



PREVALENCE AND USE OF DRIVER MONITORING SYSTEMS: A National Survey in the United States

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Abstract:


The purpose of this study was to measure the prevalence of use of driver monitoring systems among U.S. adults, and factors influencing their adoption. One in five U.S. adults has used driver monitoring, primarily to obtain a discount on insurance. Safety benefits and financial incentives are likely to influence adoption..

Introduction

Motor vehicle crashes persist as a leading cause of death in the United States.¹ Advancements in technology have enabled new opportunities for enhancing behavioral road safety. One such technological frontier is driver monitoring systems, designed to monitor driver behavior in real time. The purpose of this study was to conduct a nationally representative survey of U.S. adults about their use of driver monitoring systems, and the factors influencing the adoption of these technologies.

Driver monitoring systems can measure behaviors such as distraction, speeding, hard braking and impairment. Driver monitoring can be included as original components in the vehicle, or connected to the vehicle through aftermarket devices, such as dedicated dash mounted devices or linked to personal smartphones.² Monitoring systems can be combined with feedback where drivers receive a rating on their overall driving performance or provide driver behavior to a third party such as the vehicle manufacturer or an insurance company.

With the advancement of sensor technology and machine learning algorithms, the capabilities of driver monitoring systems are evolving rapidly, offering a range of potential safety benefits. Studies have demonstrated the effectiveness of driver monitoring to prevent distracted driving behaviors such as texting and talking on



the phone.³ Furthermore, driver monitoring systems have the potential to identify drivers who are under the influence of alcohol or drugs, enabling early intervention and preventing crashes caused by impaired driving.⁴

Despite the safety benefits offered by these systems, a clear understanding of the factors influencing their adoption remains elusive. For example, the prevalence of the use of driver monitoring systems in the United States is unknown. Motivations for the adoption of these systems, and engagement with the technology among current users is also poorly understood. We conducted a survey of a nationally representative sample of adults in the U.S. to address these gaps in our understanding of driver monitoring systems.

Methods

We fielded the survey from May 4 to June 10, 2022, using NORC's AmeriSpeak Panel, a probability-based panel representative of the U.S. adult population.⁵ The sample was drawn from this panel and the survey administered via telephone and online, in English and Spanish. NORC obtained informed consent prior to enrolling individuals in the panel. Johns Hopkins Bloomberg School of Public Health Institutional Review Board deemed this study not human subjects research. Reporting of the results follows AAPOR reporting guideline for survey studies.⁶

First, we defined driver monitoring as systems "that measure driving behavior. These are smartphone apps, devices installed in the car, or other devices that monitor things like location, speed, and braking." We then measured the prevalence of the use of driver monitoring systems by asking respondents to indicate if they were currently using a driver monitoring device, previously used a driver monitoring device, or had never used a driver monitoring device. For those respondents who reported ever using a driver monitoring system, we asked about the type of technology, reasons for using it, and the frequency of engagement with the data being collected. We then examined factors that influence the likelihood of the adoption of driver monitoring devices for a range of factors, such as cost, accuracy of the data collection system, privacy, safety, and financial incentives.

For three items asking the factors influencing the adoption of driver monitoring technologies we created a variable for "more likely" and "less likely" by combining "much more/much less" and "somewhat" responses. For the four items asking about motivations influencing the likelihood of adoption of a driver monitoring system we created a variable for "likely" and "unlikely" by combining "highly" and "somewhat" responses. Prevalence estimates and their confidence intervals incorporated sampling weights to generate nationally representative estimates. Analyses were conducted using R version 4.2.2.

Results

The survey completion rate was 31.60%, with a final sample of 2,245 adults aged 18 years or older (see Table 1). The majority of the sample (N=1,805) had never used a driver monitoring device (80.35% [95% Confidence Interval (CI) 78.03–82.66]. The remainder of the sample (N=440) was currently using a driver monitoring device



Table 1
Participant demographics N=2,245

(10.25% [CI 8.5–12.00]) or was previously using a driver monitoring device (9.41% [CI 7.74–11.07]) (see Table 2). Among those who ever used a driver monitoring device, the majority reported it allowed them to get less expensive insurance (60.59% [CI 54.42–66.76]). Approximately one quarter of those who used driver monitoring said it was something they used to monitor their own driving (24.13% [CI 18.69–29.56]). Two thirds of current and former users of driver monitoring systems said the system collected data on every drive (66.06% [CI 60.14–71.97]) and the remainder reported the system did not consistently collect data or they were unaware of when data was collected. Less than half of the respondents who ever used driver monitoring systems said they frequently or occasionally reviewed the data collected by the system (48.81% [CI 37.89–59.71]). The remainder rarely or never reviewed the data or did not have access to the data that was being collected by the driver monitoring system.

	Mean (Range or Percentage)
Age	44.63 years (18-90)
Gender	
Male	830 (37.8%)
Female	1366 (62.2%)
Race	
White, Non-Hispanic	1389 (63.3 %)
Black, Non-Hispanic	256 (11.7%)
Hispanic	368 (16.8%)
Asian, Other, Two or More Races	183 (8.4%)
Marital status	
Married	1214 (55.3%)
Divorced/Separated/Widowed	378 (17.3%)
Never married	604 (27.5%)
Employment	
Working — as an employee or self-employed	1472 (67%)
Not working — looking for work or temporary layoff	172 (7.8%)
Not working — retired	208 (9.5%)
Not working — disabled	125 (5.7%)
Not working — other	219 (10%)
Income	
Less than \$30,000	514 (23.4%)
\$30,000 to under \$60,000	586 (26.7%)
\$60,000 to under \$100,000	547 (24.9%)
\$100,000 or more	549 (25%)
Region	
Northeast	285 (13%)
Midwest	657 (29.9%)
South	739 (33.7%)
West	515 (23.5%)
Metro	
Non-Metro Area	349 (15.9%)
Metro Area	1847 (84.1%)

Table 2
Prevalence and Engagement with Driver Monitoring Systems

Description	Percentage [Confidence Interval]
Current driver monitoring use	
I am currently using a driver monitoring device	10.25 [8.5–12]
I was using a driver monitoring device but not any more	9.41 [7.74–11.07]
I have never used a driver monitoring device	80.35 [78.03–82.66]
Driver monitoring purpose	
Allows me to get less expensive insurance	60.59 [54.42–66.76]
Required by my workplace	7.57 [4.89–10.25]
Something I decided to use to monitor my driving	24.13 [18.69–29.56]
Other	7.71 [4.15–11.27]
Driver monitoring data collection	
The driver monitoring system collects data on every drive I take	66.06 [60.14–71.97]
The driver monitoring system collects data on most, but not all of the drives I take	15.58 [11.21–19.95]
The driver monitoring system collects data on some, but not most of the drives I take	5.33 [2.71–7.95]
I don't know when the driver monitoring system collects data	13.04 [8.75–17.33]
Driver monitoring data review/access	
I frequently review the data collected by the driver monitoring system	21.15 [15.93–26.36]
I occasionally review the data collected by the driver monitoring system	27.66 [21.96–33.35]
I rarely review the data collected by the driver monitoring system	26.3 [20.42–32.18]
I never review the data collected by the driver monitoring system	11.55 [7.68–15.42]
I don't have access to the data collected by the driver monitoring system	13.35 [9.34–17.36]

When all respondents were asked about the factors that would influence the likelihood of adoption of driver monitoring systems, less than half the sample considered accuracy a factor that would make them more likely to use a driver monitoring system (41.97% CI [39.88–44.05]). Roughly the same percentage rated privacy as a factor that would make them more likely to use a driver monitoring system (45.82% [CI 43.7–47.93]). Less than half the sample also said that they would be more likely to use a driver monitoring system if it came at no extra cost (43.59% [CI 41.5–45.69]). There were no significant differences in the likelihood of these factors to influence the adoption of driver monitoring systems.

Over three quarters of the sample said they would be likely to use a driver monitoring system if it reduced their crash risk (77.1% [CI 75.32–78.88]), led to a discount in their insurance premium (79.58% [CI 77.87–81.29]), or could lead to weekly rewards for safe driving (75.84% [CI 74.03–77.66]). Over two thirds of respondents said they would be likely to use a driver monitoring system if they could win prizes as part of a safe driving competition (69.95% (CI 68.01–71.9). The likelihood of adoption of driver monitoring systems was significantly lower for contests where participants could win prizes for safe driving than for weekly rewards (Figure 2).

Figure 1

Factors influencing the likelihood of adoption of a driver monitoring system.

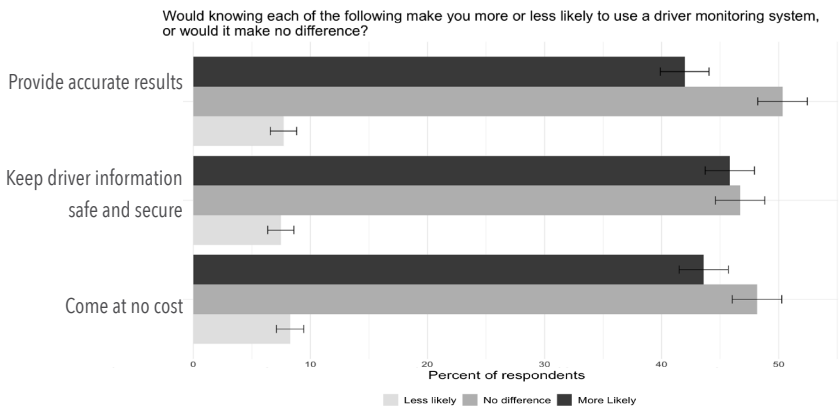
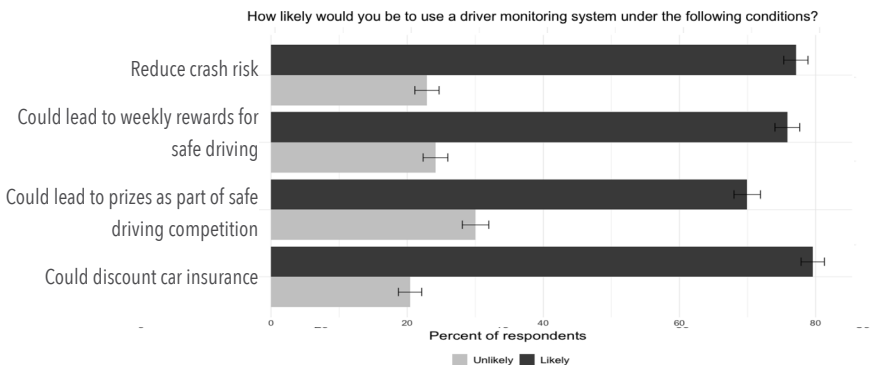


Figure 2

Motivations influencing the likelihood of adoption of a driver monitoring system.





Discussion

In this nationally representative survey of U.S. adults, we provide the first estimate of the prevalence of the use of driver monitoring systems in the United States.

While the majority of U.S. adults (80.35%) have not yet used driver monitoring devices, one in five U.S. adults were currently using or had previously used driver monitoring systems. The majority of those who used driver monitoring systems did so to obtain a discount on their insurance premium. When all respondents were asked about the factors that would influence the likelihood of adoption of driver monitoring systems, the accuracy and security of the data, and the cost of the service were similarly rated in importance. The majority of respondents said they would be likely to use driver monitoring if it reduced their crash risk, gave them a discount on their insurance premium, or could lead to weekly rewards for safe driving. These findings suggest that the public is generally receptive to the potential benefits of driver monitoring, even among those who have not yet used these technologies.

These findings suggest that individuals are more likely to adopt driver monitoring systems when they perceive clear benefits such as reduced crash risk, insurance premium discounts, and rewards for safe driving.

Privacy concerns and the cost of the system appear to be less influential factors. However, safe driving contests showed lower likelihood of adoption compared to other incentives. These insights can be valuable for policymakers, insurers and technology providers with an interest in the adoption of driver monitoring systems.

Limitations and Future Research

This study has several limitations. First, while the NORC AmeriSpeak panel used probability-based recruitment consistent with best-practice standards for survey research, these results may still be vulnerable to sampling biases. Second, the survey did not assess all potential factors that may influence public acceptability of driver monitoring systems. Future research should address these limitations by exploring a wider range of factors that may influence public attitudes toward driver monitoring technologies.

Conclusion

The findings of this survey suggest that there is potential for further growth in the adoption of driver monitoring systems. By addressing the concerns of potential users, promoting awareness of the safety benefits, and developing effective incentive programs, the adoption of driver monitoring systems could be nurtured, leading to improvements in road safety.

Acknowledgments

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The image shows the cover of the journal 'THE JOURNAL OF LAW, MEDICINE & ETHICS'. The cover features a red header with the journal title in white. Below the header is a photograph of a city street scene with people walking. The main title of the issue is '2023 Public Health Law Conference: People. Policy. Progress.' in bold black text. Below the title, it says 'CURATED AND EDITED BY VINITA CHITRA'. There is a list of articles on the cover, including 'Introduction: Where Do We Go From Here?' by David G. Mustard, 'Public Health Law: A Review of the Current State of the Field' by Jeffrey Michael, and 'The Role of Public Health Law in Addressing the Opioid Crisis' by Johnathon Ehsani. The Cambridge University Press logo is at the bottom right of the cover.

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