High Beam Headlights: Self-Reported Frequency of Use, Motivations for Use, and Opinions about Advanced Headlight Technology

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ABSTRACT

Objective: This study surveyed drivers in the Ann Arbor, Michigan, area about their use of and motivations for using high beam headlights.

Methods: Telephone surveys were conducted during summer 2015 with 604 drivers. Respondents provided information about exposure to nighttime driving, concerns about seeing and crashing at night, prevalence of high beam use on specific area roads when isolated from other traffic, factors that might influence high beam use, and knowledge of and opinions about high beam assist (also called automatic high beam headlamps).

Results: Self-reported use of high beams varied by roadway environment, with 81% of drivers reporting they use high beams always or most of the time on winding rural roads with little or no street lighting, but only 22% saying they use them always or most of the time on city streets with little or no street lighting. The most common motivations for not using high beams were the belief that there was enough lighting in an environment or that drivers did not need them. The extra viewing distance offered by high beams and the avoidance of causing glare for other drivers were the most important factors that influenced drivers' decisions of when to use high beams. A majority of drivers (60%) agreed that high beam assist sounded like an important safety feature, but only 43% agreed they would want the feature on their next vehicle.

Conclusion: A recent roadside study that observed cars driving in conditions where high beam use was appropriate found actual use to be very low (18%). The much higher rates reported by respondents in the current study indicates they overestimate how often they use high beams. Advanced headlight technologies could address the low use of high beams, but drivers may not accept them out of mistrust in automation.

Keywords: nighttime driving, visibility, high beam headlights, high beam assist

INTRODUCTION

Thirty percent of U.S. traffic fatalities in 2014 involving passenger vehicles occurred in dark and unlit conditions, while the most recent National Household Travel Survey indicates only 10% of passenger vehicle miles traveled occur between 9 p.m. and 6 a.m. (Insurance Institute for Highway Safety (IIHS), 2016a). Inadequate visibility very likely contributes to some of these nighttime crashes. A countermeasure to address poor visibility is the use of high beam headlights, which help drivers see farther ahead and more quickly identify roadside hazards on dark roadways (Reagan & Brumbelow, in press).

Drivers do not use high beams as often as they should. In a recent observational study of high beam use at 20 roadway sites in Ann Arbor, Michigan, and the surrounding county, only 18% of the more than 3,500 vehicles observed were using high beam headlights despite driving in conditions without nearby traffic or sufficient street lighting (Reagan et al., in press). Observation sites located in rural zones or on the boundaries between rural zones and Ann Arbor had higher high beam use rates than sites located within Ann Arbor. Use rates observed in previous studies ranged from 25% to 42% (Buonarosa et al., 2008; Hare & Hemion, 1968; Iragavarapu & Fitzpatrick, 2012; Mefford et al., 2006; Sullivan et al., 2004).

Little is known about why drivers underuse high beams. Drivers ages 20-25 acknowledged the visibility benefits of high beams in a 2013 survey, with a majority (54%) reporting they could see very well at night when driving with high beams (Fekety et al., 2013). Only 5% indicated the same level of visibility when using low beams, yet few (fewer than 2%) said low beam headlights provided poor visibility. This response pattern suggests drivers recognize the benefits of high beams but believe low beams provide acceptable visibility.

The current study was a telephone survey building on the work of Fekety et al. (2013) about motivations for, attitudes toward, and self-reported behavior regarding the use of high beam headlights. One goal of the survey was to sample drivers in the same area where Reagan et al. (in press) collected observational data and ask questions about high beam use on some of the same roads where high beam use was observed so that self-reported and observed use could be compared. Questions were included to identify factors that might affect self-reported high beam headlight use such as the presence of street lighting, wildlife, road curvature, and inclement weather. The current study additionally sampled drivers across a wider age span than Fekety et al. and examined whether population density affected reasons why drivers report using high beams.

A second goal of the current study was to assess drivers' knowledge of and attitudes toward high beam assist. This technology, also known as automatic high beam headlights, is an advanced lighting system that automatically switches between high and low beam headlights depending on the absence or presence of leading or oncoming traffic. High beam assist could diminish high beam underuse, but it is unclear if drivers would accept the technology.

METHOD

Telephone interviews were conducted with licensed drivers 18 and older who lived in one of ten targeted zip codes in Ann Arbor, Michigan, and the surrounding county and drove in the dark at least once in the past month. As a proxy for rurality, three subsamples were drawn from low-, medium-, and high-density zip codes by the number of residents per square mile within each zip code. Four low-density zip codes had fewer than 250 residents

per square mile, three medium-density zip codes had between 251 and 400 residents per square mile, and four high-density zip codes (each in Ann Arbor or the immediate surrounding area) had densities greater than 668 residents per square mile.

A random list of 10,632 landline and cellular telephone numbers with area codes linked to the survey region were obtained in spring 2015, with the list nearly evenly distributed between low- (n=3,387), medium- (n=3,599), and high- (n=3,646) density zip codes. From this initial sample, 2,005 individuals were reached and 604 drivers (30%) completed the survey. Of those not participating, 575 refused, 14 began but did not complete the survey, and 812 did not qualify because they did not reside in one of the targeted zip codes (516 individuals) or did not meet other inclusion criteria (e.g., unlicensed, had not driven after dark in past month, language barrier, business phone number). Approximately the same number of respondents from low- (n=202), medium- (n=201), and high- (n=201) density zip codes completed the survey. Sixty-two percent of completed interviews were conducted on landlines. Interviews were conducted by Opinion America Group, a professional survey firm, during June-July 2015, and the Chesapeake Institutional Review Board deemed the study to be exempt.

Two methods were used to weight responses. When responses are presented for the whole sample, they were weighted to reflect the age and gender distributions of the county. This procedure gives increased weight to respondents in the high-density zip codes. When responses are presented separately for the low-, medium-, and high-density subsamples, they were weighted within each subsample to reflect the age and gender distributions of the population in each rurality grouping. Chi-square tests ($p < 0.05$) examined differences in responses among rurality groupings.

RESULTS

Table 1 indicates that most respondents were 31-64 years old, and about half reported they drove 10,000-20,000 mile per year and drove in the dark at least once a week but not daily during the past month. Most respondents (82%) indicated that driving in the dark accounted for less than half of their driving. Respondents reported having less exposure to rural ("country") roads than suburban roads and city streets.

Concerns About Seeing and Crashing at Night

Table 2 summarizes drivers' concerns about driving in the dark. Forty-nine percent of respondents indicated they were more concerned about crashing when it is dark than when it is light. Those who were more concerned about crashing in the dark were asked, in an open-ended question allowing for multiple responses, to list specific reasons, and 41% reported concerns about wildlife such as deer. Other reasons included poor visibility due to weather or low lighting (25%), age or vision issues (17%), reckless or drunk drivers (13%), or not seeing unexpected hazards such as crashes or pedestrians (13%). When asked if they had vision problems that make driving more difficult when it is dark than when it is light, 22% of respondents said they had such problems, and 56% of these drivers reported they reduced their nighttime driving as a result. Similarly, 57% percent of all respondents indicated they had ever reduced their driving due to visibility associated with inclement weather such as fog, snow, and rain.

When asked how nighttime driving behavior differs from that of daytime driving, 60% of respondents confirmed they drove differently in the dark. The most common differences when driving in the dark, named in an open-ended question allowing for multiple responses, were driving more slowly (56%) or cautiously (40%) and being more alert for animals or other obstacles (23%). Only 4% of drivers who indicated they drove differently in the dark than when it is light said one of the differences was the use of high beam headlights.

Self-Reported Prevalence of High Beam Use

For a series of questions about how often they use high beams, respondents were instructed to assume there were no cars driving in the same lane ahead of them and no cars in the opposing direction of travel. Most questions referenced specific street names. Questions about the frequency of high beam use on city streets were asked both using actual street names and generically in case respondents were unfamiliar with the streets. For each driving scenario, respondents indicated whether they use high beams always, most of the time, sometimes, rarely, or never.

Self-reported prevalence of high beam use in different roadway environments is summarized in Table 3. Drivers most often reported using high beams on straight or winding unlit rural roads, with 80%-81% saying they use high beams always (52%-56%) or most of the time (25%-28%) when on such roads. Only 4% said they used them always (3%) or most of the time (1%) on city streets with good street lighting, and 22% said they used them always (8%) or most of the time (14%) on city streets with little or no street lighting.

When questioned about the prevalence of high beam use on specific unlit streets in the city of Ann Arbor, 31% of respondents indicated they use high beams always (14%) or most the time (17%). Six percent of respondents reported using high beams always (4%) or most of the time (2%) when driving on specific Ann Arbor city streets with good lighting.

Twenty-eight percent of respondents indicated they use high beam headlights always (16%) or most of the time (12%) when driving on Interstate 94 to the west of Ann Arbor, where the environment becomes increasingly rural, whereas 22% reported they use them always (14%) or most of the time (8%) when driving on Interstate 94 to the east of Ann Arbor towards the urban center of Detroit. Similar percentages of respondents (20%-26%) reported they use high beams always (9%-11%) or most of the time (11%-15%) when on unlit secondary roads and driving away from or toward Ann Arbor.

Drivers who said they rarely or never used high beams in the above scenarios were asked why in open-ended questions (see Appendix, Table A1). Across most of the roadway environments, the top two reasons given were the belief there was adequate lighting in that environment or they simply did not need high beams. Respondents who said they rarely or never used high beams on city streets and secondary roads leading to or away from Ann Arbor also indicated they did not use them because of being in a city where people are around and speed limits are lower. Additional reasons for rarely or never using high beams on interstates included the presence of other traffic or a habit of not using them on interstates.

To gain further understanding about motivations for high beam use on winding roads, half of the sample were asked whether they agreed or disagreed with the statement, “When driving on a road that has a lot of curves, I usually use my low beams so I do not cause glare for drivers.” Seventy-two percent of respondents agreed with this statement. The remaining half of the respondents were asked whether they agreed or disagreed with the statement,

"When driving on a road that has a lot of curves, I usually activate my high beams so I can see as far into the curves as possible." Eighty-two percent of drivers agreed with this statement.

Regarding drivers' beliefs about their own use of high beams in general, 82% each indicated the extra viewing distance offered by high beam headlights and the avoidance of causing glare for other drivers directly in front of them were extremely (50%) or very (32%) important factors when deciding to use to high beam headlights (see Appendix, Table A2). Eighty-two percent said the avoidance of causing glare for others driving towards them in the opposite direction was an extremely (53%) or very (29%) important reason when deciding to use high beams. Regarding all drivers in general, 54% of respondents believed all drivers use high beam headlights as often as they should, and 32% thought all drivers use high beam headlights less often than they should.

Effects of Rurality on Situational Factors That Influence High Beam Use

Questions where rurality differences were of interest included those about situational factors such as driving in rain or fog, or in locations or during times of the year when more deer were likely to be present. For these questions, respondents were asked whether they use high beam headlights more often, less often, or the same amount when the adverse condition is present compared with when it is not (Table 4). Nearly three-quarters of drivers said they use high beams more often when deer may be present. About three-quarters reported they use high beams less often when it is foggy, and 36% use them less often in the rain. Responses regarding deer ($\chi^2[4]=20.7$, $p<0.001$), fog ($\chi^2[4]=15.2$, $p=0.004$), and rain ($\chi^2[4]=13.6$, $p=0.009$) varied significantly by rurality. The proportion of drivers who said they use high beams less often in the fog was highest among drivers in low-density zip codes, and the proportion that use them more often when deer were likely to be present was lowest among drivers in high-density zip codes. Drivers in low-density zip codes were most likely to say they use high beams the same amount or less often in the rain.

Rurality also was of interest for questions asking respondents to rate the importance of factors that could explain why other drivers use high beams less than they should. Responses are summarized in Table 5. Drivers most often named as an extremely or very important factor the belief that drivers see sufficiently with low beams (41%), followed by fatigue from switching between high and low beams due to intermittent traffic (40%) or forget to activate high beams (35% each), fatigue from switching due to intermittent street lighting (30%), and being unaware they have different high and low beam settings (18%).

The proportion of respondents who named as an extremely or very important factor the belief that drivers see sufficiently with low beams as a reason for underusing high beams decreased significantly with increasing rurality, with the largest proportion among drivers in high-density zip codes (43%), followed by medium- (42%) and low- (29%) density zip codes ($\chi^2[2]=10.4$, $p=0.005$). Additionally, a significantly higher proportion of respondents in high- and medium-density zip codes, compared with low-density zip codes, indicated that tiring from switching while driving through areas with intermittent street lighting was an extremely or very important factor (32% vs. 24%, $\chi^2[1]=4.8$, $p=0.028$).

Knowledge of and Attitudes about High Beam Assist

Thirty-four percent of respondents indicated they had heard of the term "automatic high beam headlights" (Table 6). However, when these respondents were asked to describe the technology, only 33% accurately indicated it automatically turns high beams off or on based on the presence or absence of other cars. After defining automatic high beams for respondents, 60% of the sample strongly (18%) or moderately (42%) agreed the technology was an important safety feature, but only 43% strongly (15%) or moderately (28%) agreed they would like to own a car with it. The top two reasons for not wanting high beam assist, named in response to an open-ended question, were the preference to switch manually or control one's own vehicle (34%) and concerns the system would malfunction and blind other drivers (25%).

DISCUSSION

A recent roadside observational study showed that drivers underuse high beam headlights (Reagan et al., in press). The current study found drivers also overestimate their use of high beams to a large degree. Reagan et al.'s observational study was purposely conducted in the same region as the current study to allow comparison between self-reported and observed high beam use on the same roads or road types. Figure 1 compares self-reported high beam use in the current study to observed use in Reagan et al. The largest difference between self-reported and observed use was on straight rural roads, where 80% of respondents in the current study reported they use high beams always or most of the time, but only 20% of vehicles observed across six sites with straight rural roads in Reagan et al. were using high beams. Self-reported use was consistently higher than observed use across most other roadway environments examined. The only exception where self-reported use was lower than observed use was on city streets with high levels of street lighting.

Additionally, self-reported high beam use on Interstate 94 to the east and west of Ann Arbor also was higher than observed use based on data collected during a field operational test to evaluate prototypes of an in-vehicle based safety system that included forward collision warning, lane departure warning, and blind spot monitoring installed a fleet of 16 model year 2006-07 Honda Accords. The field operational test occurred during 2009-10 with 117 drivers logging more than 375,000 km in driving distance. Thirty-nine of these drivers drove 2,869 kilometers on Interstate 94 at night either to the west or east of Ann Arbor. Only two of the 39 used high beams at all on the interstate (Flannagan, 2016). In contrast, 28% and 21% of survey respondents indicated they use high beams always or most of the time on Interstate 94 to the west and east of Ann Arbor, respectively.

A question asking how often respondents used high beams on curves further highlighted drivers' lack of awareness of their own high beam use. More than 80% of drivers said they usually use high beams on roads with lots of curves when the question was phrased to highlight the visibility benefits of high beams, but nearly the same proportion said they usually use low beams on such roads when the question was phrased to highlight the potential for glare. Only about a third of respondents thought that other drivers used high beams less often than they should.

The current survey and previous observational studies (Mefford et al., 2006; Reagan et al., in press) suggest drivers adapt their use of high beam headlights depending on situational factors, but only do so to a limited degree. For example, self-reported and observed use was higher on rural roads compared with urban roads, and survey respondents also indicated greater high beam use when and where deer are more active. Drivers in rural areas were

especially likely to modulate use in conditions of fog or when deer are expected to be present. However, the results also indicate that substantial proportions of drivers rarely or never use high beam headlights. Given that many of the respondents who said they rarely or never use high beams said they do so because high beams are not necessary, it may be difficult to get these drivers to use them as much as would be prudent.

Seventy-one percent of pedestrian fatalities in 2014 occurred in the dark (IIHS, 2016b). This is alarming given that about a quarter of drivers who rarely or never use high beams on unlit urban roads said high beams were not needed because of driving in residential or city areas where people are around and speeds limits are lower. Drivers overestimate the distances at which they can see pedestrians, and pedestrians overestimate the distances at which they can be seen by drivers (Tyrell et al., 2004; Wood et al., 2010), making detection of pedestrians in the dark particularly problematic. Optimal use of high beams on unlit city streets where pedestrians are likely to be present could be especially helpful in reducing crashes with pedestrians.

The current study supports a previous survey (Fekety et al. 2013) of young drivers' beliefs about high beam use with respect to the emphasis drivers place on avoiding glare for other drivers. In the current study, the percentage of drivers (82%) who indicated that avoiding glare for other drivers was an extremely or very important factor when deciding to use high beam headlights was the same as that for drivers who indicated that the extra viewing distance offered by high beams was an extremely or very important factor. Although the vehicles studied in Reagan et al. (in press) were isolated from opposing traffic and from lead vehicles for a minimum of 10 seconds, ensuring the closest traffic was far enough away to avoid glare from high beam headlights, the authors reported a consistent effect for the proximity of other traffic on the rate of high beam use. This finding suggests drivers may activate low beams sooner than needed.

Despite drivers' concerns, glare does not contribute to a substantial proportion of crashes. In a nationally representative survey of drivers, about 30% experienced headlight glare as disturbing, but fewer than 1% experienced glare resulting in a crash or near crash (Singh and Perel, 2004). In the National Motor Vehicle Crash Causation Survey, where in-depth crash investigations were performed on more than 5,000 crashes, headlight glare was a contributing factor in fewer than 1% of the crashes (IIHS, 2016c).

High beam assist systems could address the underuse of high beams. More than a third of respondents said that fatigue in switching between high and low beams was an extremely or very important reason why drivers use high beams less often than they should. High beam assist would resolve this problem, but the current study indicates drivers are not aware of the technology. When high beam assist was described to them, fewer than half of the respondents indicated they would want such a system on their next vehicle, despite more than 60% agreeing it was an important safety feature. About a quarter of drivers who would not want the system were concerned it would malfunction and cause glare for other drivers. It remains to be seen how these systems are accepted by drivers who have them on their vehicles. Other vehicle features that perform automated functions such as adaptive cruise control are well-liked by drivers that use them (Cicchino & McCartt, 2015; Eichelberger & McCartt, 2014, 2016).

Adaptive driving beams may be more acceptable than high beam assist. Adaptive driving beam systems provide high beam visibility when a vehicle is on unlit roads and isolated from other traffic. However, rather than switching between binary low or high beam settings, adaptive driving beams continuously modulate beam patterns

to shadow oncoming or leading vehicles but otherwise provide high beam visibility. Thus, drivers with the system still benefit from increased forward lighting without causing glare for oncoming or leading vehicles. This technology is permitted in vehicles designed for the European market. However, U.S. Federal Motor Vehicle Safety Standard No. 108 mandates that headlights must be either low beam or high beam headlights, and the National Highway Traffic Safety Administration has determined that adaptive driving beam systems are neither. Mazzae et al. (2015) assessed the performance of four adaptive driving beam systems installed in vehicles that met European testing requirements and concluded that revising the U.S. standard requires an objective, repeatable test procedure to ensure the technology does not introduce unacceptable levels of headlight glare.

In conclusion, drivers do not use high beam headlights as often as they should, but believe they use them more often than they actually do. Although some drivers seem distrustful that technology like high beam assist would work properly, these systems have potential to eliminate underuse, improve visibility, and reduce nighttime crashes.

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REFERENCES

Buonarosa ML, Sayer JR, Flannagan MJ. *Real-world frequency of use of lighting equipment*. Report no. UMTRI-2008-14. Ann Arbor, MI: University of Michigan Transportation Research Institute; 2008.

Cicchino JB, McCartt AT. Experiences of Model Year 2011 Dodge and Jeep owners with collision avoidance and related technologies. *Traffic Inj Prev*. 2015;16:298-303.

Eichelberger AH, McCartt AT. Volvo drivers' experiences with advanced crash avoidance and related technologies. *Traffic Inj Prev*. 2014;15:187-195.

Eichelberger AH, McCartt AT. Toyota drivers' experiences with Dynamic Radar Cruise Control, Pre-Collision System, and Lane-Keeping Assist. *J Safety Res*. 2016;56:67-73.

Fekety DK, Whetsel SA, Sewall AS, Tyrell RA. Drivers' beliefs, habits, and strategies regarding high beam usage. *Proc. Human Factors and Ergonomics Society 57th Annual Meeting*, pp. 1800-1804. Santa Monica, CA: Human Factors and Ergonomics Society; 2013.

Flannagan MJ. [Unpublished analyses of in-vehicle based safety system field operational test.] Ann Arbor, MI: University of Michigan Transportation Research Institute; 2016.

Green M. How long does it take to stop? Methodological analysis of driver perception-brake times. *Transp Hum Factors*. 2000;2(3):195-216.

Hare CT, Hemion RH. *Headlamp beam usage on U.S. highways*. Report no. AR-666. San Antonio, TX: Southwest Research Institute; 1968.

Insurance Institute for Highway Safety. (2016a). [Unpublished analyses of data from the National Household Travel Survey.] Arlington, VA: Author.

Insurance Institute for Highway Safety. (2016b). [Unpublished analyses of data from the Fatality Analysis Reporting System.] Arlington, VA: Author.

Insurance Institute for Highway Safety. (2016c). [Unpublished analyses of data from the National Motor Vehicle Crash Causation Survey.] Arlington, VA: Author.

Iragavarapu V, Fitzpatrick K. High-beam usage on low-volume rural roads in Texas. *Transp Res Rec*. 2012;2298:88-95.

Mazzae EN, Baldwin GHS, Andrella A, Smith LA. *Adaptive driving beam headlighting system glare assessment*. Report no. DOT HS 812 174. Washington, DC: National Highway Traffic Safety Administration; 2015.

Mefford ML, Flannagan MJ, Bogard SE. *Real-world use of high-beam headlamps*. Report no. UMTRI-2006-11. Ann Arbor, MI: University of Michigan Transportation Research Institute; 2006.

Reagan IJ, Brumbelow ML. Drivers' detection of roadside targets when driving vehicles with three different headlight systems during high beam activation. *Accid Anal & Prev*; in press.

Reagan IJ, Brumbelow ML, Flannagan MJ, Sullivan J. The effects of rurality, proximity of other traffic, and roadway curvature on high beam headlamp use rates. *Traffic Inj Prev*. in press.

Singh S, Perel M. *Drivers perceptions of headlight glare from oncoming and following vehicles*. Report no. DOT HS 809 669. Washington, DC: U.S. Department of Transportation; 2004.

Sullivan JM, Adachi G, Mefford ML, Flannagan MJ. High-beam headlamp usage on unlighted rural roadways. *Light Res Technol.* 2004;36:59-65.

Tyrell RA, Wood JM, Carberry TP. On-roads measures of pedestrians' estimates of their own nighttime conspicuity. *J Safety Res. 2004;35:483-490.*

Wood JM, Tyrrell RA, Marszalek RP, Lacherez PF, Carberry TP, Chu BS, King MJ. Cyclist visibility at night: perceptions of visibility do not necessarily match reality. *J Australas Coll Road Saf*. 2010;21:56-60.

Table 1
Age range and driving exposure of sample

Characteristic	Percent (N=604)
Age	
18-30	22
31-64	62
65 or older	15
Sex	
Female	48
Male	52
Miles driven per year	
< 10,000	32
10,000-20,000 miles	46
> 20,000 miles	21
Unsure	1
In the past month, how often did you drive when it is dark?	
A few times per month, but not weekly	28
At least once a week, but not daily	56
Every day	16
Unsure	<1
How much of your driving occurs when it is dark?	
Less than a quarter	50
About a quarter	32
About half	15
About three quarters or more	3
Unsure	<1
How often do you drive on city streets?	
Couple times per month or less	8
Once or more a week	23
Every day or most days	69
Unsure	<1
How often do you drive on suburban roads?	
Couple times per month or less	15
Once or more a week	26
Every day or most days	57
Unsure	2
How often do you drive on country roads?	
Couple times per month or less	44
Once or more a week	23
Every day or most days	33
Unsure	1

Table 2
Concerns about seeing and crashing at night

	Percent
More concerned about crashing when it is dark than when it is light	N=604
Yes	49
No	51
Among those more concerned about crashing when it is dark, what are your concerns?	N=294[a]
Seeing animals or deer	41
Lack of visibility due to weather or low lighting	25
Difficulty seeing because of age or vision issues	17
Not seeing dangers, other accidents, pedestrians	13
Other reckless or drunk drivers	13
Getting help when getting into an accident	8
Other	5
Have vision problems that make driving in the dark more difficult than when it is light	N=604
Yes	22
No	78
Among those with vision problems, ever reduce driving in dark	N=135
Yes	56
No	44
Ever reduce amount of driving in dark, unlit conditions out of concerns about visibility issues associated with snow, fog, or rain	N=604
Yes	57
No	43
Drive differently when it is dark compared with when it is light	N=604
Yes	60
No	40
Among those who drive differently in dark, how	N=363[a]
Drive slower	56
Drive cautiously or carefully	40
More aware or observant for animals and accidents	23
Use high beams	4
Drive more defensively	3
Other	1
Unsure	1

[a]Multiple responses allowed; percentages sum to more than 100 percent

Table 3

Self-reported frequency of high beam use in various roadway environments (percent, N=604)

Environment	Always	Most of the time	Sometimes	Rarely	Never	Unsure/don't drive on these roads	Total
City streets with good street lighting	3	1	5	22	68	0	100
City streets with street lighting, such as West Stadium Blvd., Packard Street north of Stadium Blvd., or Eisenhower Parkway near Briarwood Mall	4	2	11	22	60	1	100
City streets with little or no street lighting	8	14	31	21	25	0	100
City streets with little or no street lighting such as Huron Parkway, Oak Valley Drive, or Newport Road	14	17	33	15	15	6	100
Heading out of Ann Arbor on a main suburban road like Nixon Rd, Liberty Rd, or State Street	11	15	35	17	18	5	100
Heading into Ann Arbor on a main suburban road like Nixon Rd, Liberty Rd, or State St	9	11	33	17	27	3	100
Interstate 94 on the Detroit side (east) of Ann Arbor	14	8	28	17	28	6	100
Interstate 94 on the Chicago side (west) of Ann Arbor	16	12	30	16	21	5	100
Winding rural country roads with little or no street lighting and speed limits over 45 mph	56	25	14	1	1	2	100
Straight rural country roads with little or no street lighting and speed limits over 45 mph	52	28	16	1	1	2	100

Table 4
High beam use in various conditions (percent)

Condition	All drivers (N=604)	High-density zip codes (N=201)	Medium-density zip codes (N=200)	Low-density zip codes (N=202)
When it rains compared with when it is not raining				
More often	27	31	25	16
Same amount	37	35	36	46
Less often	36	34	39	37
When it is foggy compared with when it is not foggy				
More often	15	17	16	7
Same amount	11	13	9	8
Less often	73	70	75	85
During certain times of year or in certain areas where I know there are a lot of deer				
More often	74	69	85	84
Same amount	21	26	10	14
Less often	5	5	5	3

Table 5
Importance of reasons why other drivers underuse high beams (percent)

Reason	All drivers (N=604)	High-density zip codes (N=201)	Medium-density zip codes (N=200)	Low-density zip codes (N=202)
Some drivers are not aware they have different high beam settings				
Extremely important	10	9	13	11
Very important	8	9	10	5
Important	12	12	11	14
Of minor importance	17	20	9	11
Not important at all	45	41	51	56
Unsure	7	8	6	4
Many drivers believe they see fine with their low beams and do not need high beams				
Extremely important	15	14	21	12
Very important	26	29	21	17
Important	27	25	29	33
Of minor importance	13	13	12	14
Not important at all	16	15	13	20
Unsure	4	4	4	5
Many drivers get tired of switching between high and low beams when they drive on roads where street lights come and go every couple miles				
Extremely important	11	11	15	8
Very important	19	20	19	16
Important	21	21	22	21
Of minor importance	17	16	17	22
Not important at all	28	28	24	32
Unsure	4	4	4	2
Many drivers get tired of switching between high and low beams when they see that cars are driving toward them				
Extremely important	20	22	17	16
Very important	20	19	20	22
Important	17	14	26	20
Of minor importance	15	14	15	15
Not important at all	24	25	19	24
Unsure	4	5	3	2
Many drivers forget to activate high beams for long periods of time				
Extremely important	17	17	21	11
Very important	18	16	21	23
Important	27	26	28	31
Of minor importance	16	17	12	18
Not important at all	18	19	16	15
Unsure	3	4	2	2

Table 6
Knowledge of and attitudes towards high beam assist (also called automatic high beam headlights)

	Percent
Have heard of automatic high beam headlights	N=604
Yes	34
No	66
Among drivers who have heard of them, description of what automatic high beam headlights do	N=205 [a]
Automatically turn on or off when senses absence or presence of other cars	33
Automatically turn on or off when dark or light	31
Automatically turn on or off	21
Automatically turn on or off when needed	17
Other	1
Unsure	5
After being told correct definition, agree or disagree that automatic high beam headlights sound like an important safety feature in cars	N=604
Strongly agree	18
Moderately agree	42
Neutral	8
Moderately disagree	18
Strongly disagree	14
After being told correct definition, agree or disagree that they would like to own a vehicle with automatic high beam headlights	N=604
Strongly agree	15
Moderately agree	28
Neutral	17
Moderately disagree	21
Strongly disagree	19
Among drivers who would not want a car with auto-switching high beams, why not	N=240 [a]
Prefer to control my own car/can do it on my own	34
It will not perform correctly/malfunction or blind people	25
Drivers should do it themselves and not be lazy	12
Part/sensor break	10
Don’t think it is needed	8
Need to know more about feature	8
Added cost to car	7
Don’t use high beams	1
Other	10
Unsure	2

[a]Multiple responses allowed; percentages sum to more than 100 percent

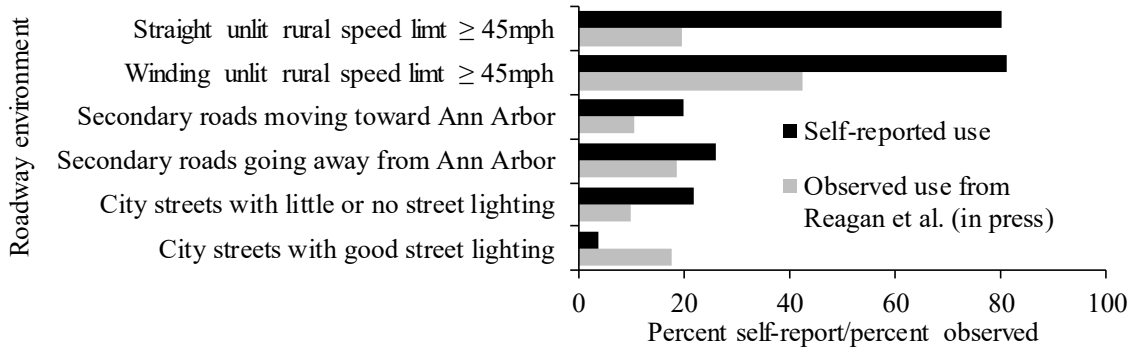

Figure 1. Percent of drivers who always/most of the time use high beam headlights compared with observed use of high beam headlights.

APPENDIX

Table A1
Drivers' top four reasons for rarely or never using high beams by roadway environment

	Percent
City streets with street lighting, such as West Stadium Blvd., Packard Street north of Stadium Blvd., or Eisenhower Parkway near Briarwood Mall	N=492
Adequate lighting/good visibility	82
Don't need them: no further explanation	10
City/residential area, do not need because people are there and speeds are slower	7
Traffic: always cars around	6
City streets with little or no street lighting such as Huron Parkway, Oak Valley Drive, or Newport Road	N=181
Adequate lighting/good visibility	36
Don't need them: no further explanation	36
City/residential area, do not need because people are there and speeds are slower	22
Don't need: I know the area well	12
Heading out of Ann Arbor on a main suburban road like Nixon Rd, Liberty Rd, or State Street	N=208
Adequate lighting/ good visibility	58
Don't need them	26
City/residential area, do not need because people are there and speeds are slower	15
Don't need: I know the area well	7
Heading into Ann Arbor on a main suburban road like Nixon Rd, Liberty Rd, or State St	N=268
Adequate lighting/ good visibility	60
Don't need them: no further explanation	26
City/Residential area: Don't need there due to people, slower speeds	14
Don't need: I know the area well	13
Interstate 94 on the Detroit (east) side of Ann Arbor	N=271
Adequate lighting/good visibility	42
Don't need them: no further explanation	26
Enough traffic on highway/interstate	20
Don't use or avoid using on highway/interstate	15
Interstate 94 on the Chicago (west) side of Ann Arbor	N=223
Don't need them: no further explanation	30
Adequate lighting/good visibility	29
Enough traffic on highway/interstate	24
Don't use or avoid using on highway/interstate	17
Straight rural country roads with little or no street lighting and speed limits over 45 mph	N=16
Don't use high beams / avoid using	32
Don't need them: no further explanation	31
Other specified reasons	15
Don't drive on roads that often at night	13

Note: Multiple responses allowed

Table A2

Importance of visibility distance and glare when considering high beam use (percent, N=604)

When deciding to use your high beams, how important are the following factors?	Extremely important	Very important	Important	Of minor importance	Not important at all	Unsure	Total
The extra viewing distance I get from high beams compared with low beams	50	32	12	3	1	1	100
Avoiding causing glare for drivers directly in front of me.	50	32	13	3	2	0	100
Avoiding causing glare for drivers driving toward me from the opposite direction	53	29	12	2	3	0	100