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EXECUTIVE SUMMARY

DIGITAL SIGNAGE AND TRAFFIC SAFETY: A STATISTICAL ANALYSIS

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When it comes to studying the impact of digital signage on traffic safety, a simple measure of crash frequencies before and after sign installation doesn't provide a complete picture. That's why a group of researchers from Texas A&M University incorporated the Empirical Bayes (EB) statistical analysis method, allowing for better control of external factors. Their work is believed to be the first comprehensive and scientifically based research on the issue.

The safety analysis included 135 sign locations based on the following criteria:

- The signs were located in Washington, North Carolina, Ohio or California.
- The signs were installed in 2006 or 2007 in order to have adequate time in both the before and after analysis periods to compare crash histories.
- The signs were located on major roads, as the Highway Safety Information System (HSIS) crash dataset usually does not include crashes that are located on minor roads or private driveways.

As the use of digital on-premise signs continues to increase, so, too, have efforts to regulate the way digital messages are displayed. Jurisdictions often cite traffic safety impact as justification for local sign codes and ordinances. This research, however, provides a scientifically based, national analysis to help all involved better understand the true impact of on-premise digital signage on safety.

The 2012 study was performed by H. Gene Hawkins, Jr., Ph.D., P.E., associate professor and research engineer, Zachry Department of Engineering, Texas A&M University; Pei-Fen Kuo, graduate research assistant, Texas A&M Transportation Institute; and Dominique Lord, Ph.D., associate professor and research engineer, Zachry Department of Engineering, Texas A&M University. It was funded by a grant from the Sign Research Foundation.

BEST PRACTICES

This executive summary highlights three key takeaways from the report.

THE STUDY USES ADVANCED STATISTICAL METHODS ALONG WITH A LARGE SAMPLE SIZE OF DATA.

- The 135 sites—narrowed down from an original pool of 3,000 possible locations—came from four states. Sites had to meet all study criteria of location and date of installation to be included.
- The size and specificity of the study allowed for more robust and accurate results than previous research.
- Crash data was acquired from the Federal Highway Administration's Highway Safety Information System. The data also included roadway characteristics such as number of lanes, speed limits and other factors. The research team gathered information about the location of on-premise digital signs from two sign manufacturing companies. The datasets were then carefully merged through a lengthy validation process.
- A basic comparison of crash frequencies before and after sign installation would be known as a naïve before-after analysis. The Empirical Bayes method used for the study, however, is the recommended procedure for evaluating the impact of safety treatments. Safety impacts are represented by the safety index, a ratio of safety before and after an event, in this case, the installation of digital signs.

THE DATA REVEALED THAT THERE IS NO STATISTICALLY SIGNIFICANT INCREASE IN CRASH FREQUENCY AFTER INSTALLING AN ON-PREMISE DIGITAL SIGN.

- The research involved a review of previous studies, including hypotheses that on-premise business signs distract drivers, leading to higher crash rates, and that on-premise business signs might mask the visibility of regulatory and warning road signs, also increasing crash risk.
- Previous research has been inconsistent, and some studies have had important weaknesses and study limitations.
- Hawkins, Kuo and Lord took every avenue to deliver as accurate and valid a study as possible; the analysis even separated crashes into single- and multi-use incidents. No statistically significant differences were found overall.
- The safety index for all four states was 1.0 with a 95 percent confidence interval that ranged from 0.93 to 1.07, meaning the use of on-premise digital signs does not increase the risk of crashes.

FIVE DISTINGUISHING FACTORS

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USING THE ANALYSIS OF VARIANCE (ANOVA), THE TEAM ALSO EXPLORED THE IMPACT OF ON-PREMISE DIGITAL SIGN COLOR, DIMENSION AND BUSINESS TYPE ON SAFETY.

- ANOVA is a collection of statistical models used for comparing several groups or variables for statistical significance.
- Hawkins, Kuo and Lord compared single color and multi-color signs as part of the study; 89 were single and 37, multi-colored. They found no significant difference in the mean of safety index among signs having single or multiple colors.
- The study considered small, medium and large signs. In the final dataset, 36 signs had a sign area of less than 10 ft^2; 56 had a sign area from 10-15 ft^2; and 34 had a sign area greater than 15 ft^2. Sign size was delineated based on the area of the electronic display, not the overall size of the complete sign. Here, too, the researchers found no statistically significant difference among the categories in terms of safety.
- The researchers looked at business type, such as restaurants (seven); pharmacies and retail stores (18); hotels (three); gas stations (three); auto shops (seven); and others (84). Once again, there was no statistically significant difference among the population means.

1. Thorough literature review on safety aspects of digital signage and previous statistical analyses
2. Evaluation and gap analysis of past studies
3. Data collection of sign installation dates & crash data over four states (largest sample size of any study to date)
4. Use of the Empirical Bayes (EB) statistical analysis method - recommended by the Highway Safety Manual, the "authoritative document for analyzing the safety impacts of various transportation improvements or treatments."
5. Key study findings, conclusions, and recommendations

Read the Full Report Statistical Analysis of the Relationship between On-Premise Digital Signage and Traffic Safety (2012):
www.signresearch.org/trafficsafety

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