**Inconsistent results beneath consistent conclusions: The need for a new approach to analysing alcohol availability.**

*John Holmes1, Petra S. Meier1*

*1*School of Health and Related Research, University of Sheffield, 30 Regent Street, Sheffield, UK

Email: [john.holmes@sheffield.ac.uk](mailto:john.holmes@sheffield.ac.uk)

More off-premise outlets associated with fewer alcohol-related injuries. Bar sales do not affect alcohol-related injury admissions. Areas with higher young male populations have lower levels of alcohol-related injury. These are some of the findings which do not feature in the conclusions of Hobday et al.’s well-executed analysis of the relationship between alcohol availability and alcohol-related injury. What follows is not a criticism of the authors’ work, which is good quality, offers useful findings on extended trading permits and merits its publication. Instead, we offer a reflection on a case study which is symptomatic of persistent problems in this area of alcohol policy analysis.

Hobday et al. find evidence that the number of alcohol outlets in an area (in this case on-trade outlets and particularly those with extended trading permits) is positively associated with an outcome of interest to public health (in this case night time injury admissions to emergency departments). What the conclusions do not tell us is that, like many researchers before them, the authors’ results tell an inconsistent story and, at times, are plain contrary (1). From a policy perspective, the persistent identification of inconsistent finding is challenging and difficult to accommodate within compelling advocacy messages. It is easy to see why they are neglected. However, scientists should see such inconsistencies as a positive: They raise questions to be answered and a spur for new thinking.

To their credit, Hobday et al. seek to examine their unexpected results, but their arguments are not always convincing. The economies of scale afforded by large off-trade outlets will likely prompt higher sales, but this does not explain why, after controlling for sales per outlet, a reduction in the number of off-trade outlets is associated with an increase in alcohol-related injuries. Perhaps drinkers are switching to the on-trade, a sector more closely associated with acute alcohol-related harm, but this explanation leads us to the puzzling finding that on-trade sales are unrelated to alcohol-related injury admissions. It is reasonable to conclude that increased on-trade outlet numbers are associated with increased injuries because the drawing together of crowds presents more opportunities for injuries to occur; however, public health researchers and advocates have long argued that intoxication levels are a partial cause of alcohol-related violence. Perhaps the lack of a relationship between on-trade sales per outlet and alcohol-related injuries is due to high sales outlets having more customers rather than more intoxication. It may be that sales per outlet is a measure with limitations but now we have more drinkers in one space again and we would anticipate the crowding hypothesis to hold such that a significant effect on injuries is identified. But perhaps bigger outlets have better security or perhaps their clientele are less predisposed to injurious behaviours. And so we turn to the wider literature for clarity.

Evidence that measures of alcohol availability are positively associated with a range of alcohol-related harms has accumulated rapidly in recent years. This has strengthened the conclusions of previous systematic reviews that reducing alcohol availability is an effective approach to reducing alcohol-related harm (2-4). However, while not strongly disputing this general conclusion, commentators have highlighted problems: Livingston et al. (5) noted similar studies often yield contradictory findings, such as bar density but not liquor store density being predictive of violence in one study (e.g. Cunradi et al. (6)), but the exact opposite pattern of relationship being true in another (e.g. Cunradi et al. (7)). Holmes et al. query the aggregation of highly heterogeneous outlets into an on-trade vs. off-trade dichotomy and argue little attention has been paid to how drinkers traverse cities for work or pleasure such that purchasing, consumption and residence may be geographically spread (1). Gmel et al. address theoretical plurality, observing that the availability literature offers a theory to support almost any finding, and facilitates the explaining away of inconvenient results without reconsidering core positions (8).

How to resolve this problem? To our mind, those researching alcohol availability should travel two roads: first, to continue refining statistical methods and data and apply them to ecological studies of the standard design (i.e. regressing measures of availability on measures of harm). Problems aside, this approach has established convincing conclusions through weight of evidence while offering useful theoretical insights. However, the anomalous findings and their unsatisfactory explanation undermine confidence in policy recommendations and we would therefore like to see that a second path is simultaneously taken: to step back and consider alternative, possibly radically different, study designs which may yield insights to explain unexpected results. We recommend a particular focus on establishing and accounting for the lived experience of availability. This would apply both qualitative and quantitative approaches to understand how different patterns and forms of availability shape different kinds of purchasing and/or consumption behaviours.

1. Holmes J., Guo Y., Maheswaran R., Nicholls J., Meier P. S., Brennan A. The impact of spatial and temporal availability of alcohol on its consumption and related harms: A critical review in the context of UK licensing policies, Drug and Alcohol Review 2014: 33: 515-525.

2. Middleton J. C., Hahn R. A., Kuzara J. L., Elder R., Brewer R., Chattopadhyay S. et al. Effectiveness of Policies Maintaining or Restricting Days of Alcohol Sales on Excessive Alcohol Consumption and Related Harms, American Journal of Preventive Medicine 2010: 39: 575-589.

3. Campbell C. A., Hahn R. A., Elder R., Brewer R., Chattopadhyay S., Fielding P. et al. The Effectiveness of Limiting Alcohol Outlet Density As a Means of Reducing Excessive Alcohol Consumption and Alcohol-Related Harms, American Journal of Preventive Medicine 2009: 37: 556-569.

4. Popova S., Giesbrecht N., Bekmuradov D., Patra J. Hours and Days of Sale and Density of Alcohol Outlets: Impacts on Alcohol Consumption and Damage: A Systematic Review, Alcohol and Alcoholism 2009: 44: 500-516.

5. Livingston M., Chikritzhs T., Room R. Changing the density of alcohol outlets to reduce alcohol-related problems, Drug and Alcohol Review 2007: 26: 557-566.

6. Cunradi C., Mair C., Ponicki W., Remer L. Alcohol Outlet Density and Intimate Partner Violence-Related Emergency Department Visits, Alcoholism: Clinical and Experimental Research 2012: 35: 847-853.

7. Cunradi C. B., Mair C., Ponicki W., Remer L. Alcohol outlets, neighborhood characteristics, and intimate partner violence: ecological analysis of a California city, Journal of urban health : bulletin of the New York Academy of Medicine 2011: 88: 191-200.

8. Gmel G., Holmes J., Studer J. Are alcohol outlet densities strongly associated with alcohol-related outcomes? A critical review of recent evidence, Drug and Alcohol Review 2015.