

**The use of video feedback in novice 14½ year-old drivers: the million-mile study**

Draft Proposal Submitted to:  
The  
Iowa Department of Transportation

By  
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THE UNIVERSITY OF IOWA

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## PROPOSAL

Project Title: The use of video feedback in 14½ year-old novice teen drivers: the million-mile study

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Organization: University of Iowa

Principal Investigator: Daniel V. McGehee

Team Members: Cher Carney, John Lee, Mireille Raby, Michelle Reyes

### 1. BACKGROUND AND PROJECT OBJECTIVE

The million-mile study of 14½ year-old drivers is the first study of its type to provide parents and teens context-related information on their driving development using video feedback. Using the DriveCam event triggered video recorder, this study will provide a unique and sustained look into young driver skill development for state and federal policy makers, and the automotive and insurance industries. The proposed three-year data collection will be the longest field study of its type to study safety-related driving. The objective of this project is to examine driver skill development, behavior and safety of our youngest and most vulnerable drivers—14½ year-old independent drivers driving to school and school-related activities. Known in some states as a school-permit or school license, six states (Alabama, Iowa, Kansas, Mississippi, Montana, and South Dakota) currently allow very young teens (14½) to operate independently on public roadways.



Figure 1. Young novice driver with system

The crash rates for this very young group are high. While such early licenses have been available to some rural states of over 75 years, there is concern that such early licenses result in higher

crash and fatality rates—putting not only these very young drivers at risk—but their passengers and the motoring public, too. According to the Iowa DOT (2006), 14 ½ to 16 year old school license holders are 6½ times more likely to receive a moving violation conviction and 11½ times more likely to be involved in a traffic crash than 14 ½ to 16 year-old instruction permit holders.

Having adult supervision (which has been shown to have a protective effect) is one of the basic reasons why instruction permit holders have far lower traffic conviction than those who drive without adult supervision. School license holders, even though the vast majority (92-97%) holds this license for less than a year (average length 4.5 months) (Iowa DOT, 2006), have moving violation conviction and traffic crash rates that are far higher than instruction permit holders of the same age.

Iowa DOT data on the number of school license holders by rural and urban counties reveal a far larger percentage of drivers required to attend the Driver Improvement Program (for three or more moving violations or one violation for speeding 25 mph over the speed limit violation) than any of the ten-year age groups of older drivers.

Fourteen year-old drivers have never been studied in the naturalistic driving context before. Applying a detailed analysis of this population will provide important additional data to understanding the driving development for our youngest drivers. Such data could be used in future policy enhancements for graduated drivers licensing and training recommendations.

The long-range goal of this research is to reduce crashes and related injuries among teen drivers by increasing driving skill and safe driving practices. The project will test a family-focused intervention to influence teens' driving and related safety behaviors.

## **2. THE 'MILLION MILE STUDY'**

The million-mile study will build on two successful rural and urban teen driving studies that we have complete in rural Iowa and urban Minneapolis. We will recruit 14 year-old drivers into this study just prior to their 14½ year-old Iowa school permit licensure. Incrementally recruiting new drivers as they get their license will be a first—one that allows a unique view into driver development at this very early age. The study will recruit 60 new drivers from five rural high schools in Eastern Iowa. During the three-year study data collection, drivers will receive weekly feedback on safety related events that they may have triggered. Previous studies have shown an 88% reduction in safety relevant events among the riskiest drivers. Data from this study should scale to other state populations—as states show very similar crash statistics among the youngest population. Participants will receive video feedback during early licensure and throughout their most vulnerable years of driver training—through age 17½. We will also supplement the study with periodic surveys of their opinions on hazard and risk assessment—thus being able to judge how risk and hazard perception changes as the drivers develop. Parents will also be surveyed and throughout the project so their input is also considered. Understanding the parenting and communication styles will also be a part of this research.

### **The specific driver development and safety issues we will identify are:**

1. Types and frequency of driving errors, safe and unsafe driving behaviors, crashes and near-crashes among a high mileage rural cohort of 14½ year old drivers for 36 months.

2. The influence of an in-vehicle video feedback intervention (report card) on driving errors, risky driving behaviors, good responses (e.g. defensive driving), crashes and near-crashes for 36 months.
3. Identifying the effects of removing the in-vehicle video feedback intervention after 36 months.
4. Understanding the role of maturation relative to the feedback
5. Understanding how parenting style influences driving safety

### **3. WORK PLAN AND TASK STRUCTURE**

This project will take place over a 48 month time period. The UI will work with project partners to refine the test plan and then as quickly as possible get human subjects approval so that recruitment can begin. The estimated dates are expected to take a shorter amount of time than currently allocated, but delays in human subject approvals at the UI and NIH (Certificate of Confidentiality) are frequent and uncertain. Such projects that involve minors (e.g. 14½ year-olds) have extra scrutiny relative to adult participants.

#### *Task 1. Finalize test plan (3 months after award)*

With all of our partners, we will finalize the test plan so that data gleaned from the study are broadly useful. Experimental design, logistics and school locations will be finalized in the test plan.

This study will employ a randomized controlled trial design. A delayed-intervention design will mix the start and stop times of the video feedback and report cards. This type of study design will help us understand the complex maturation issues that are present in this very young age group. Such a design will enable us to understand if driving changes are due to the feedback or just maturation.

#### *Task 2. Obtain Institutional Review Board (IRB) and NIH Certificate of Confidentiality (six months after award)*

Any study that involves minors has an extra burden to ensure that confidentiality of all data (video and electronic) is maintained at the highest level. The University of Iowa has obtained both IRB and NIH approval for previous studies-- so a precedent has been set. The IRB process is still time-intensive and changes as new issues arise. For this study, we plan to change the recruitment model so that parents can sign-up their teens—much like they do in the real world. This adds the possibility of coercion—something we will have to mitigate.

Each IRB application is very resource intensive—as each application is independently reviewed. Such applications can take 3-6 months and require frequent communication between the human subjects office and Iowa personnel.

Deliverable: All IRB related documents and NIH certificate of confidentiality.

#### *Task 3. Recruit teen participants (seven months after award)*

Using a variety of word-of-mouth, school assemblies, and media campaigns. We will solicit teen volunteers and their parents from five high schools in east central Iowa. In order to attract participants to the project, we will offer monthly compensation. Additional compensation will be provided for installation, surveys and removal of the system. We will budget \$600 per subject per year for compensation. Recruitment will be incremental and done over the first year—as not all drivers turn 14½ at the same time.

Recruitment for such studies is very challenging. Target numbers may be hard to reach—but all efforts will be made to maximize our numbers.

Deliverable: A status report that describes the number of participants that have volunteered along their gender, age and school.

*Task 4. Instrument Vehicles (eight months after award)*

A subcontract with DriveCam to fund the purchase and installation of the systems into each of the participant's vehicles will be let. Additional contracts with cellular companies for data downloading will also be handled by DriveCam. Systems will be installed and maintained by a contractor secured by DriveCam (e.g., Best Buy).

We will be using DriveCam version 4 – which has yet to be released. It uses a cellular system with GPS to collect video and location data.

Systems will be installed over a six-month to one-year period—as participants turn 14½.

Deliverable: A status report on the instrumentation phase and any difficulties that may have occurred.

*Task 5. Baseline data collection (nine-months after award)*

Data collection will begin with a one-month baseline period of driving without feedback. Drivers will have the system in the car but will receive no feedback in the form of LED lights or parental feedback. This period of time will be used to allow drivers to get used to having the system in the car and to capture 'normal' driving. Data will be downloaded automatically on a daily basis via the school parking lot wireless network. Video clips will be coded during this time. As described previously, participants will be incrementally inducted. Because we will recruit subjects that will turn 14½ at the start of our data collection, we estimate that approximately 5-10 subjects a month could be recruited per month.

The baseline periods offer a unique window into the naturalistic driving behaviors of this youngest driver group.

Deliverable: Once we have a total of 30 participants we will send out status reports that describes an overview of the number and type of safety relevant events among the participants.

*Task 6: Data collection with feedback*

After the four-week baseline, the DriveCam systems will have their feedback LED lights turned on. Teens and parents will receive a CD in the mail or log onto a secure website to obtain their son or daughter's safety relevant events. Parents will coach their first session at home after a

mock coaching session that will be held during the installation phase. Parents will receive a CD in the postal mail or email for review each week. With this information, parents and teens will have weekly “coaching sessions” where the most recent events are reviewed along with the standard messages for the broad category of concerning driver behavior.

Once there are enough data from all drivers, the coaching session will also include review of teen’s performance compared to their peers. A weekly report card will be supplied with an email or with the CD that show progress or lack thereof.

Deliverable: A status report that describes an overview of the number and type of safety relevant events among the participants during the feedback phase.

*Task 7: Data collection: Baseline 2, no feedback*

This task will be repeated several times as each group rotates in and out of feedback. This type of design will allow us to understand how maturation effects driving. It is quite possible that the natural process of maturing reduces safety relevant driving events. This type of study design will help us tease out these possible effects.

Deliverable: A status report that describes an overview of the number and type of safety relevant events among the participants during the second baseline phase.

*Task 8: Data analysis*

Following the 36-month data collection, the systems will be removed from the participants’ vehicles. Final data analyses for the study will then be run. Data will include surveys for both teen participants and their parents.

Deliverable: Data analyses will be presented in the final report.

*Task 9: Final reporting*

After the data analyses are complete, the final report with executive summary will be produced for all partners. Tech transfer issues will also be addressed along with future recommendations and implementation strategies. In addition to the final report, a mini-conference will be planned to present the results directly to the partners and Technical Advisory Committee. Approved photos and selected videos may also be released for additional documentation by the partners/TAC. Throughout the project, update meetings will be held in pooled fund member locations.

Deliverable: Final report.

## 4. SCHEDULE

The timeline describes that program over four years—after the front-end logistics of designing the final test plan, obtaining human subject approval, and recruitment—we will begin data collection over a 36-month period. Many of the tasks overlap because we incrementally recruit subjects into the study. Because drivers do not turn 14½ all at the same time, recruitment will occur over the course of six to nine months.

| Task               | Year 1: 2008-2009 |             |             |             | Year 2: 2009-2010 |             |             |             | Year 3: 2010-2011 |             |             |             | Year 4: 2011-2012 |             |             |             |
|--------------------|-------------------|-------------|-------------|-------------|-------------------|-------------|-------------|-------------|-------------------|-------------|-------------|-------------|-------------------|-------------|-------------|-------------|
|                    | 1st quarter       | 2nd quarter | 3rd quarter | 4th quarter | 1st quarter       | 2nd quarter | 3rd quarter | 4th quarter | 1st quarter       | 2nd quarter | 3rd quarter | 4th quarter | 1st quarter       | 2nd quarter | 3rd quarter | 4th quarter |
| 1. Test plan       |                   |             |             |             |                   |             |             |             |                   |             |             |             |                   |             |             |             |
| 2. IRB             |                   |             |             |             |                   |             |             |             |                   |             |             |             |                   |             |             |             |
| 3. Recruitment     |                   |             |             |             |                   |             |             |             |                   |             |             |             |                   |             |             |             |
| 4. Install systems |                   |             |             |             |                   |             |             |             |                   |             |             |             |                   |             |             |             |
| 5. Baseline data   |                   |             |             |             |                   |             |             |             |                   |             |             |             |                   |             |             |             |
| 6. Feedback        |                   |             |             |             |                   |             |             |             |                   |             |             |             |                   |             |             |             |
| 7. Second baseline |                   |             |             |             |                   |             |             |             |                   |             |             |             |                   |             |             |             |
| 8. Data analysis   |                   |             |             |             |                   |             |             |             |                   |             |             |             |                   |             |             |             |
| 9. Final reporting |                   |             |             |             |                   |             |             |             |                   |             |             |             |                   |             |             |             |

## 5. RESEARCH TEAM

The Human Factors and Vehicle Safety Research Division at the University of Iowa Public Policy Center will serve as the lead technical team. Each team member has been deeply involved in novice teen driving research using event-triggered video for several years. They have completed two pilot studies in rural and urban areas.

The UI team will be Dan McGehee (PI), Cher Carney, Mireille Raby, Michelle Reyes and John Lee.

## 6. BUDGET

The million-mile study will be a pooled fund study with a number of partners. Cost savings will be realized because of a 26% indirect rate has been previously negotiated (half of the usual indirect rate) for this project. The total Transportation Pooled Fund (TPF-5-XXX) contribution for the 14½ year-old study will be \$90K/year for four years, which will be divided among participating states. The TPF is a separate entity and is considered one partner.

From the overall project proceeds, DriveCam, Incorporated will receive a subcontract to pay for the individual units, installation, and cellular fees. Total subcontract amount to DriveCam is estimated at \$105K.

Project partners will distribute the cost across each task.

| Task                   | TPF-5_XXX    | NHTSA        | CDC          | TBD          | Total          |
|------------------------|--------------|--------------|--------------|--------------|----------------|
| 1. Test plan           | \$9          | \$9          | \$9          | \$9          | \$36           |
| 2. IRB                 | \$9          | \$9          | \$9          | \$9          | \$36           |
| 3. Recruitment         | \$12         | \$12         | \$12         | \$12         | \$48           |
| 4. Install systems     | \$30         | \$30         | \$30         | \$30         | \$120          |
| 5. Baseline data       | \$40         | \$40         | \$40         | \$40         | \$160          |
| 6. Feedback            | \$150        | \$150        | \$150        | \$150        | \$600          |
| 7. Secondary baselines | \$60         | \$60         | \$60         | \$60         | \$240          |
| 8. Data analysis       | \$35         | \$35         | \$35         | \$35         | \$140          |
| 9. Final reporting     | \$15         | \$15         | \$15         | \$15         | \$60           |
| <b>TOTAL</b>           | <b>\$360</b> | <b>\$360</b> | <b>\$360</b> | <b>\$360</b> | <b>\$1,440</b> |

Partners to date are:

1. Pooled fund states (TPF-5-XXX)
2. NHTSA
3. CDC
4. TBD partner



## 7. TECHNICAL ADVISORY COMMITTEE

The TAC will be comprised of the following members:

*TPF- Iowa DOT Lead*

*CDC*

*NHTSA*

Sandra Larson (Iowa DOT)

Ruth Shults

Patricia Ellison-Potter

Scott Falb (Iowa DOT)

TPF member states

The TAC will meet once per year at a central site or via teleconference. Budget permitting, TPF states may also have on-site briefings. Quarterly progress reports will also be emailed to all TAC members throughout the project.

### **Investigator contact information:**

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