Alcohol Availability and Road Crashes in Perth: How Does Distance Affect the Relationship?

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Abstract

This study aims to examine the effects of road network distance from alcohol outlets to alcohol- and non-alcohol-involved road crashes across the Perth metropolitan area. A retrospective population-based study (2005-2015) was undertaken using measures of alcohol- and non-alcohol-involved crashes, and their proximity to alcohol outlets. Using a geographic information system and logistic regression, this study found that, as distances to the closest on-premise alcohol outlets increase, crashes were more likely to be alcohol-involved than non-alcohol-involved. Recommendations about the timing and location of police enforcement and blood alcohol concentration testing are made.

Background

Previous research has examined the effects of alcohol outlet density on various alcohol-related harms including road crashes and driving while drinking (Cameron et al., 2012; Gruenewald, 2010; Gruenewald & Ponicki, 1995; LaScala, Johnson, & Gruenewald, 2001) with inconsistent results found (e.g. Cameron et al., 2012; McCarthy, 2003). There is minimal research examining how the effects of licensed outlets on road crashes differ i) at varying distances from outlets, ii) between on and off-premise outlets, and iii) in different parts of cities. The study aims to fill this gap.

Method

A retrospective population-based study (2005-2015) was undertaken in the Perth metropolitan area. Measures of alcohol availability were counts of off-premise outlets (bottleshops) and on-premise outlets (e.g. hotels, nightclubs) per postcode, obtained from the Department of Racing, Gaming and Liquor Western Australia. Crash data (including crash location) were obtained from the Integrated Road Information System which is maintained by Main Roads Western Australia. All crashes with at least one driver with a blood alcohol concentration (BAC) of 0.05% or more were included. An internationally validated surrogate measure of non-alcohol-involved crashes, all day-time crashes (07h00 to 17h59), was used in this study.

A geographic information system was created, and postcode-level boundaries, the road network, all relevant crashes and alcohol outlets were plotted. Heat maps were also created to demonstrate the patterns of crash concentration across the metropolitan area. Road network distance was calculated between each crash and the closest alcohol outlet by type. Logistic regression was undertaken, comparing the distance from alcohol outlets to alcohol-involved versus non-alcohol-involved crashes, and controlling for postcode-level socioeconomic and demographic factors.

Results

There were 7,564 (2.2%) crashes with drivers with a BAC of 0.05% or more and 252,923 (74%) day-time crashes between 2005 and 2015. The heat maps (Figure 1) demonstrated that there were focused areas of high concentrations of crashes involving drivers with confirmed BAC of 0.05% or more, especially in the inner city and certain coastal areas. In contrast, high concentrations of day-time crashes were spread across the central and middle parts of Perth with lower concentrations of crashes in the outer parts of the metropolitan area.

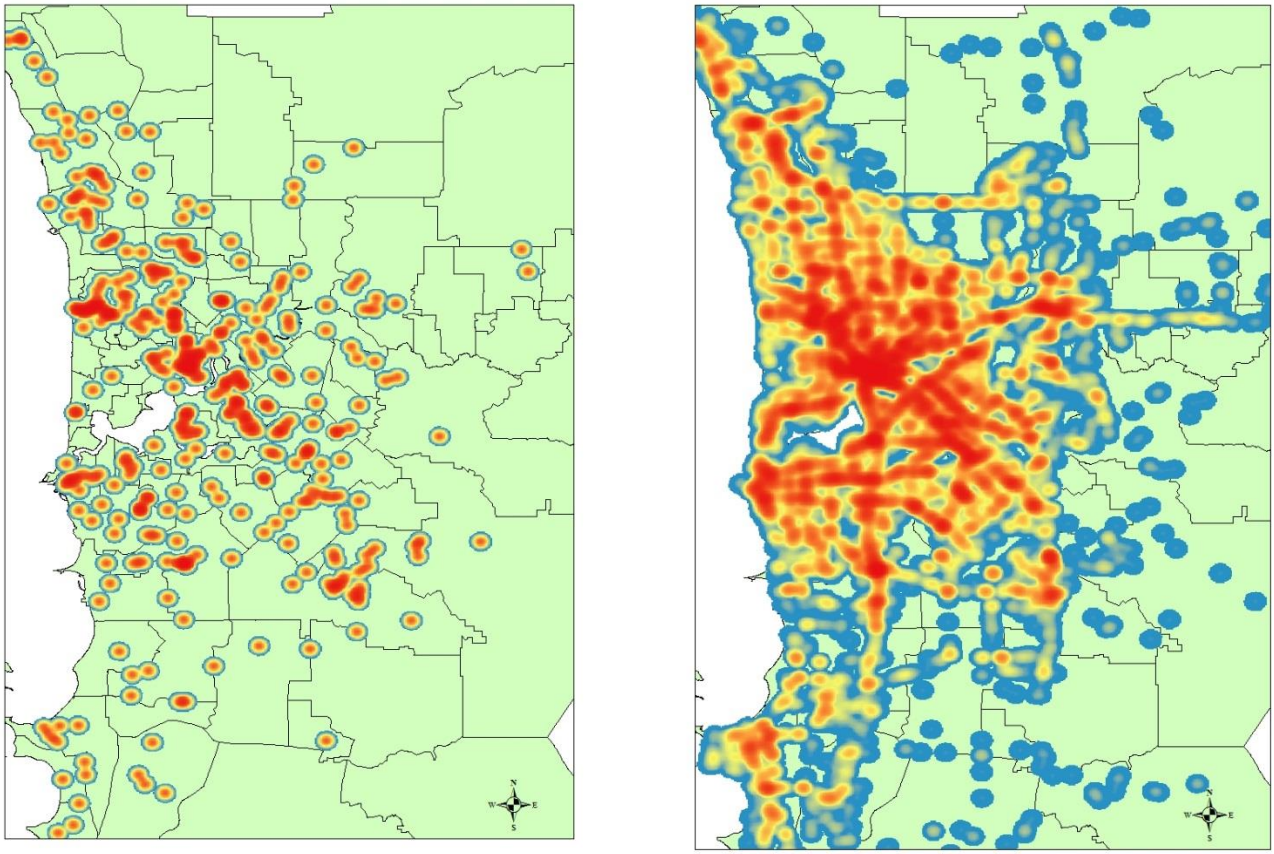

Figure 1. Heat maps of crashes with a driver with a BAC of 0.05% or more (left) and all day-time crashes (right) in Perth metropolitan area in 2015[1]

Increasing distances from the closest on-premise outlets to crashes were significantly more likely to be associated with an alcohol-involved crash compared with a day-time crash (OR: 1.061; 95% CI: 1.044-1.078). Compared to crashes in the central business district (CBD), crashes occurring in postcodes in middle and outer zones beyond the CBD (middle: OR=1.420; 95% CI: 1.163-1.733, and outer: OR=2.761; 95% CI: 2.266-3.364) were more likely to be alcohol-involved than non-alcohol-involved crashes.

Conclusions

Crashes were more likely to be alcohol-involved as distance to the closest on-premise outlet increased. The results suggest that police enforcement, including random breath testing, should take place not only near the areas with high densities of alcohol outlets, but closer to primarily residential areas, particularly in the early hours of the morning. Future research should investigate how these relationships vary across regional and remote parts of Western Australia.

[1] Areas with the highest concentration of crashes are indicated in red, and areas with the lowest concentration of crashes are in blue. Intermediate areas are in yellow.

References

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