

★★★★★ Senior Safety & Mobility

Use of Advanced In-Vehicle Technology by Young and Older Early Adopters: *Survey Results on Headlamp Systems*

Background

High intensity discharge (HID) headlamps and especially directionally-adaptive headlamps are still relatively new technologies within the U.S. passenger vehicle fleet.

Many drivers limit their nighttime driving as they get older. Driving at night may be especially difficult for some older drivers who experience reduced ability to see under low light levels or are bothered by glare. One in eight Americans is 65 or older now, and this concern will continue to grow as the American population ages. It is possible that new technologies such as HID headlamps can assist older drivers to drive more safely with less stress, thus extending their safe driving years. It is also possible that advanced headlamps may cause unintended consequences such as over-reliance on the technology or unsafe levels of glare for other drivers.

The research reported here was conducted as one part of a broader study to learn more about driver experience with several new and emerging in-vehicle technologies, with focus on how these technologies are being used and how well their capabilities and limitations are understood, and with particular emphasis on the experience of older drivers.

The Study

- Questionnaires were mailed to 10,000 owners of vehicles known to offer HID headlamps or directionally adaptive headlamps as a standard or optional feature.
- Half of the surveys were mailed to persons aged 65 or older, and half were mailed to persons 25 to 64.
- Completed questionnaires were returned by 2126 respondents including 1117 who had HID headlamps. Only a few had directionally-adaptive headlamp systems, hence data on directionally-adaptive headlamps are not reported here.
- Questions addressed driver acceptance of their headlamp systems, perceived system effectiveness and usability, awareness and understanding of system capabilities and limitations, and behavioral adaptations which may occur with system use.
- Follow-up phone interviews were conducted with 34 participants.

Key Findings

Some drivers don't know what type of headlamps they have

- Some respondents (18%) did not know whether or not their vehicle had HID headlamps.
- Some respondents (20%) did not know whether or not their headlamps were directionally adaptive.

Drivers who have HID headlamps generally are pleased with them



HID headlamps use an electrical arc instead of the tungsten filament used in conventional headlamps. This produces a brighter and often blue colored light with a greater luminance.



Directionally-Adaptive Headlamps adjust the aim of the headlight beams to illuminate the roadway based on inputs from the vehicle (steering wheel, speed, yaw).

- Most respondents said they would want to get HID headlamps again (88%).
- Most respondents preferred their HID headlamps to conventional headlamps (75%).
- Owners of HID headlamps were more likely to say that it was easy for them to see lane lines of curved roads, overhead signs, pedestrians, and the roadway ahead when approaching a hill.

Changes in driving behavior with HID headlamps

- Some HID headlamp owners (23%) said that they were willing to drive faster with their HID headlamps than with conventional headlamps.
- Many respondents with HID headlamps (40%) said that they were more willing to drive at night; however the reported frequency of driving at night did not depend significantly on whether the respondent had HID headlamps.
- Most respondents (70%) with HID headlamps said that their behavior would not change if their headlamps had to be replaced with conventional headlamps. However, others would limit their amount of nighttime driving (9%), avoid unfamiliar places at night (10%), and avoid dark roads (11%).

Perceived safety of HID headlamps

- Most HID headlamp owners (57%) said that they are safer drivers because they have this technology.
- Among vehicle owners without HID headlamps, 17% indicated that a reason for not purchasing HID headlamps was because they thought HID headlamps would be a nuisance or distraction to other drivers.

HID headlamps and glare

As an indication of how much glare their headlamps were causing for other drivers, respondents were asked how often they had received high beam flashes from other drivers while their own low beams were on.

- Over 18% of HID headlamp owners reported at least occasionally receiving high beam flashes from other drivers as compared to only 10% of non-HID headlamp owners who reported this.
- When controlling for many factors (age group, gender, beam pattern, and head-lamp optics) the type of headlamp light source (HID vs. non-HID) was a significant predictor of receiving high beam flashes.
- HID headlamp owners with at least 30,000 miles on their vehicle were the most likely to report receiving high beam flashes from other drivers.
- Among older respondents, HID headlamp owners were more likely than non-HID headlamp owners to find light from oncoming vehicles acceptable.

“I feel the HID lights are too bright for oncoming cars; about 1 in 10 cars flash me when I’m on two lane roads.” (Female, 40)

Compared to younger respondents, older respondents...

- Tended to have less driving experience with their current vehicle.
- Were more likely to wear glasses (less likely to wear contact lenses) and more likely to report having cataracts or cataract surgery (less likely to have had Lasik surgery).
- Had a similar subjective perception of light (glare) from following vehicles (the majority found it “Acceptable”).
- Were more likely to limit their driving at night and to avoid unlit two-lane roads, where as younger respondents were more likely than older respondents to use active strategies such as blocking the light with their hands.

Conclusions

Although HID lighting is available on an increasing number of vehicles, many owners who have HID headlamps are unaware that they have them. Drivers who know they have HID systems said they preferred HID headlamps and thought they were safer. Many drivers reported increases in their nighttime driving because they had HID systems, although there was no statistically significant difference in the amount of night driving reported by people who owned HID systems than among those who did not. The potential safety benefits of HID headlamps may be offset by increased glare for other drivers and higher travel speeds; more research is needed to address these issues.

