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The impact of retail practices on violence: The case of single serve alcohol beverage containers

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Abstract

Introduction and Aims. *This paper examines the role that sales of single serve alcoholic beverages plays in violent crime in surrounding areas. Increasingly a target of regulatory measures, this is the first study to systematically assess the impact of single serve containers on neighbourhood violence.* ***Design and Methods.*** *The relative proportion of shelf space in each liquor establishment in San Bernardino, CA devoted to single serve alcohol containers was surveyed. Assuming that this is a rough indicator of the amount of sales derived from single serve containers, we use this indicator as a measure of the impact of specific retail practice on violence around the outlet.* ***Results.*** *Results show that the average proportion of shelf space devoted to single serve containers in the unit of analysis, the US Census Bureau block group, was positively related to violent crime, net of overall retail availability of alcohol and relevant social and economic indicators often used to predict violent crime rates in such units.* ***Discussion and Conclusions.*** *These findings suggest that if the city were to make the voluntary ban on single serve container sales mandatory, violence in the surrounding areas would decline, all other things being equal. This study provides a much more grounded and specific justification for enacting such policy changes and once again shows the utility of alcohol policy for the reduction of crime and violence.* [Parker RN, McCaffree KJ, Skiles D. The impact of retail practices on violence: The case of single serve alcohol beverage containers. *Drug Alcohol Rev* 2011;30:496–504]

Key words: single serve alcoholic beverage, violent crime, prevention, public policy, alcohol policy.

Introduction

Traditional approaches to preventing the negative impacts of the use and abuse of alcohol have focused on individual-based strategies designed to change individual behaviour. For example, interventions such as mass media campaigns, alcohol treatment and recovery, and education-based programs have been widely used in communities in an attempt to reduce or prevent harms caused by alcohol consumption [1–5]. However, the results from such efforts have generally been disappointing [2,4–6].

More recently, efforts have been directed at changing the drinking environment at the community level [7]. This approach is based on the notion of environmental prevention, a set of ideas, concepts and approaches that has increasingly come to be viewed as the most effective way to intervene in communities in the wake of disappointing individual-based approaches [8–10]. The environmental approach is based on increasing evidence from research and evaluation that changing the structural conditions of drinking alcohol, such as availability, access and social/economic costs is more effective in changing the drinking habits and patterns of individuals than attempting to convince individuals to change their patterns and behaviours in an environment that was part and parcel of the establishment of these habits and patterns in the first place [2,8].

The environmental approach, with its emphasis on the drinking environment and its characteristics, independent of the individuals involved in drinking, can also be contrasted with a population approach to prevention. In the population approach, an attempt is made to reduce the level of consumption of alcohol across the entire population through such global interventions as tax increases on ethanol content of all the beverages

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consumed, or a universal increase in the age of minimum purchase. In one sense, the population approach can be thought of as a background environmental characteristic, operating at a more basic level and on a more 'geological' time frame. An analogy might be the basic amount of average rainfall in a location has an environmental impact on the population living in the area, but the degree to which conservation of water resources is practised is a more proximal determinant of whether people will have a healthy and comfortable existence or whether they will be plagued with drought-related problems. The rainfall levels can and do change due to large scale interventions in the global climate, like the population-based harm reduction approaches, such as taxation or minimum purchase increases. However, the way sales of alcohol are managed and regulated at the point of sale can have a negative or positive impact on harm reduction regardless of the taxation or age regulations [3,8,11].

So, then, while population approaches have focused on national policies, such as minimum drinking age or minimum age of purchase [12–15], more environmental policies, such as restrictions on driving behaviour and so-called 'zero tolerance' approaches to drinking and driving, have also been employed [8,16,17]. Retail practices of alcohol outlets, both on- and off-sale outlets, have also been used as policy tools at the community level [11]. For example, restrictions on hours of sale have been examined and some evidence has been uncovered that such policies can cause fluctuations in apparent consumption [18,19]. Other variations on retail behaviour, and the difficulties involved in enacting local legislation have been investigated [20–22], but little if any research has focused on the impact of specific types of beverage containers, such as single serve containers, the subject of this paper.

This is surprising, given that the motivations and demographics of customers purchasing a couple bottles of wine may be importantly different than those who choose to buy a single, chilled 40 oz Budweiser. To assume that, although the size of containers varies (as well as some being chilled and ready to consume) the customer motivation in regards to consumption remains more or less consistent is unlikely and, regardless, in need of further investigation. It may well be that those customers interested in buying a chilled, ready-to-drink 40 oz can of Budweiser differ importantly from customers who decide to buy a six pack for later consumption, and these differences may bear on subsequent alcohol-fuelled violence. This alcohol–violence link is supported by substantial empirical evidence showing a relationship between alcohol outlet density and violent crime [13,23–26]. Campbell *et al.* [27] reviewed more than 40 studies and report a consistent positive and significant impact across studies between outlet density and crime.

Many communities in the USA have been concerned about sales of 40 ounce alcoholic beverages and other single serve containers and the relationship they may have to violence and civic disorder. For example, in October 2009, a suburb of Chicago, Arlington Heights, Illinois, enacted a ban on 40 ouncers and other small containers of beer, a ban which mandates that all allowable single serve containers must be kept outside of coolers at room temperature [28].

Some of the same arguments made in the literature on outlet density as to why higher density is likely to be a causal factor in violence apply to the case of single serve container sales. Outlet density is associated with consumption, so that by increasing consumption, higher outlet density also has a positive impact on rates of violence in the areas nearby concentrations of alcohol outlets. If some outlets have single serve containers as a significant portion of their business, the impact on violence could be expected to be more immediate and more local, that is, more closely associated in geographic space with the outlet. These containers which, by definition, are sold chilled and ready to consume, are purchased for immediate consumption. Because retail establishments in California are not allowed to legally provide space for consumption of alcohol in the store or on the premise outside of the store, this immediate consumption would have to take place on the streets, parks, sidewalks or alley ways nearby the store, or in a motor vehicle in the parking lot, parked on a street or in motion driving away from the store. In contrast, on-site consumption of beer is limited to single serve bottles or cans; for draft beer, pitchers can be purchased in some on-site locations, but these are usually sold to groups of drinkers, not to a single patron. California laws differ from other US states; for example, in Illinois, many on-site outlets also sell six packs and larger packaging for off-site consumption, but this is not the case in California. So the most likely pattern of consumption is to begin immediately drinking the chilled beverage as soon as the customer leaves the store. Although such public drinking is illegal in California, the more a customer waits to consume a single serve beverage purchased in this manner, the less desirable the outcome, as the beverage will begin to lose its chilled state. As these single serve containers range in size from 12 ounces to 40 ounces, and as a customer may purchase two or three of these containers for immediate consumption (there are no explicit limits on the amount a customer can purchase at one time under California regulations; the only reference is to the fact that intoxicated consumers are not allowed to purchase any alcohol), the level of intoxication and impairment will increase rapidly. The likelihood that some violence will occur near these outlets, given this pattern of consumption, does not require any major assumptions or

leaps of faith, but is rather a reasonably certain and predictable outcome of such retail activity. The more volume of such sales an outlet does, the more violence is likely to occur within a few blocks of the store; the more outlets there are within the local areas that have high rates of such sales, the more likely the area will show high rates of violence.

The study reported here examines the link between single serve container sales in off-site alcohol outlets in San Bernardino and the rate of violent crime in small areas in which these outlets are located. Close attention was paid to determining whether or not any impact of single serve container sales on violent crime occurred independent of overall alcohol outlet density.

Data and analysis

In 2007 our assistance was requested by the Institute for Public Strategies and the San Bernardino County Department of Public Health, two prevention agencies working to reduce alcohol-related problems in the City of San Bernardino, California. To accommodate this request, we collected data on alcohol outlet locations, addressed-based violent crime reported to the San Bernardino Police Department, and US Census data from 2000 on a variety of population, family and age indicators. Then, using a Geographic Information Systems framework, in which the spatial, physical relationship between variables such as violence, alcohol availability and other relevant factors can be assessed at a detailed, neighbourhood-like level, we began to construct maps of the City of San Bernardino using the US Census block group as the unit of study. These units are usually made up of between four and eight city blocks, with a population varying (in 2000) between 200 and 2000; these are the smallest geographic units for which data on racial and ethnic composition are routinely available from the US Census.

An important issue was how to assess the degree of sales and business in an outlet generated from standard purchases of bottles of wine, six, 12 and 24 packs of beer and other beverages clearly purchased for consumption elsewhere versus those generated from the sale of single serve alcohol beverage containers, almost always sold chilled and ready to consume as soon as the customer exits the front door of the establishment. By definition in this study, single serve containers are those that are sold individually, that is, not in a package that connects them to other similar containers, varying in size from 8 ounces to 40 ounces, and are sold chilled in an ice bucket or more likely, a refrigerated cooler unit. We suggested that a good, if indirect, indicator of the importance of single serve sales to a retail establishment would be to determine the percentage of cooler shelf space for alcoholic beverages that was devoted to single serve containers. For example, if a retail establishment had 10 standard coolers (three-foot wide, running from floor to ceiling) or the equivalent devoted to alcoholic beverages, and only one of them was devoted to single serve containers, the inference would be that single serves represent a relatively small portion of the total volume of alcohol being sold at the establishment. However, if 30% of cooler space was devoted to this type of product, it would indicate that single serves represent a major portion of alcohol sales at a particular establishment. Although it might be the case that six packs sold chilled could be purchased and then divided among two or three individuals, we adjusted for this by measuring the ratio of cooler space devoted to single serve versus other chilled containers and packages. If chilled six packs were being purchased and split for immediate consumption, the sales of this type of beverage would dominate the single serve sales, and cooler space would be adjusted properly by the retailer. That is, our measure depends on the retailer responding to sales patterns in allocating different containers to the coolers. Cooler space is expensive to maintain, and thus will be limited, so that retailers will use this scarce display method for the enhancement of sales. Furthermore, we would expect that if alcohol from single serve containers is being immediately consumed, rates of violence would tend to be higher around retailers with higher percentages of cooler space devoted to these products.

To test this hypothesis, staff members from the Department of Public Health's Alcohol and Drug Abuse Prevention Program surveyed every alcohol retail outlet in the city during April 2007, recording the address of the outlet, the total number of coolers containing alcoholic beverages, and as a subset of this latter measure, the amount of cooler space devoted to single serve containers. These data were then linked by address to the outlets and thus as well to the Census block groups. No data on the size of the retail establishments were available from this survey, and we would contend that this makes the current measure a conservative one, likely to underestimate the impact of single serve containers. If two stores had similar ratios of single serve to other package types in the coolers, but one had 10 000 square feet of store and the other had 1000, the current measure would underestimate the impact of single serve sales. Thus if we find an effect with our measure, having data on store size would lead to an even larger effect being detected. The absence of such data does not then undermine the logic of the current measure and our analysis.

Figures 1–3 show these data in the context of San Bernardino, as they and the city are geographically represented. Figure 1 shows the concentration of retail alcohol outlets in San Bernardino; the outlets included here were all those currently licensed to operate in the

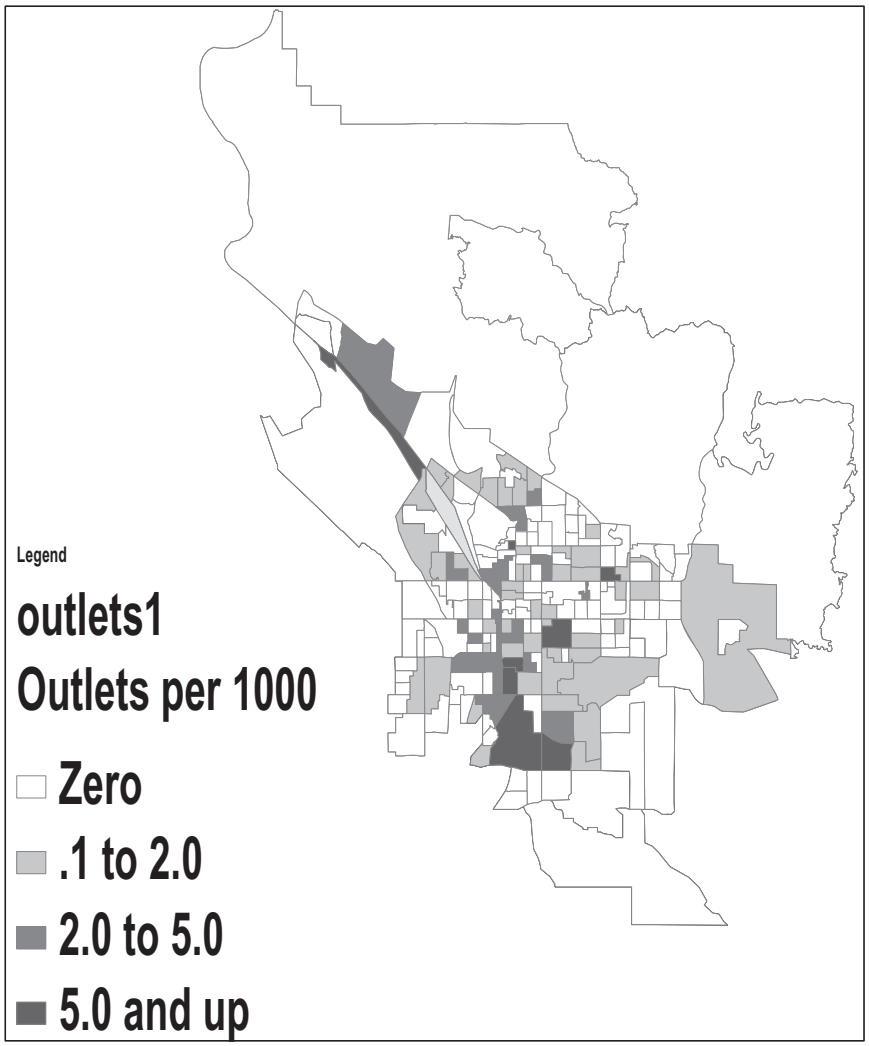

Figure 1. *San Bernardino retail off-sale alcohol outlets.*

city; no outlets were excluded or missing. Figure 2 shows the areas of high, moderate and low/zero violent crime, a category which included homicide, rape, assault and robbery, with data provided by the San Bernardino Police Department for the 2007 calendar year. Figure 3 shows the same data in the background, while in the foreground two types of retail establishments are shown: the dark-coloured dots represent outlets that had 20% or more of their shelf space devoted to single serve containers; the number signs represent outlets with less than 10% of cooler space devoted to such containers (outlets shown on this map outside the city boundaries were not included in the analysis discussed below). These results suggest that there may be a link between single serve container availability and violence with the correlation between average cooler space devoted to single serve containers and the violent crime rate being 0.39 for the US Census block groups, the unit of analysis on the maps and for the analysis reported below, inside the city limits.

Although this correlation is evidence of a relationship, further analysis is needed to provide evidence that this relationship is an important one for understanding how violence rates differ across parts of San Bernardino. First of all, violence is a complex phenomenon that has multiple causes, and in order to suggest that single serve container availability has an important impact, such that policies aimed at reducing violence should be framed around regulating this retail activity, additional variables identified in previous research as predictors of violence must be included in the analysis. This will allow us to have more confidence in our findings about the effect of single serve availability, as we will have accounted for other important predictors of violence as well. The research term for this is a net effect, that is, the effect of single serve availability after we account for the effects of other important factors. A specific example of this problem is the well-known impact on violence that alcohol availability in general has. Many studies have shown an impact, net of other

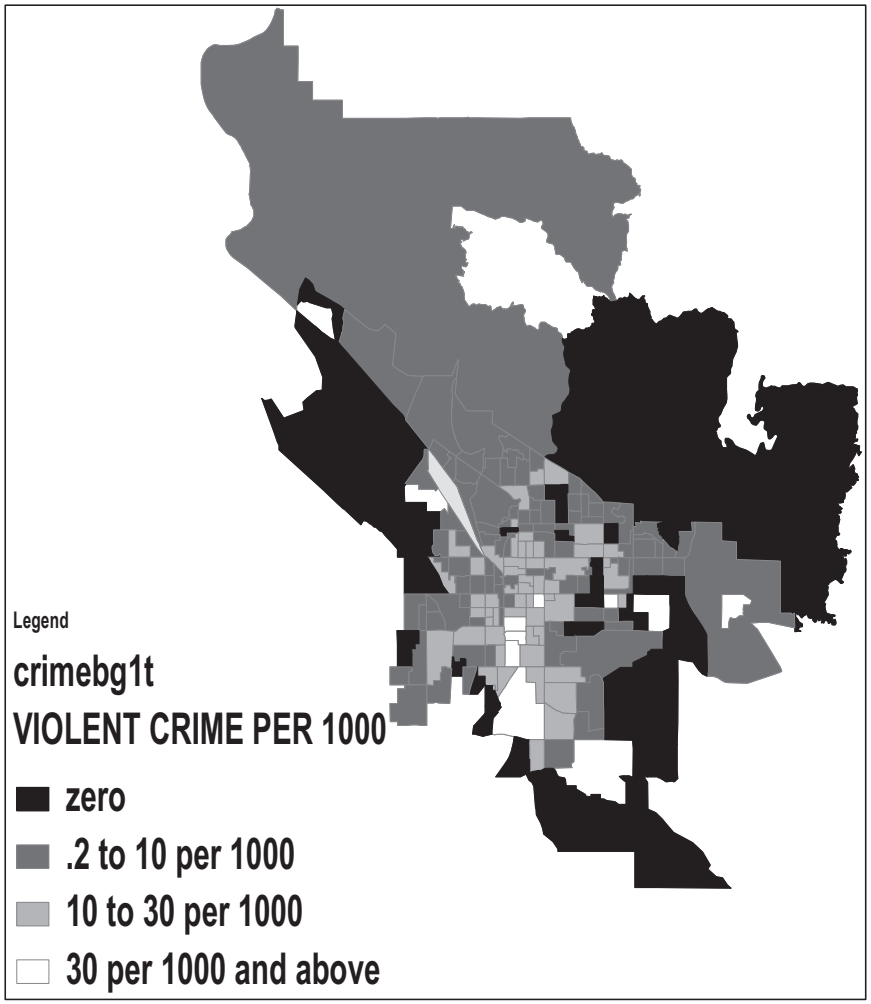

Figure 2. *San Bernardino violent crime. Homicide, robbery, rape and serious assault included in violent crime.*

predictors, of alcohol outlet density on violent crime, so the question here is whether single serve availability has a net effect on violence after the impact of general availability of alcohol is accounted for [13,26]. Although concern about collinearity might lead the reader to conclude that it will be difficult if not impossible statistically to separate the impact of outlet density and the relative importance of an alcohol beverage container sold at those outlets, the results reported below indicate that this is not the case. If collinearity had been a problem in these data, we would not expect both variables entered into the same equation to be positive and significant, as will be shown below in Table 1. Based on prior research and data availability, the other measures we included were the presence of ethnic minorities (in this case, the per cent of Latino population), the age structure (per cent of people age 18–29), family structure and poverty (the per cent of all families that are female headed with children under 18 present; this measure is used in a number of indices of 'structural disadvantage' found in the criminological literature in the US; see [10,26]. This indicator is highly correlated with income based measures, which were not available in these data.), and the housing structure of the neighbourhood (per cent of housing units that are unoccupied). The data for these indicators come from the 2000 US census of the population.

Second, the nature of these data, being geographic and contiguous in nature, presents statistical issues. In order to address this and the former issue, we conducted a geo-spatial, multivariate analysis that takes into account the small space, geographic nature of these data (such data require special statistical treatment) and involves computing net effects of density and single serve on violence independent of other factors. This methodology provides multivariate regression like estimates that have been corrected for the impact of spatial autocorrelation, something that is endemic in data of the type analysed here. Spatial autocorrelation occurs in data such as these because one of the major

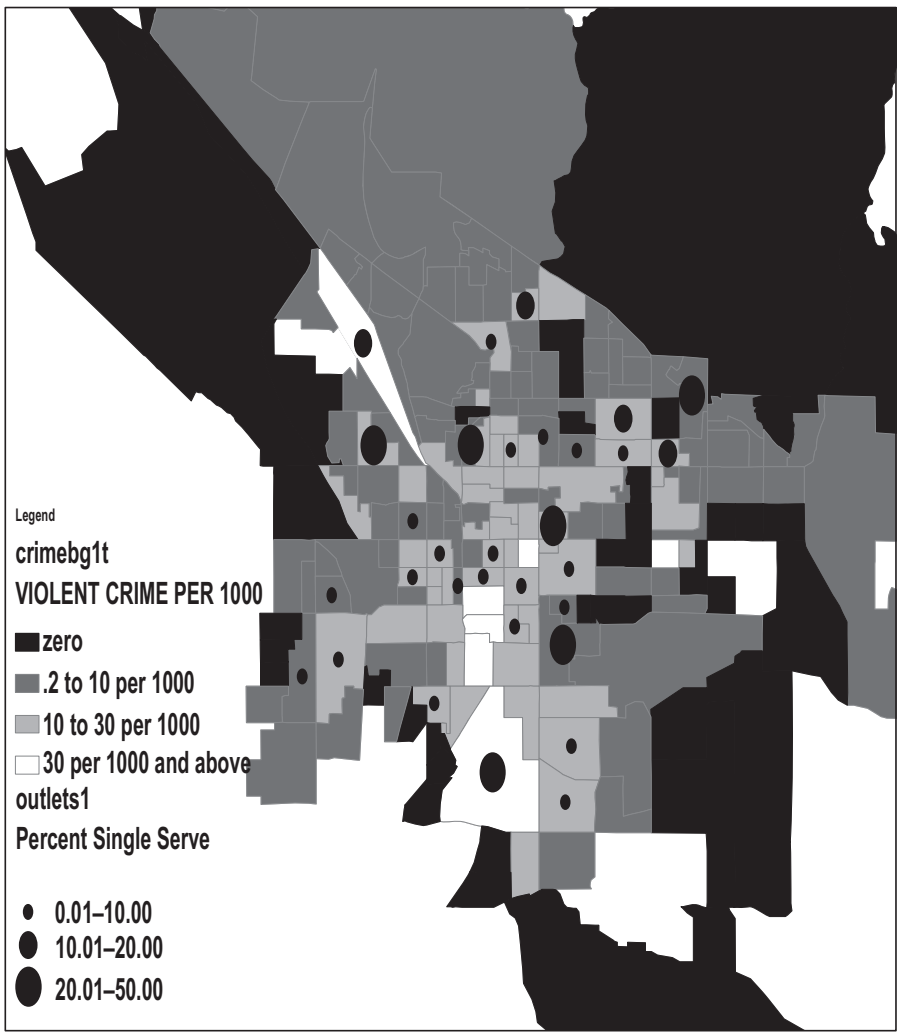

Figure 3. *Single serve shelf space and violent crime in San Bernardino. Per cent single serve is the average percentage of refrigerated shelf space in all outlets in the block group devoted to the display and sales of single serve alcohol bottles and cans.*

Table 1. *Multivariate spatial model results: violent crime (homicide, robbery, rape, assault) per 1000 population*

Variable	Coefficient	Standard error	*T*-test
Per cent Latino	0.028	0.027	1.037
Per cent aged 18–29	–0.001	0.063	0.016
Female headed households	0.011	0.106	0.104
Per cent housing units vacant	0.098	0.061	1.607[a]
Outlet density per 1000 population	3.352	0.322	10.410[b]
Per cent single serve cooler shelf space	0.122	0.076	1.605[a]
Constant	2.323	1.817	1.279
Fit measures	Pseudo $R^2 = 0.523$	Rho = 0.459	GLS efficiency = 14.4%

[a]Significant at 0.05, one-tailed test. [b]Significant at 0.05, two-tailed test. Single serve measured as average for outlets in the block group. Unit of analysis is the US Census Bureau block group, 2000. Number of block groups is 192. Rho is the estimated spatial autocorrelation for the model. GLS efficiency is the improvement in quality of the GLS estimate over the OLS estimate the latter of which ignores the impact of spatial autocorrelation.

assumptions of standard multivariate modelling is that the cases or units of analysis are sampled independently from an underlying population of the same units. For example, in a survey, the survey respondents are assumed to be sampled independently from a population of people, say the residents of a country, and not selected because a group of them happen to live in the same neighbourhood. The latter type of sampling would undermine the assumption of independent selection, and would result in the underestimate of the variance of any measure taken from the sample. This results in smaller standard errors of the regression coefficients, and thus more false positive findings, that is, variables found to have a significant net effect in the multivariate analysis when in fact, this is not the case. To adjust for this potential bias and remove its impact from this analysis, we used a GLS statistical model that not only includes an adjustment for the presence and degree of this lack of independence, but also adjusts the results for the structure of the space being analysed. In this case, the source of bias not only includes the lack of independence that comes from using all the adjacent and non-adjacent units or block groups in the city, but also because of the way the space is structured – are there large numbers of small units, in which case the bias would be bigger (highly similar areas being divided into small contiguous units), or does it contain smaller numbers of larger units that would by nature be more heterogeneous, in which the bias would be smaller. Parker and Asencio [29] discuss this model in detail.

Multivariate results

The results of this analysis are shown in Table 1; univariate statistics are given in Table 2. The findings in Table 1 show that although outlet density had a significant net effect, so did single serve availability, controlling for outlet density and the other factors listed in the table. The impact of both alcohol-related variables was positive, so that in areas with higher average percentages of single serve availability, violence rates were also higher, as was the case for areas with higher outlet density. The percentage of vacant housing was also associated with higher rates of violence. The coefficients given are unstandardised, and we have utilised one-tailed statistical tests for the hypotheses as previous research gives a strong indication that the effects of the two alcohol-related measures should be positive on crime, as is the case with vacant housing. Thus the impact of single serve density can be seen as modest; the fact that this effect is found net of outlet density, a variable likely to be highly correlated with single serve density, lends support to the importance of this finding.

Table 2. *Univariate statistics (*n *= 192 block groups)*

Variable	Mean	Standard deviation
Violent crime per 1000 population	7.42	9.08
Per cent Latino	32.31	24.00
Per cent aged 18–29	20.59	7.61
Female headed households (% of all family households)	5.75	4.58
Per cent housing units vacant	7.70	8.01
Outlet density per 1000 population	0.83	1.59
Per cent single serve cooler shelf space[a]	2.17	6.57

[a]Average across 192 block groups; 160 have no outlets and a zero value; 32 have one or more outlets, with a range of 3.4% single serve shelf space to 50% single serve shelf space for the block group.

Conclusions

We have examined a newly developed measure, the average proportion of cooler shelf space devoted to single serve alcohol containers, in the context of a study of alcohol outlet density and violence in San Bernardino, CA. The effect of the single serve measure was positive and statistically significant, if modest, net of outlet density and other theoretically and empirically important predictors of violence. These results suggest that using a regulatory approach to alcohol availability and, specifically, to single serve container availability, may be an effective way to reduce alcohol-related harm, such as violence, especially as part of an overall strategy designed to reduce such crime in San Bernardino. Alcohol outlet density also had a positive net effect on violence, consistent with a large number of contemporary studies in this literature [27]. Our replication of the density findings and our addition of a similar finding for single serve density significantly add to the notion that alcohol control can be an important tool in violence prevention.

We mentioned above that a community in Illinois passed a regulation banning single serve products to be available in off-site outlets chilled or refrigerated, thus ready to drink. We are aware currently of no other jurisdictions in the USA or elsewhere that has considered such an approach. It does seem impressionistically that the retail sales branch of the alcohol industry in the USA is expanding its efforts to produce and distribute single serve containers in off-site outlets. At least a few studies we are aware of linked ready-to-drink beverages ('alcopops' and malt liquor) with higher levels of consumption [23,30].

A number of regulatory implications can be drawn from this research as well. Our findings point to two significant paths for reducing the negative impact alcohol outlets have on the neighbourhoods they exist

in, so that policies designed to reduce outlet density can be expected to provide relief from violence in and around these outlets. In addition, banning or reducing the sales of single serve ready-to-consume containers of alcohol can have an additional impact on violence prevention and harm reduction. One type of regulatory measure that could be justified on the basis of these findings would be the adoption of a Deemed Approved Ordinance, which would give the city more authority to set acceptable standards of practice for existing alcohol retailers, as well as helping to reduce existing outlet density be strengthening the local authority's ability to punish consistent violators of these standards of practice with the permanent loss of the ability to do business.

A number of limitations of the current study should be noted. First, a measure of the overall size of the outlets, in terms of square footage of floor space, was not collected in the survey. It may be possible to find such data in the City planning and zoning department paper files, but we had no access to these files and our experience in other communities in California and elsewhere in the USA suggests that such files rarely are accessible and even more rarely contain systematic information such as floor space. We have found one other study that measured shelf space, but this study did not measure relative shelf space, only total, in feet, and it did not distinguish between refrigerated shelf space and unrefrigerated shelf space; beverage type shelf space was measured over the total number of feet of shelf space as a ratio, for example beer shelf space per foot of shelf space. However, the shelf space measures were used as dependent variables with demographic measures, such as ethnicity, and violence was not included in this study [31]. However, this study did show that larger outlets were more likely to be in relatively well-off (economically) areas, suggesting that size of store leading to hire volume of sales may not be the key relationship with regard to violence. Our measure of relative cooler space for single serve may operate independently of size of the outlet; testing this relationship empirically remains a topic for a new data collection.

Another limitation is that we are unable to ascertain the influence of beverage container type on the volume of sales of alcohol at each outlet. In the USA and in the state of California, data on volume of sales by outlet are considered a trade secret under Uniform Trade Secrets Act of the federal government and under California Civil Code § 3426. In addition, no data for counties or cities on the volume of alcohol sold by type of container exist; the only data related to type of beverage is available at the state level is in the broad categories of beer, wine and spirits. A replication of this study in a location where such legal codes do not exist would be useful for gaining further understanding of how the single serve measure used here influences violence.

No data on price were collected in this study; data were collected by the San Bernardino County Department of Public Health. The attraction of a ready-to-drink alcohol beverage in a single serve container is most likely to appeal to consumers on a convenience basis, and not on a price per volume basis. We would assume that the price per volume of a single serve is indeed higher than that of a six pack or a case (24 containers), although we have no empirical data for the outlets we studied here.

Although the data from the outlets and violent crimes are from 2007, and the data for the other measures are from the 2000 US Census, these are the best currently available data. This could result in some under- or overestimation of some of the effects reported here in the multivariate analyses, as population growth and change have occurred that is unaccounted for in this study. As US Census data are not available to the public for at least 2 to 3 years after they are collected, this is a problem that all environmental studies face to some extent. Continued replication and updates of studies such as these with additional data will reveal if these issues are important.

In addition, the data show geospatial skewness, in that many units of analysis have no violence and no outlets. However, the geospatial models used help to adjust statistically for the uneven distribution of these data; these issue are discussed in Section Three of Parker and Asencio [29].

As far as we are aware, this is the first study of its kind to examine the impact of single serve sales on violence, and the first study to use the proportion of cooler space as an indicator of sales volume of a type of alcoholic beverage. Thus further studies using this measure, explorations of alternative measures, validation studies in which actual sales volume can be compared against cooler shelf proportion are called for. Replications of the impact of any measure of single serve container activity at outlets and violence is also needed to place this study and its findings in context. However, there is no reason that communities concerned about single serve containers and their impact cannot take regulatory action on basis of this limited study; community interests should dictate local policy, and the potential benefits of reduced violence outweigh any potential harm that the banning or limitation of such sales would create.

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