered (despite not resulting in the discovery of contraband per se), both the Type II and Type III search success rates for Hispanic motorists increase. They still remain lower than the search success rates for Whites, but this difference is not statistically significant for Type III searches.

Based on these findings, it is the conclusion of this report that important racial and ethnic disparities exist for searches and seizures conducted during officer-initiated traffic stops. Again, these results are comparable to those reported in the Years 1 and 2 Reports, with little substantive difference in the racial/ethnic disparities discovered except for the rates of discovery of contraband or undocumented aliens now that the data field measuring the latter includes *any* undocumented aliens. These findings, however, do not address the legality of individual searches. The data collected and reported within this document only examine trends and cannot address questions of whether or not individual searches conducted by DPS officers were legally justified or based on discrimination.

As described in Section 2, the transition by DPS to the electronic TraCS data collection system in October 2008 provides more detailed information about searches than was previously collected in KOTS. If the DPS extends the current contract of the UCPI team, analyses that could be conducted for the Year 4 Report will examine target-specific information regarding whether a search was performed, the search authority for that search, and whether contraband was seized during that search for drivers, passengers, and vehicles. These analyses may shed additional light on the reported racial/ethnic disparities in searches and seizures.

RECOMMENDATIONS

Based on the findings reviewed above, a series of recommendations are provided by the UCPI research team. The purpose of these recommendations is to assist DPS administrators in continuing to improve the already rapid progress that is being demonstrated within their agency. These recommendations are divided into the following categories: Data collection and analysis, supervisory oversight, understanding and addressing racial/ethnic disparities.

Data Collection

The development and implementation of the TraCS system is a significant improvement over previous data collection methods. This system provides a more efficient, effective, and reliable means of capturing information related to traffic stops. It will be important to now analyze data collected from this new system and compare to previous reports. There are a few minor adjustments to this data collection system that DPS officials should consider.

Recommendation #1: The DPS should continue to collect and analyze traffic stop data beyond the requirements of the current settlement agreement.

Continued monitoring of racial and ethnic disparities in traffic stop outcomes, particularly searches and seizures is recommended. The DPS should continue to collect and analyze traffic stop data to examine patterns and trends across the agency and across time. The DPS should also extend the current contract with the UCPI research team or hire a different external research team to provide the statistical expertise in conducting these analyses. By comparing multiple years of traffic stop data, particularly as the data quality is improved through TraCS, it is possible to examine the relative effectiveness of any new policies and training (e.g., *Courtesy and Vigilance, Considerations for Effective and Culturally Responsible Law Enforcement in Arizona* Advanced Officer Training instituted earlier in 2009). Further, continual monitoring of traffic stops provides valuable information to the organization, while simultaneously institutionalizing a culture within the organization that inspires fair and equitable policing and demonstrating a public commitment to the same.

Recommendation #2: Develop and maintain a data collection committee to examine the current data collection system and recommend any needed changes.

It is further recommended that DPS officials convene a committee to examine the current data collection effort and consider making minor adjustments. For example, the inclusion of the state of registration is a valuable piece of information as related to criminal interdiction efforts, but was eliminated from the data collection system in the transition from KOTS to TraCS. Another possible addition might be to include a text field where officers may specify the type of contraband seized when they utilize the "other" category. It is also important to bring feedback from the field to administrators regarding the use of the data collection system and officers' recommendations for improvements.

Finally, it will be important to consider whether any additional elements should be added to the system to better understand reported racial/ethnic disparities. Based on the initial results from the added data elements, some of the reported racial/ethnic disparities can be attributed to drivers' demeanor, pre-stop indicators of suspicion, undocumented aliens in the vehicle, etc. It is highly probable that other factors unaccounted for within this data collection system might also better predict traffic stop outcomes, including driver & passengers' behaviors during the stop, as well as the existence of a language barrier between a driver and an officer. These types of factors should be considered and recommendations (if any) should be made for the inclusion of additional data fields. These recommendations, however, must be

balanced with the need for an efficient data collection system. This discussion should be the work of this internal committee (with direct consultation from the UCPI research team).

Recommendation #3: Minor adjustments to the validation rules should be incorporated into the TraCS system to further reduce and/or eliminate the small percentage of remaining errors associated with missing and invalid data.

The data audit in Section 2 revealed the error rate for stop data collected via TraCS in the last three months of 2008 to be only 2.1%, compared to 9.8% for data collected during the previous nine months via KOTS. The TraCS error rate is well under the PERF-recommended threshold of 10% (Fridell, 2004) and nearly reaches the research team's ideal goal of 2% or less for missing/invalid data. It is obvious that instituting an electronic data collection system and its accompanying training have dramatically improved the accuracy and consistency with which stop data are being collected across the department. Although the internal consistency problems associated with the stop data and violation data have also been improved by the simultaneous collection of violation information on the electronic stop data collection form in the TraCS system, minor discrepancies remain. As described in Section 2, a small number of cases indicated violation information for outcomes that were not selected, while other cases indicated a specific outcome but no accompanying violation information. To eliminate these errors, it is recommended that the TraCS data collection system be programmed to only accept violation information when the appropriate outcomes have been selected and to require corresponding violation information for all selected outcomes. Further validation rules, default settings, and error warnings should be explored to continue to lower the small percentage of data that remains affected by missing or invalid data. The UCPI team is optimistic that the data quality will continue to be enhanced through proper data management and supervisory oversight.

Supervisory Oversight

Recommendation #4: DPS field supervisors should continue to be held directly accountable for ensuring the proper collection of traffic stop data by their subordinates.

Phase 2 of the data audit in Section 2 shows slight discrepancies between the stop data and the comparison database of officer activity logs, though the margin of error is well within acceptable limits. The UCPI research team nevertheless recommends that first line supervisors continue quality assurance measures to ensure DPS Officers are completing the data collection form for every contact. Although the electronic data capture has drastically reduced data entry errors, it will not ensure that officers are completing the form during every traffic stop. Continual supervisory oversight and routine data audits, like the weekly cross-checks currently required by DPS, are necessary to ensure the continued accuracy and validity of these data.

One specific area of concern regarding proper data collection is plain view searches. As noted in Section 6, the overall search success rate of plain view searches is 49.6%. By

definition, a plain view search should result in a high contraband seizure rate.[39] Further analyses and detailed inquiry indicated that the overall search success rate of plain view searches was due to an improper classification of a search as plain view and/or the improper documentation of contraband seized during these searches. Although these errors were committed by a small number of officers, they resulted in discrepancies that impacted the overall department's search success rates. It is important to recognize that systematic errors committed by only a handful of officers can dramatically impact the overall findings of the study. Therefore, it is recommended that all officers receive refresher training on the data collection system and that supervisors more effectively monitor the information collected by officers.

To assist supervisors in providing this type of oversight, it is recommended that monthly data status reports be developed by the UCPI team and provided to the DPS. These reports would document the number of traffic stops recorded, and some basic information about these stops for all units within the agency. The monthly status reports should be shared with supervisors so they can make any necessary adjustments quickly, rather than waiting for the results documented in final reports based on the preceding year of data. Data status reports were originally proposed by the UCPI research team as an important way to maintain data integrity. They were not developed, however, because the original KOTS data collection system did not capture information in real time (i.e., there was a 6-10 month lag between the traffic stop and entry into the database). With the development of the TraCS data collection system, status reports could be developed for ongoing use. While these reports will not impact the data quality for information already collected during 2009, it can increase the reliability and validity of information collected in 2010.

<u>Recommendation #5</u>: The specific findings documented in this Year 3 Report should be disseminated immediately to DPS supervisory personnel with a clear mandate to continue exploring the reasons for the racial/ethnic disparities reported, and attempt to reduce them if believed to be based on illegitimate factors.

Better understanding of the racial/ethnic disparities in post-stop outcomes is necessary to ultimately reduce these disparities. Across the department, Hispanic, Native American, and Black motorists are significantly more likely to be issued citations, arrested, and searched compared to Whites, even after statistically controlling for reasons for the stop, vehicle, and stop characteristics. Field supervisory staff must be made aware of racial/ethnic disparities in citation, arrest, search, and seizure rates within their jurisdictions.

Although the additional information collected via TraCS has shed some additional light on these relationships, some unexplained racial/ethnic disparities in citations, arrests, and searches remain. It continues to be important for DPS administrators to better understand

[39] Note, however, that in the KOTS data collection system (in use for 9 months of the 2008 data collection year), plain smell searches were included as plain view searches. Plain smell searches may be less likely than plain view searches to produce the discovery of contraband because smell often remains even after contraband is removed. In the TraCS data collection system, plain smell and plain view searches are separated. Analyses of 2009 data of these types of searches may provide further insight into the search success rates of these types of searches.

and examine these trends. There are several possible explanations for these elevated rates that can only be determined based on local knowledge of the area and additional information that is not included in the data collection.

Further, it is critical that field supervisory personnel examine their officers' stopping patterns and trends. If DPS officers are engaging in bias policing, it is likely to be revealed at the field supervisory level. While aggregate statistical analyses can provide supervisors with information to identify potentially problematic geographic areas or shifts, ultimately it is the more specific information available to field supervisors (e.g., citizen complaints, feedback from other officers, direct observation of patterns and practices) that will assist in identifying and eliminating any bias practices. For these reasons, it is critical that the DPS continue to improve the quality of its supervisory management and training, with an additional focus on detecting and eliminating officer bias.

Further Examination of Racial/Ethnic Disparities

Recommendation #6: If a contract extension is approved, the DPS should consider providing the additional data captured on the consent to search form to the UCPI team to allow for further exploration in the Year 4 Report of the possible explanations for the continued racial/ethnic disparities in search and search success rates.

Acting on recommendations made in the *Year 2 Report*, the DPS has made changes to the consent to search form to document pre and post stop indicators of suspicion as well as information that confirm criminal or other suspicious activity where no seizure was made. These qualitative data could provide invaluable context for the quantitative search and seizure data similar to the information gleaned from the focus groups with DPS officers in 2008.

The analyses of 2008 data indicated that, as in previous reports, even after considering legal variables, stop, vehicle, and other driver characteristics, Hispanic, Native American, and Black drivers were all more than twice as likely to be searched compared to White drivers. The higher rates of Hispanic searches specifically, however, do not produce comparable rates of seizures. Although Hispanic motorists were significantly more likely to be searched during officer-initiated traffic stops compared to Whites, they were significantly less likely to be found in possession of contraband. There are a number of reasons that might account for these racial/ethnic disparities, including legitimate explanations, or possibly officer discrimination / bias. In an effort to better understand racial/ethnic disparities in search and seizure rates, the UC research team conducted focus groups with canine handlers and officers assigned to the Highway Division that were actively engaged in search and seizure activity. These focus groups provided context for criminal interdiction work and greater insight with which to interpret the statistical findings related to searches and seizures.

The DPS is considering voluntarily extending the contract with the University of Cincinnati to include a fourth year of data analysis. As noted in the first recommendation, the UCPI team highly recommends this, as a fourth year of analysis will allow the UCPI team to analyze a full year of data collected electronically and more fully explore the new data elements implemented in October of 2008. The quantitative analyses of these data could be

enhanced considerably by the examination of qualitative data regarding pre and post stop indicators of suspicion as well as information that confirm criminal or other suspicious activity where no seizure was made (e.g., admission, drug debris, paraphernalia). This information, collected on the revised consent to search form, would likely provide additional insight into DPS officers' search and seizure activities in the same way that the focus group interviews provided invaluable context and a better understanding of the complexities of criminal interdiction work. Therefore, if the contract extension is approved, it is recommended that these data be made available to the UCPI team for inclusion in the Year 4 analyses.

Conclusion

The racial/ethnic disparities in traffic stop outcomes reported within this document for stops initiated by officers of the Arizona Department of Public Safety are not unique to this department. Instead, they are consistent with findings from state and local jurisdictions across the country, particularly findings related to racial/ethnic disparities in searches and seizures. This suggests that rather than individual police officer bias, there are larger cultural and/or organizational explanations for these disparities – particularly for searches of Hispanic drivers.

As demonstrated by the DPS's ongoing data collection and its responsiveness to the UCPI research team's recommendations from the *Years 1 and 2 Reports*, DPS officials are dedicated to an innovative and professional approach to understanding and altering racial/ethnic disparities in traffic stop outcomes. Expedient implementation of the new recommendations provided above will assist the DPS in continuing this approach as well as providing equitable treatment across racial/ethnic groups and maintaining their legitimacy among the citizens of Arizona.

If a contract extension is reached with the UCPI team for a fourth year of data analysis, an update to this report will be delivered in November 2010, based on the statistical analyses of data collected during traffic stops in 2009, which would provide the first full year of data collected via the redesigned and expanded TraCS electronic data collection system. It is expected that the analyses of a full year of these improved data will lead to a better understanding of the racial/ethnic disparities in traffic stop outcomes that will enable DPS administrators to make informed changes in policies, procedures, and training to ensure the continued delivery of unbiased policing services to Arizona citizens.

7. REFERENCES

Ayres, I. (2001). *Pervasive Prejudice? Unconventional Evidence of Racial and Gender Discrimination.* Chicago: The University of Chicago Press.

Becker, G.S. (1957). *The Economics of Discrimination*. Chicago: University of Chicago Press.

Engel, R.S. (2008). A critique of the "outcome test" in racial profiling research. *Justice Quarterly, 25,* 1-36.

Engel, R.S. (2005). Arizona Department of Safety Traffic Stop Data Report, January 2003- December 2003, Focus on I-17. Report submitted to the U. S. District Attorney's Office (District of Arizona) in the matter of *U.S. v. Bustamante*.

Engel, R.S. (2004). Arizona Department of Safety Traffic Stop Data Report, January 2003 - December 2003. Report submitted to the U. S. District Attorney's Office (District of Arizona) in the matter of *U. S. v. Gayle* and the Coconino County, Arizona Prosecutor's Office in the matter of *Arizona v. Palacios*.

Engel, R.S., Cherkauskas, J.C., & Beck, S. (2008b). Identifying Best Practices in Criminal Interdiction Activities for the Nebraska State Patrol. Submitted to the Nebraska State Patrol, Lincoln, NE.

Engel, R.S., Cherkauskas, J.C., & Smith, M.R. (2008a). *Traffic Stop Data Analysis Study: Year 2 Final Report.* Submitted to the Arizona Department of Public Safety, Phoenix, AZ.

Engel, R.S., Cherkauskas, J.C., Tillyer, R. (2007a). *Traffic Stop Data Analysis Study Report: Final Literature Review and Review of Other Jurisdictions.* Submitted to the Arizona Department of Public Safety, Phoenix, AZ.

Engel, R.S. & Tillyer, R. (2008). Searching for equilibrium: The tenuous nature of the outcome test. *Justice Quarterly, 25,* 54-71.

Engel, R.S., Tillyer, R. & Cherkauskas, J.C. (2007b). *Understanding Best Search and Seizure Practices: Final Report*. University of Cincinnati, Submitted to the Ohio State Highway Patrol, Columbus, OH.

Engel, R.S., Tillyer, R., Cherkauskas, J.C., & Frank, J. (2007c). Traffic Stop Data Analysis Study: Year 1 Final Report. Submitted to the Arizona Department of Public Safety, Phoenix, AZ.

Fridell, L. (2004). *By the Number: A Guide for Analyzing Race Data from Vehicle Stops.* Washington, D.C.: Police Executive Research Forum.

Knowles, J., Persico, N., & Todd, P. (2001). Racial bias in motor vehicle searches:

Theory and evidence. *The Journal of Political Economy*, *109*, 203-229.

Liao, T.F. (1994). *Interpreting Probability Models: Logit, Probit, and Other Generalized Linear Models*. Thousand Oaks, CA: Sage.

Ramirez, D., McDevitt, J., & Farrell, A. (2000). *A Resource Guide on Racial Profiling Data Collection Systems: Promising Practices and Lessons Learned*. Washington, D.C.: U.S. Department of Justice.