Analysis of Police Pursuit Data

Prepared for the Police Training Institute
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Summary of statistically significant patterns in the reasons for pursuit termination

When the initiating event is Suspected DUI, Reckless Driving, or Suspected Criminal Activity, it is more likely that the pursuit will terminate with surrender of the suspect or because the officer voluntarily terminated the pursuit.

When the initiating event is Misdemeanor, Minor Traffic Violation or Outstanding Misdemeanor Warrant, it is more likely that the pursuit will terminate with the surrender of the suspect, and less likely that the suspect will flee on foot.

Summary of statistically significant patterns in the occurrence of crashes

Pursuit distances between 2 and 3 miles are associated with a high occurrence of crashes.

When the initiating event is Misdemeanor, Minor Traffic Violation, or Outstanding Misdemeanor Warrant, it is less likely that there will be a crash.

Detailed analysis of the effects of explanatory variables on the reasons for pursuit termination

We investigated the effect of a number of explanatory variables (officer years of service, race, gender, full-time versus part-time status, initiating event, duration of pursuit, and locale) on the reasons for pursuit termination.

To facilitate the analysis it was necessary to reduce the number of categories of initiating event. Based on advice from Police Training Institute staff, the original thirteen categories of initiating event were grouped into five categories according to seriousness of the event:

Firearm Use, Felony Crime, and Felony Violent Crime Warrant were characterized as most serious and coded as "most_eve";

Misdemeanor, Minor Traffic Violation, and Outstanding Misdemeanor Warrant were characterized as least serious and coded as "least_eve";

Suspected DUI, Reckless Driving, and Suspected Criminal Activity were grouped together and coded as "DUI_eve";

Felony Property Crime Warrant and Wanted by Another Agency were grouped together and coded as "property_eve";

Suspect Stolen Vehicle and Others were grouped together and coded as "other_eve."

The SAS procedure GENMOD was used to construct appropriate models with a Poisson distribution and a logarithmic link function. Of the 976 reports in the database, 897 contained all the relevant variables for the selected model and could therefore be used in the analysis.

Here is a summary of the results:

- The initiating events DUI_eve and least_eve and the officer's years of service have significant effects on the reason for pursuit termination.

    - The P-value for DUI_eve is less than 0.0001 (any P-value below 0.05 is considered statistically significant).

    - The P-value for least_eve is less than 0.0001.

    - The P-value for years of service is 0.0405.

- No other explanatory variables were significant.

- The initiating event DUI_eve is associated with a high incidence of terminations in which the suspect surrendered or the officer voluntarily terminated pursuit.

    - 28.91% of DUI_eve pursuits terminated with the suspect surrendering, versus 22.58% of non-DUI_eve pursuits.

    - 16.67% of DUI_eve pursuits terminated with the officer voluntarily terminating pursuit, versus 12.02% of non-DUI_eve pursuits.

- The initiating event least_eve is associated with a low incidence of terminations in which the suspect fled on foot.

    - 11.76% of least_eve pursuits terminated with the suspect fleeing on foot, versus 17.38% of non-least_eve pursuits that terminated with the suspect fleeing on foot.

- The initiating event least_eve is associated with a high incidence of terminations in which the suspect surrendered.

    - 27.84% of least_eve pursuits terminated with the suspect surrendering, versus 20.82% of non-least_eve pursuits that terminated with the suspect surrendering.

Analysis of the effects of explanatory variables on the occurrence of crashes

The SAS procedure LOGISTIC was used to construct appropriate models with a binary response. Of the 976 reports in the database, 544 contained all the relevant variables and could therefore be used to select variables that are likely to have significant effects on the response. 680 reports contained the selected variables and were used in the analysis.

The effects of distance of pursuit and initiating event on the occurrence of crashes were investigated.

- Least_eve has significant effects on the occurrence of crashes, whereas distance has some effects that are on the boundary of the 0.05 significance level.

  - The P-value for least_eve is 0.002.

  - The P-value for distance is 0.0508.

- The pursuit distance of range 2 to 3 miles is associated with a high occurrence of crashes. The initiating event least_eve is associated with a low occurrence of crashes.

  - In 8.82% of pursuits without crashes the distance was 2 to 3 miles, while in 14.80% of pursuits with crashes the distance was 2 to 3 miles.

  - In 21.5% of least_eve pursuits a crash occurred; in 32.38% of non-least_eve pursuits a crash occurred.

- Other explanatory variables were not significant.

Analysis of the effects of explanatory variables on stop techniques

We also examined the effect of the explanatory variables on the stop technique. None of the explanatory variables was significant, which may be due to sparseness of the data (relatively few reports indicated which stop technique was used).