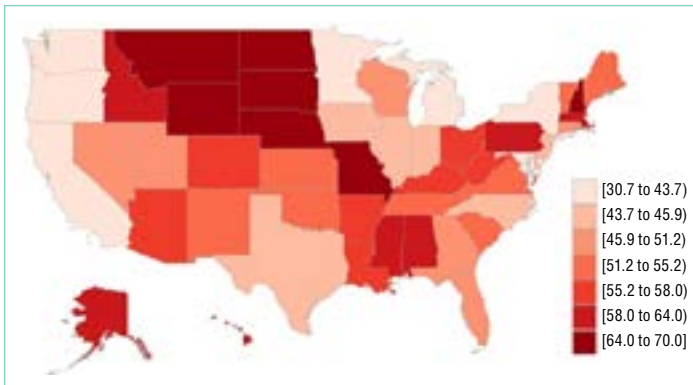




Defining Contextual Variables Related to Seat Belt Use in Fatal Crashes

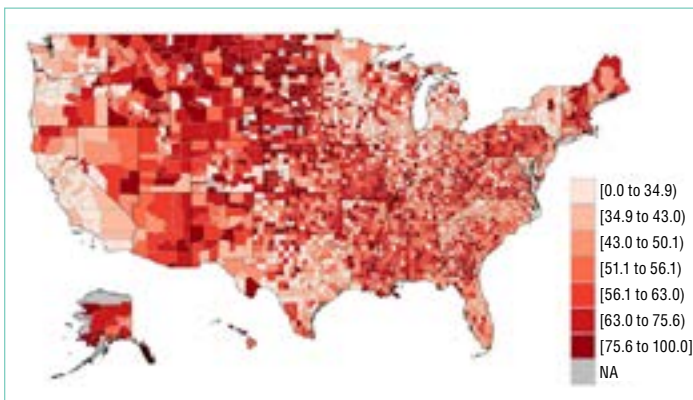
In both 2018 and 2019, 47% of passenger vehicle occupants killed in motor vehicle traffic crashes in the United States were unrestrained (NCSA, 2020). As seen in Figure 1, there is considerable variation across States in terms of the percentage of unrestrained fatalities. However even in States with relatively low percentages, Figure 2 shows considerable variation at the county level in the percentage of all motor vehicle crash fatalities who were unrestrained.

Figure 1. State-level percentage of unrestrained crash fatalities



Source: FARS 2012-2016

Figure 2. County-level percentage of unrestrained crash fatalities



Source: FARS 2012-2016

Note: NA values indicate zero fatalities and/or zero fatalities with known restraint use in a county.

Prior research has focused on characteristics of people (e.g., age, sex) and the immediate environment (e.g., roadway type, presence of passengers) that influence seat belt use. While people’s physical and community environments also shape their decisions and actions (e.g., Green & Kreuter, 2005), less is known about the contextual and environmental characteristics of places that may influence seat belt use—and, by implication, the percentage of unrestrained fatalities.

This study investigated whether some characteristics of counties’ physical environments influence the likelihood that a crash fatality was unrestrained. Specifically, the current study focused on the relationship between unrestrained fatalities from 2012 to 2016 and the densities of businesses where alcohol is purchased for on-site consumption (on-premises alcohol outlets, e.g., bars, pubs), businesses where alcohol is purchased for off-site consumption (off-premises alcohol outlets, e.g., wine and liquor stores), and tourism locations (e.g., parks, museums) in counties. The research team predicted that increased densities of each of these types of places in a county would be associated with increased likelihood that crash fatality occurring in the county was unrestrained.

Methods

Density measures were created by calculating the number of each type of place per 1,000 residents in each county. Restraint status of crash fatalities was obtained through the Fatality Analysis Reporting System (FARS). Three logistic regression models examined whether the likelihood that a crash fatality was unrestrained was predicted, in part, by the density of on-premises alcohol outlets, off-premises alcohol outlets, and tourism locations in the county in which the crash occurred.

The base logistic regression model included the three density measures of interest and nine covariates describing person- (e.g., age, sex), county- (e.g., percentage of county residents that were unemployed), and State-level (whether a State had primary enforcement of front seat belt laws) information. The expanded logistic regression model included the same density measures and covariates as the base model, along with 14 covariates describing additional person- (e.g., seating position), crash- and vehicle- (e.g., light condition at time of crash, vehicle age), county- (e.g., rurality), State- (e.g., whether a State had primary enforcement of rear seat belt laws), and regional- (Census region) level information. Finally, an exploratory fully expanded model included the same density measures and covariates as the “expanded” model but disaggregated sub-types of on-premises alcohol outlets (e.g., bars, tasting drinking places).

Table 1. Results from logistic regression analyses, for the density measures of interest only

	Base Model	Expanded Model	Fully Expanded Model
Density of Tourism Locations	<i>n.s.</i>	↓	↓
Density of Off-Premises Alcohol Outlets	↑	↑	↑
Density of On-Premises Alcohol Outlets	↓	↓	
Density of Bars			↑
Density of Dancing Drinking Places			<i>n.s.</i>
Density of Stage Performance Drinking Places			↓
Density of Tasting Drinking Places			↑

Note: ↑ = higher density associated with increased likelihood that a crash fatality was unrestrained ($p < .05$); ↓ = higher density associated with decreased likelihood that a crash fatality was unrestrained ($p < .05$); *n.s.* = not statistically significant.

Results

Density of off-premises alcohol outlets. As predicted, higher densities of off-premises alcohol outlets in a county were associated with increased likelihood that a crash fatality in that county was unrestrained (Table 1). This relationship remained statistically significant even in the expanded model that included a covariate to control for whether the vehicle’s driver had been drinking. Because the drivers for whom there was sufficient evidence to conclude they had been drinking may not have been the fatally injured occupants, this result cannot be solely attributed to the direct influence of alcohol on seat belt use. Alternatively, counties with higher densities of off-premises alcohol outlets may be associated with different cultural, environmental, or other characteristics associated with lower rates of seat belt use among drivers and passengers.

Density of tourism locations. Contrary to predictions, higher densities of tourism locations in a county were not associated with increased likelihood that a crash fatality was unrestrained in any of the three models.

Density of on-premises alcohol outlets. Unexpectedly, higher densities of on-premises alcohol outlets in a county were also not associated with increased likelihood that a crash fatality was unrestrained. In a follow-up exploration of this result, higher densities of bars and stage performance (e.g., cocktail lounges) drinking locations in a county were associated with increased likelihood of a crash fatality being unrestrained, while higher densities of dancing (e.g., nightclubs) and tasting (e.g., vineyards, breweries) drinking places were not.

Discussion

The current exploratory study investigated whether aspects of counties’ physical environments influence the likelihood that a crash fatality in the county was unrestrained. Some results were expected, and some were contrary to expectations. As expected, the density of off-premises alcohol outlets and the densities of the on-premises alcohol outlets of bars and stage

performance drinking places were associated with a higher proportion of unrestrained fatalities. However, the densities of tourism locations and the densities of the on-premises alcohol locations of dancing and tasting drinking places were not associated with higher portions of unbelted fatalities.

The study had limitations. First, the densities of interest may reflect unmeasured local characteristics that influence seat belt use. As such, reductions to the densities of off-premises alcohol outlets, bars, and stage performance drinking places may not necessarily reduce the likelihood that a crash fatality is unrestrained. Second, the definitions of business types varied across States and localities; a bar in one State might be considered a restaurant in another.

Despite these limitations, off-premises alcohol outlets, bars, and stage performance drinking places may benefit from messaging or intervention, not only to reduce alcohol-impaired driving but seat belt non-use, as well. In addition, it is possible that awareness campaigns or seat belt enforcement in these areas could be effective for preventing unbelted fatalities, but any such campaigns should be evaluated thoroughly.

References

Green, L., & Kreuter, M. (2005). *Health program planning: An educational and ecological approach* (4th ed.). McGraw Hill.

National Center for Statistics and Analysis. (2020, December). *Overview of motor vehicle crashes in 2019* (Traffic Safety Facts Research Note. Report No. DOT HS 813 060). National Highway Traffic Safety Administration.

Download a copy of *Defining Contextual Variables Related to Seat Belt Use in Fatal Crashes* (DOT HS 813 144) through the National Transportation Library: <https://rosap.ntl.bts.gov/>.

Suggested APA format citation for this publication:

National Highway Traffic Safety Administration. (2021, September). *Defining contextual variables related to seat belt use in fatal crashes* (Traffic Tech Technology Transfer Series. Report No. DOT HS 813 144).

TRAFFIC TECH is a publication to disseminate information about traffic safety programs, including evaluations, innovative programs, and new publications. Feel free to copy it as you wish.



U.S. Department of Transportation
National Highway Traffic Safety Administration
 1200 New Jersey Avenue SE, NPJ-320
 Washington, DC 20590