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Perceived Risk of Loss of Driving & Alternative Mobility Planning

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Summary

Driving is the primary mode of transportation for the vast majority of adults in the United States and losing the ability to drive is a major threat to older adults' independence, especially those living in low-density areas. Losing the ability to drive is a risk often less considered when thinking about older age. However, it may have a major impact on people's lives and may incorporate additional risks such as social isolation or the need to move. This research aims at understanding people's perceptions of risks related to a future loss of driving and their attitudes and plans around alternative mobility options such as dependence on spouses, friends or public transportation, but also the use of ride shares or self-driving cars. This research also aims at investigating potential interventions to influence people's perceptions and attitudes, which in turn may support them in planning for older age.

1. Theoretical Background

Risk is the probability and magnitude of harm, such as the probability and consequences of getting into an accident when driving a car. However, peoples' judgments of risks often deviate from actual probabilities of harm; as a consequence, we need to differentiate between *perceived risks* and *objective risks*. Objective risks are measurable and require analytical processing of facts such as the number of fatalities by miles driven per year. For example, older drivers over the age of 65 have higher fatality rates than middle-aged drivers between 35 and 54 (see Figure 1).[1,2] These increased fatality rates in the older population are primarily due to increased vulnerability to injury in a car accident.[3]
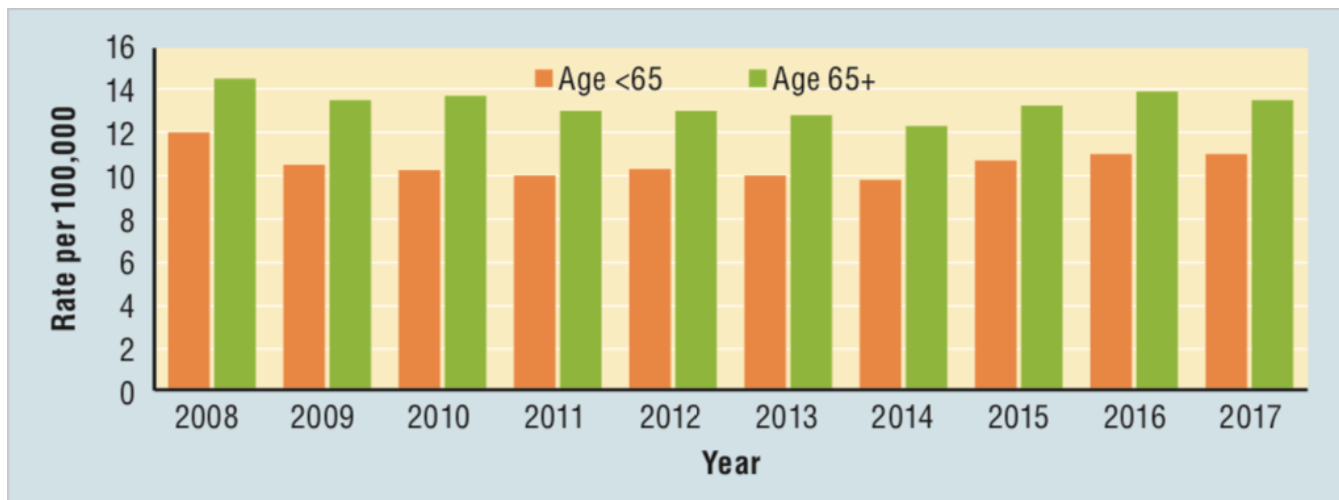
Figure 1: Motor Vehicle Traffic Fatality Rates by Age Group per 100,000 Population, 2008-2017[2]

However, an increase in objective risk for traffic fatalities in the older population does not necessarily result in increased perceived risks of driving in this population. In general, risk perception and risk behavior are negatively correlated: the higher one perceives the risk of a behavior the less likely the person will engage in that behavior.[4,5] However, multiple variables can predict risk behavior. A study with older drivers showed

that lower self-rated health and older age predicted risk avoidance behavior on the road (e.g., driving at night, in wet conditions or on unfamiliar roads). Self-reported risk avoidance on the road was also predicted by lower perceived control over one's driving safety among men and by lower subjective driving abilities among women. However, being the only driver in the house or long distances to services (e.g., medical facilities, stores) predicted less risk avoidance when controlling for all other factors.[6] This is in line with research showing that the decision to voluntarily stop driving often depends on a variety of factors and occurs in stages of self-imposed restrictions. Often, older adults gradually reduce their driving because there is less need (due to retirement) and/or because they feel less comfortable in challenging situations (e.g., driving at night or during wet conditions).[7] While many older adults report a gradual change in driving behavior to compensate for physical limitations and to decrease risk on the road, others experience a sudden event (e.g., stroke, accident) that results in the immediate need to stop driving.[7–9] Those who gradually reduce their driving, have the opportunity to adapt to changes in their mobility options and find alternatives. However, those who suddenly and unexpectedly find themselves unable to drive, will depend on others and risk social isolation.

1.2. Risk Perception & Driving Cessation

Most older adults have no intensions to give up driving as long as they feel capable of it. As a result, they presumably underestimate their personal risk of losing the ability to drive. Active car use, feeling safe as a driver, and not having illnesses that impair driving ability are some of the main reasons why older people keep renewing their license.[10] However, people tend to underestimate personal risks. While people make quite accurate judgments about societal traffic risks,[11] many do not feel that these risks apply to them personally. Most people underestimate personal traffic risks (e.g., due to perceived control) and believe that they are safer drivers than the average driver.[12] In addition, most people think they are less vulnerable than other people and that others are more likely to be affected by harm, which has been termed *unrealistic optimism* or *optimism bias*.[13] In a study with drivers over the age of 65 who had to undergo driving evaluation, 65% believed they would do better in a driving test than their peers. However, those who considered themselves to be better drivers were actually more likely to be judged as unsafe drivers by independent observers.[14] Unrealistic optimism is associated with feelings of control over the driving situation. People acquire feelings of control over driving situations, in part, through driving experience regardless of whether they have experienced accidents or not.[15]

Perceived control of the environment is a basic human need that is associated with well-being. Losing control over one's personal mobility when giving up driving, may result in depressive symptoms as well as declines in physical and cognitive functioning. Giving up driving is also associated with an increased risk of being admitted to a long-term care facility as well as an increased risk of mortality. Other consequences of driving cessation include being dependent on others, being socially isolated, having to move or increased

costs for alternative mobility options may add to or even explain these health declines. Thus, the underestimation of the personal risk of having to give up driving may result in a lack of planning for alternative mobility options and a variety of additional risks. Research has shown that pre-planning driving cessation increases older people's quality of life.[16]

1.3. Acceptance and Availability of Alternative Mobility Options

Research suggests that people do not plan sufficiently for transportation needs and a potential loss of their ability to drive in the future. In one study, older drivers who indicated that driving will become a problem within the next 5 years, 39% had given alternative options some thoughts, but 18% had given this no thought at all. Of those who had given it some thought, 45% thought of arrangements for rides, 36% of moving somewhere with better public transportation and 33% of moving to senior housing with transportation.[17] However, in another study, older adults in the US who were asked about the importance of certain aspects of a neighborhood they wanted to live in, rated public transportation among the least important aspects.[10] These studies suggest that people may not think much about alternative mobility options until they realize that they may have to give up driving within the next few years.

Especially in rural areas of the United States, there is a lack of public transportation. In a recent study of older adults across the United States, participants indicated to live, on average, 3.12 miles from the next grocery store (3.01 miles in urban, 3.04 miles in suburban and 3.49 miles in rural areas). However, only 50% of the participants in this study indicated to have a public transportation stop within a mile of their home (15% in rural, 49% in suburban and 78% in urban areas).[18] Therefore, people in rural, but also suburban areas who give up driving often become dependent on others for rides or decide not to take certain trips anymore.[19] Public transportation or getting a ride from someone is not the only alternative mobility options. Ridesharing, such as using Uber or Lyft, has become an attractive alternative to driving, especially in urban areas.

More advanced technologies such as self-driving cars are on the way and will affect the future of transportation. While especially older adults seem to be skeptical about new technologies such as self-driving cars, many will depend on alternative forms of mobility when they lose the ability to drive themselves. In a recent study, age was negatively associated with perceptions of self-driving cars, interest in using them, and behavioral intentions to use them when they become available.[20] Having to give up control, as well as lack of familiarity, poor understanding of how the technology works, lack of trust and unresolved ethical issues may explain some of the skepticism associated with self-driving cars.[21,22] In fact, people's attitudes and perceptions might be more of a barrier to a successful introduction of self-driving cars than technical challenges.[23] However, having some experience with automated vehicle technologies already on the market has been associated with more positive attitudes about self-driving cars.[24,25]

1.4. This Study

Little is known about whether people consider the risk of losing their driving ability and consequences of it when planning for older age and retirement. This research aimed at understanding people's perceptions of risks regarding a future loss of driving and their plans for alternative mobility. It was hypothesized that people underestimate the risk of loss of driving and do not consider it sufficiently when planning for older age. It was further assumed that people are also not aware of additional negative consequences of losing driving such as social isolation or the need to move. In addition, results will extend knowledge on underlying factors around the perception and acceptance of alternative and new forms of mobility. And finally, a major practical implication will be the development of tools to communicate the risk of losing driving to support planning for older age.

2. Methods

2.2. Participants

In order to investigate drivers' subjective risk perception around giving up driving and their plans for alternative mobility options, we are conducting a large-scale nationwide online survey. This report is based on pretest data with 54 participants. Participants were recruited and reimbursed through NORC/AmeriSpeak, which maintains a nationally representative sample. Participants who have never had a license were excluded from the analysis. This resulted in a sample of 53 participants ages 23 to 81 (M = 53.79, SD = 16.05). Of those, 45.3% identified as male and 52.8% as female, 84.9% described themselves as white, 3.8% as Black or African American, 3.8% as Asian, and 7.5% as Hispanic, Latinx or Spanish origin. Of all included participants, 51 were active and regular drivers. In addition to general demographics, questions in the survey also covered people's health status (from 1 = excellent to 5 = poor)

2.3. Measures

2.3.1. Current and Future Mobility

Participants were asked how satisfied they were with their ability to go where they want to go, when they want to go there (from 1 = very dissatisfied to 5 = very satisfied). They also indicated their primary mode of transportation they are using on a daily or day-to-day basis and their expected primary mode of transportation 10 years from now by choosing from a list of several options (e.g., drive myself; friend, family member or caregiver drives me; taxi; car pool; ride sharing; bus or trolley; subway; walk; bicycle). More in-depth questions were asked about the distance (available a quarter mile from home; walking distance from 1 = less than 5 minutes to 4 = 15 minutes or more and 5 = I cannot walk the distance) to and satisfaction with public transportation (agreement with various statements about public transportation; e.g., public transportation routes do not go where I want to go; from 1 = strongly disagree to 5 = strongly agree) and reasons for using or not using ride sharing services (using: e.g., convenience, use if I am going out

socially, don't like driving, use when I don't want to worry about finding parking somewhere; not using: e.g., concerns over whether driver is safe, good or trustworthy, concerns over my personal safety, cannot physically access vehicle).

2.3.2. Driving Cessation

Participants were asked about their thoughts, plans and expectations regarding driving cessation. Active drivers stated their agreement on several statements regarding their concern about losing the ability to drive. These statements were "Driving is important to me", "I worry about losing the ability to drive when I get older," and "Not being able to drive when I get older would create financial challenges for me," (from 1 = strongly disagree to 5 = strongly agree). Additional statements were specifically about what would happen if they had to give up or stop driving. These statements were "I would depend more on family or friends to take me where I needed to go," "I would worry about having to rely on others to take me where I needed to go," "I would look forward to self-driving cars to take me around," "I would take public transportation more often," "I would use ride sharing services more often (e.g., Uber, Lyft)" (from 1 = strongly disagree to 5 = strongly agree). Former drivers received similar sets of statements, but adapted to their current situation (e.g., driving was important to me, not being able to drive is a burden for me, I depend more on family and friends to take me where I need to go). They indicated whether anyone in their household who has a vehicle and who is currently a licensed driver may be available to give them rides.

All participants stated their opinion on when, on average, people usually give up or stop driving (from 1 = in their 20s to 8 = in their 90s and 9 = never) and at what age people should give up or stop driving. Active drivers were additionally asked at what age they expect to give up or stop driving (options started at their current age group) and whether certain events (e.g., feeling uncomfortable or insecure as a driver, feeling like they are posing a risk or a threat to others, a health incident or major health change) would make them give up or stop driving. Further, active drivers indicated how much they would be concerned about certain consequences if they had to give up or stop driving permanently such as increased costs of transportation, additional time needed to go anywhere or do anything, fewer spontaneous trips, decreased ability to get outside and socialize, dependence on others for transportation or rides or having to move (from 1 = not at all, to 4 = a lot). Former drivers were asked to what extent they had experienced these issues after they gave up or stopped driving.

2.3.3. Risk Behavior

Participants' risk behavior was measured with several items. Participants indicated how often, in a typical week, they are willing to engage in challenging driving situations (e.g., drive at night, drive on highways, merge on to another road, drive in poor weather; from 1 = absolutely never to 4 = does not usually affect my willingness to drive). Further, drivers were asked how risky or cautious they are as a driver (from 1 =

very cautious to 5 = very risky) and how willing they are to take risks in general (from 0 = not at all willing to 10 = very willing). All participants were also asked how risky on average they considere driving generally, drivers over the age of 75, and drivers under the age of 25 (from 1 = not at all risky to 5 = extremely risky).

3. Results

In general, participants were quite satisfied with their ability to go where they want to go, when they want to go there (M = 3.96, SD = 1.21). Most participants indicated that their primary mode of transportation is driving (90%). Of those, 80% thought that driving will also be their primary mode in 10 years from now, 11.1% thought that someone else (e.g., friend, family member or caregiver) will drive them, 2.2% plan to use car sharing (e.g., ZipCar, Enterprise) as their primary mode of transportation, 2.2% plan to use the bus or trolley and 4.4% plan to use a self-driving vehicle 10 years from now.

Almost half of participants (48.1%) indicated that public transportation is available in their community, but they have never used it. While almost half of the participants (44.4%) had a public transportation stop within a quarter mile of where they lived, only 7.4% indicated to currently use public transportation. Similarly, 48.3% indicated that ride sharing (e.g., Uber, Lyft) is available in their community, but they have never used it, while 18.5% indicated to currently use it (14.8% did not know or were unsure). Car sharing was used by 3.7% of participants, 22.2% indicated it is available, but they have never used it and 42.6% did not know or were unsure.

Of those who are currently using public transportation, used in the past or have it available in their community, 47.6% agree or strongly agree that the routes do not go where they want to go, 47.8% agree or strongly agree that public transportation is not comfortable for them and 78.6% agree or strongly agree that it takes too long for them to get where they need to by public transportation. However, a large number of participants neither agreed nor disagreed on most questions around public transportation, which may suggest that they have not put much thought into this form of transportation. Those who use ride sharing services, mostly use it when they are on vacation without a car (70%), to avoid driving under the influence (60%), when they do not want to worry about finding parking (50%) or because it is convenient (50%). Most participants who have never used ride sharing services, indicated that they do not have any need for the service (76%).

Of current active drivers (N = 52), the majority (53.8%) thought that people usually give up or stop driving in their 80s (see Table 1). When asked when people *should* give up driving, however participants' opinions shifted to slightly younger ages: 42.3% thought people should give up driving in their 80s and 25% thought people should give up driving in their 70s. A large number of participants (19.2%) were unsure about when people should give up driving or when they expect to give up driving themselves. Interestingly, while 11.5% thought that most people never give up driving and 9.6% thought they themselves will never give up

driving, much fewer thought that people *should* never give up driving (3.8%). In other words, other people on the road should eventually give up driving, but when it comes to one's own behavior and perception of peer behavior, never giving up driving is an option.

Table 1: Opinions at what age on average people usually give up driving, when they should give up driving and when participants expected to give up driving.

	When people <u>usually</u> give up or stop driving	When people <u>should</u> give up or stop driving	At what age do you <u>expect</u> to stop or give up driving?
60s		1.9% (*N* = 1)	3.8% (*N* = 2)
70s	19.2% (*N* = 10)	25% (*N* = 13)	15.4% (*N* = 8)
80s	53.8% (*N* = 28)	42.3% (*N* = 22)	46.2% (*N* = 24)
90s	9.6% (*N* = 5)	7.7% (*N* = 4)	3.8% (*N* = 2)
Never	11.5% (*N* = 6)	3.8% (*N* = 2)	9.6% (*N* = 5)
Don't know / unsure	5.8% (*N* = 3)	19.2% (*N* = 10)	21.2% (*N* = 11)

Table 2 summarizes reasons that would make people give up or stop driving. The majority of participants would give up driving if they posed a risk to others or felt insecure. Objective medical advice or data are also among the top reasons to give up driving. A health incident or major health change would be a reason for about 70% of participants, while only about half of the participants would follow the advice of a family member. Accidents were among the weakest reasons to give up driving.

Table 2: Which, if any, of the following would make you give up or stop driving?

Reasons	% Yes
Feeling like I am posing a risk or threat to others	86.5%
Feeling uncomfortable or insecure as a driver	78.8%
Failed vision or another test at license renewal	78.8%
My doctor told me I should no longer drive	76.9%
Health incident or major health change	69.2%
A family member told me I should no longer drive	50.0%
A major accident	40.4%
A minor accident	15.4%
Other	0.0%

When asked about people's concerns if they had to give up or stop driving permanently when they are older, most participants worried a lot about fewer spontaneous trips, dependence on others for transportation and additional time needed to go anywhere (see Figure 2). People had less concerns about increased costs, fewer opportunities to socialize and having to move. This may suggest that people perceive driving cessation more of an inconvenience than something that would really change their lives. As a result, people may underestimate some of the risks (e.g., social isolation, depression, financial issues, having to move) associated with having to give up driving. Some participants mentioned additional

concerns they had if they had to give up or stop driving permanently when they are older. These included emergency evacuation from their home, losing independence and reduction in personal freedom.
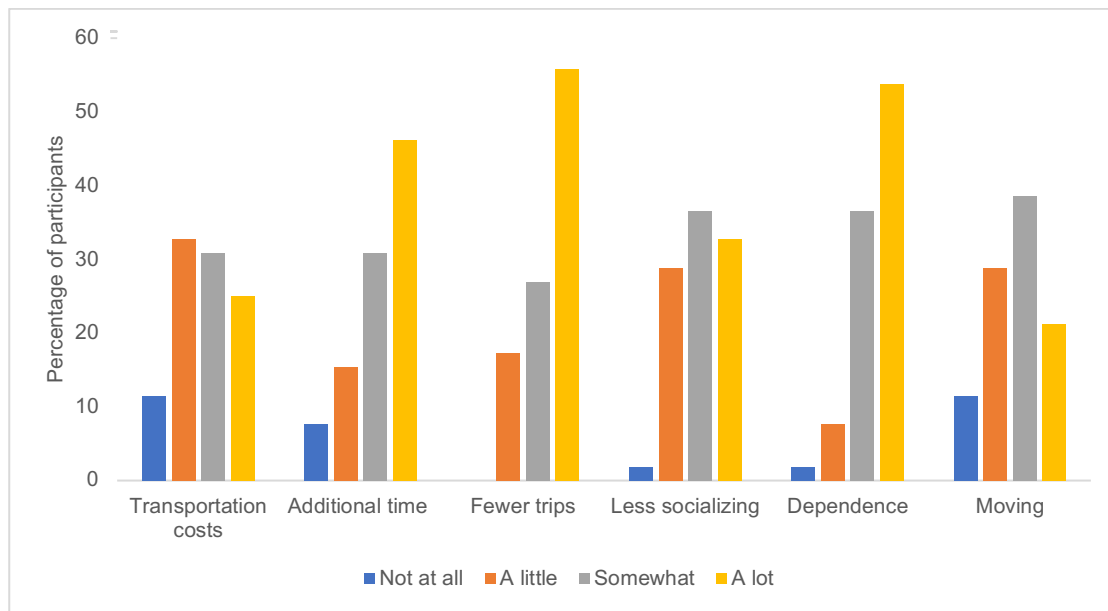
Figure 2: Concerns about having to give up driving.

As demonstrated in Figure 3, most participants (88.5%) agreed or strongly agreed that driving is important to them, but not all of them worried about losing their ability to drive when they get older (63.5% agreed or strongly agreed). People were somewhat unsure whether not being able to drive would create financial challenges (23.1% disagreed or strongly disagreed, 40.5% did neither agree nor disagree and 34.6% agreed), but most agreed or strongly agree that they would depend more on family and friends to take them where they needed to go (76.9%) and would worry about having to rely on others (86.5% agreed or strongly agreed). People's opinions about alternative mobility options were rather spread out. About two thirds looked forward to self-driving cars to take them around (64.2% agreed or strongly agreed), almost half (48.1% agreed or strongly agreed) would use ride sharing services, but less than a quarter (23% agreed or strongly agreed) would take public transportation more often.
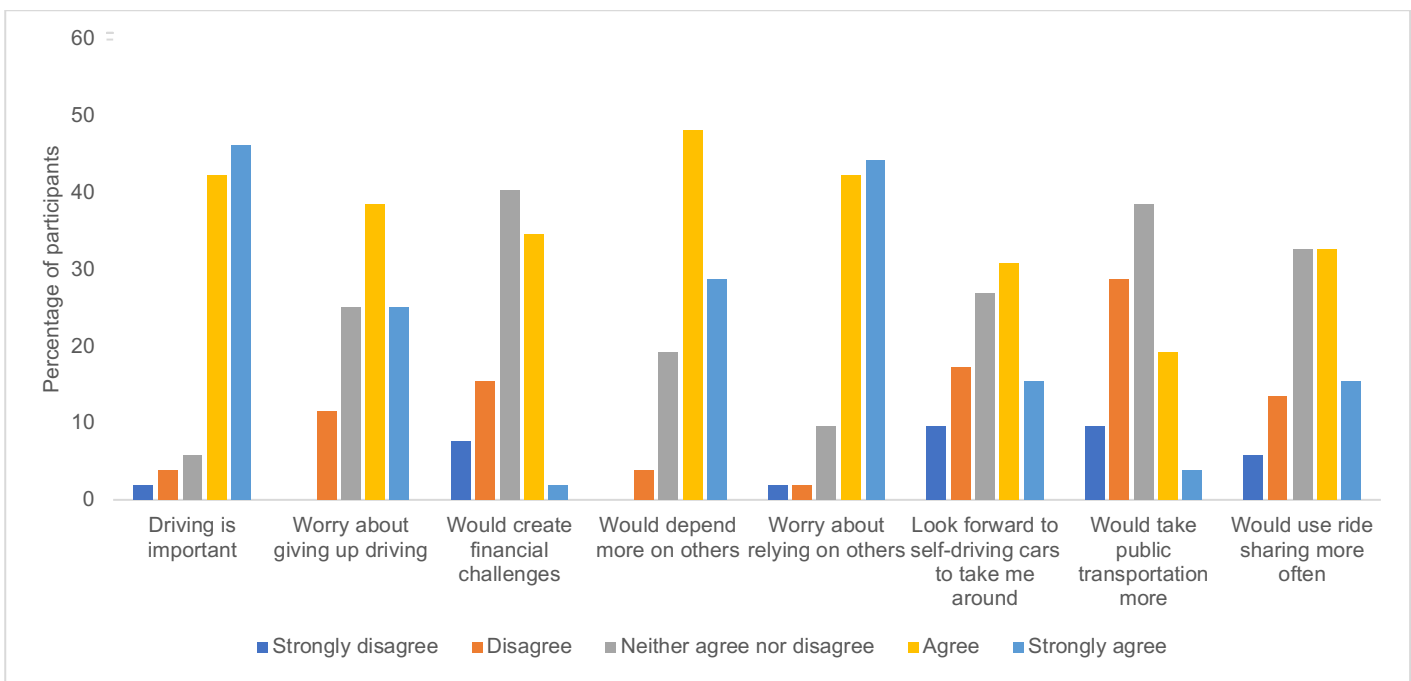
Figure 3: Opinions about driving and consequences of having to give up driving.

Based on reliability analyses, a measure for concerns about having to give up driving (alpha = .79) was created. Most participants were somewhat concerned about having to give up driving when they get older (M = 3.06, SD = .61). Additionally, a measure was created that summed up the amount of reasons that would convince people to give up driving.

Correlational analyses showed a positive association between people's concerns about having to give up driving when they get older and the number of reasons that would convince them to stop driving (r = .46). This may indicate that these measures capture people who have put some thought into the issue already. Age, however, was neither associated with concerns nor the number of reasons that would convince them to stop driving. Age was negatively associated with the perceived riskiness of drivers over the age of 75 (r = -.33) and positively associated with participants' opinions on the average age people should give up or stop driving (r = .50). Willingness to take risks or riskiness as a driver were not associated with people's concerns about giving up driving or their perceptions around when people should give up driving or when they expected to give up driving.

4. Discussion

The potential lack in transportation is a major risk in older age. Not having transportation available at any time when one loses the ability to drive, may incorporate additional risks such as depression, social isolation, the need to move or unexpected expenses for ride shares, taxis or public transportation. Additionally, as the future of transportation is changing, it is essential to understand how people think about various transportation alternatives. The results of this study are based on pretest data, but nevertheless offer some insights into people's thoughts about giving up driving and transportation alternatives.

The data offers support for the hypothesis that people underestimate the risk of loss of driving. While driving is the primary mode of transportation for 90% of participants in the study and important to 89% of participants, much less (64%) worried about losing their ability to drive. If asked about having to give up driving in the future, participants were concerned about their time, the number of trips they can take and being depended on others. They were less concerned about certain risks of giving up driving such as costs for alternative transportation, social isolation and having to move. People not only seem to think little about certain risks associated with giving up driving, but many also expect to never give up driving or to still drive in their 80s or 90s. While this might be true for some, unexpected health changes may force people to give up driving earlier than expected. Health changes or major accidents, however, were not the top reasons for people for giving up driving. Some of the top reasons for giving up driving were rather subjective and open to individual interpretation (e.g., at what point do I pose a risk to others? What does it mean to feel insecure?), which may postpone the decision, but also offers the opportunity to prepare for alternative mobility options. Many people would also follow advice to give up driving from a medical authority or license renewal office, but less from family members. This puts doctors and license renewal staff in an important position and they should be able to discuss the issue as well as encourage aging drivers to plan for alternative options.

When it comes to alternative mobility options, most participants expected to depend on others for rides. While public transportation seems to be the least attractive form of alternative mobility for people, many indicated that they would use ride sharing services or look forward to self-driving cars if they had to give up driving in older age. However, none of the participants selected ride sharing as their expected primary mode of transportation 10 years from now. Public transportation may be underutilized by people as many did not have strong opinions on why they were not using it, but for others public transportation seems to be inconvenient even when it was available. Ride sharing seems to be used in special occasions only and not as a form of transportation for daily activities, which may be due to costs. However, while some people seem to embrace the idea of self-driving cars as a potential form of alternative mobility in the future, they may underestimate the costs associated with it.

Older age was associated with lower risk perceptions around driving over the age of 75 and also with a higher average age of when people should give up driving. This indicates that people's perspective around driving cessation change once they actually reach the age in which giving up driving might become an issue. While age and health status do not seem to influence people's concerns around driving cessation, concerns were associated with the amount of reasons that would convince people to stop driving. As a result, having to give up driving seems to come unexpected for most people and they may underestimate both its likelihood and risks associated with it.

5. Recommendations

The data underscores that driving is the primary mode of transportation for the vast majority of adults in the United States. For many, driving is more than getting from Point A to Point B. Giving up driving is dreaded, but not necessarily because of financial and health risks that have been demonstrated by research. Having a car provides a sense of independence and autonomy for drivers of all ages – and, according to our results, losing driving means first and foremost being dependent on others, needing more time to do things and being less able to do spontaneous trips. The results from this study suggest that people underestimate some of the risks and consequences of losing the ability to drive. Additional costs for alternative mobility options that let people remain independent (e.g., ride sharing services) or the option of having to move should be considered and planned for to prevent depression and other health risks stemming from reduced activity levels and social isolation.

It is especially important to make people aware of a potential lack in transportation being a major risk in old age. People need to be encouraged to plan for this possibility and consider options that let them stay independent in order to mitigate risks such as social isolation and depression. For example, communities should consider ways to make public transportation a more attractive and convenient option for people, and potentially include additional services in areas that are not reached by ride sharing. Because this research also demonstrated that most people seem reluctant to take advice about giving up driving from friends and family members, medical providers, but also staff at license renewal office should take a lead in creating awareness and educating people about risks of losing driving and ways to mitigate these risks.

It is expected that additional data analyses will reveal more insights about factors that contribute to people's underestimation of risks and their perception and acceptance of alternative forms of mobility. The full dataset for this study is expected to include around 1,000 participants across the United States. Future research should investigate effective ways to communicate risks around losing driving and how to support planning around this issue. By finding ways to increase people's awareness of the compound risks of losing driving through effective risk communication, these risks could potentially be mitigated.

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