Older Drivers' Self-Awareness of Functional Declines Influences Adoption of Compensatory Driving Behaviors

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ABSTRACT
Age-related declines may occur in various functions that are critical for safe driving. Compensatory driving strategies such as limiting driving exposure or avoiding challenging traffic conditions can be effective for older drivers to mitigate potential impacts from age-related functional declines on crash risks. Using a structured interview and a cognitive task, the present study aimed to provide insights on how older drivers' self-awareness of declines in cognitive and driving functions influences their adoption of compensatory strategies during driving. The findings of this study suggest: 1) older drivers may not have precise knowledge regarding their age-related functional declines and associated compensatory driving strategies, 2) older drivers self-regulate their driving to cope with increased risks, and 3) self-awareness of age-related functional declines in specific driving skills and performance, rather than the self-awareness of cognitive declines in daily life or during driving, strongly influences the adoption of compensatory driving behaviors among older drivers.

INTRODUCTION

As population aging becomes a global trend, it is inevitable for many countries to encounter rapid growth of older driver population. In the United States, the number of older drivers (i.e., drivers aged 65 or older) is expected to reach 57 million by 2030 (*1*). By that year, older drivers will represent about 25 % of all licensed drivers in the U.S. (*2*). Keeping driving ability is essential for older adults to maintain their independency and well-being. However, research has suggested older drivers suffer from higher fatal crash risks than most other age groups (*3,4*), with one reason being normative age-related functional declines that lead to unsafe driving behavior. Therefore, developing methods to help older drivers to cope effectively with the age-related functional declines is important for their safe driving.

One method is, in addition to the widely used method of driver screening and training, promoting compensatory driving strategies through self-regulation. Promoting compensatory driving could be an effective alternative approach to improve road safety while maintaining older drivers' mobility. Even at advancing age, an older adult may continue to drive without a fatal incident, despite age-related functional declines if he/she strategically adopt appropriate compensatory driving behaviors. Many older drivers are found to self-regulate driving behaviors to accommodate their functional impairments (*5,6,7*). For instance, they travel fewer miles (*8*), drive slowly (*9*), keep a longer headway distance, and avoid challenging driving situations such as driving in heavy traffic (*10*). Drivers may regulate their driving strategies at strategic, tactical, and operational levels (*11*). In addition, older drivers have also been found to adapt response criteria according to traffic situations (*12*).

Despite that many older drivers regulate their driving behaviors, large individual differences exist in the practice of this self-regulation (*13*). The large individual differences may suggest some older drivers who have functional impairments might not be adopting compensatory strategies at an appropriate level, or some may not even be self-regulating at all. One important factor determining an individual driver's adoption of compensatory driving behavior would be the driver's confidence in driving abilities. Prior research has found that compensatory strategies among older drivers rely more heavily on drivers' self-perception of own abilities rather than the actual level of driving competency (*13,14*). In particular, self-perceived driving abilities and mobility functioning, as well as one's own feelings of comfort and safety during driving were significantly associated with an older driver's self-regulation in driving, whereas the level of cognitive functioning as assessed using standard tests did not predict self-regulation in driving (*13*). Similarly, Devlin & McGillivray (*14*) found that self-regulation in among older drivers was more related to their self-confidence in the activity than to their actual functioning.

Given the importance of self-awareness of functioning in the adoption of compensatory driving strategies among older drivers, facilitating an accuracy of self-awareness of one's own age-related functional declines is critical. However, older drivers may face particular challenges in the development of this accurate self-awareness due to cognitive declines. For instance, older drivers, especially those who exhibit attentional and memory functions, might not be able to notice when they make errors during driving, or they may not remember their errors even upon noticing them. Furthermore, older drivers may be more likely to over-estimate their driving competency when they consider their decades of driving experience.

The current study aims to explore the potential links between self-awareness of age-related declines in the cognitive functions that are critical for safe driving and compensatory driving behaviors utilized by the older drivers. This exploratory study was a part of a larger project examining the relations of attentional functions and crash risks of older drivers. The complete study included a variety of cognitive and driving measures such as computerized attentional tests, simulated driving, questionnaires, and an interview. This paper reports the findings from the interview and an attentional task. During the interview, older drivers reported their awareness of own functional declines and changes in their driving behaviors that they made (if any) in the recent past. It was hypothesized that the level of self-awareness of declines in cognitive and driving capabilities was related to the adoption of compensatory driving behaviors, which led to reducing crash risks.

METHODS

Participants

A total of 82 older adults were recruited from local communities in a capital city of a southeastern state of the U.S. Participants' ages ranged from 65 to 92 years ($M = 73.16$, $SD = 5.20$; the majority of participants were between 65 and 85 years old, except one was 87 and another 92 years old). All participants had a valid government-issued driver's license at the time of participant, had been driving on a regular basis, and had a normal or corrected-to-normal vision. All participants reported no history of severe vision, hearing, or memory problems or any other major health issues, although no official records were acquired to verify their medical conditions. Most participants reported that they drove almost every day and the average miles driven during the past year was approximately 10,000 miles. Each participant also reported the number of traffic tickets, warnings, and crashes he/she had in the past five years. Table 1 illustrates demographics and driving history of the participants.

Stimuli & Measures

Structured Interview

A structured interview consisting of two parts was administered to assess participants' self-awareness of functional declines and compensatory driving behaviors.

Self-awareness of Functional Declines The first part of an interview examined older drivers' self-awareness of functional declines. It consisted of three sub-sections: *self-awareness of declines* in 1) *Everyday cognition*, which assesses the awareness of one's own cognitive declines in everyday life, 2) *Driving cognition*, which assesses the awareness of one's own cognitive declines in the context of driving, and 3) *Driving task*, which measures the awareness of declines in one's own driving competency (e.g., to check traffic signs, to enter or exit a roundabout, making a U-turn, etc.).

Self-awareness of declines in everyday and driving cognition was assessed in three attentional functions as defined in the attention networks model (*15*). The attentional function has been suggested as a strong predictor of drivers' crash risks and driving errors (*9,16,17,18*). The attention networks model is a neurocognitive model that describes attention as a multifaceted construct, which includes three distinct functions of the alerting, orienting, and executive attention (*15,19*). The alerting is a function to achieve and maintain the high alert and vigilance state. The orienting function is for switching attention toward a particular sensory input to select task-relevant information. Lastly, the executive function refers to an ability to resolve conflicts in the presence of competing information (*19*). For each of the alerting, orienting, and executive attentional functions, participants were asked during the interview to give a rating on awareness of functional declines in everyday life as well as in the context of driving. The experimenter provided a definition and examples of everyday tasks that would reflect each of the attentional functions. For example, the alerting function would be demanded while reading a book or boiling water, or when going to a pool with grandkids, continuously scanning the water for prolonged periods of time looking out for them. The alerting function would also involve increased readiness such as when hearing emergency sirens, one should be alerted and prepared to respond to the impending situation. Participants rated to what extend they have noticed that daily activities requiring this particular function are becoming more difficult or challenging in daily living within the recent 5 - 10 years. A relatively broad time frame of the past 5 to 10 years was used to capture any changes that participants might have encountered at their early old ages. A 5-point Likert scale, with 1- being strongly disagree or definitely no changes and 5- being strongly agree or definitely noticed changes, was used for rating. Then, some examples describing how each function is involved in driving were also provided to help participants to understand the role of each attentional function within the context of driving. For example, participants were told that alerting function would be demanded during a long drive or to increase readiness for a deer crossing after seeing a sign indicating a deer crossing area. Then, participants were asked to indicate if the function had become more difficult or challenging during driving on the same 5-point Likert scale.

The interview also included a list of driving tasks in which older drivers may have noticed declines in performance (i.e., *self-awareness of functional declines in driving task)*. The driving tasks included in the interview were adopted from previous older driver safety research (*7*), including: 1) to read or check road signs or traffic signals, 2) to know when you have the right-of-way to proceed at an intersection (through or turn), 3) to judge gaps in traffic, 4) to detect other vehicles or pedestrians in the periphery, 5) to keep up with the flow of traffic on high speed roads), 6) to judge what other drivers are going to do in traffic to anticipate potential hazards, 7) to pay attention to everything at the same time, 8) to merge at a yield sign, 9) to enter or exit a roundabout, 10) to change lanes on a multilane roadway, 11) to make a unprotected left turn at an intersection (e.g., stop-sign, flash signal, etc.), 12) to make a right turn in a busy area where lots of other road users such as pedestrians and cyclists are around, 13) to pay attention to signal light changes, 14) to ignore distracting roadside scenes, 15) to multi-task during driving (e.g., eating or talking), 16) to check a rear-view or side mirrors, 17) to make a U-turn, and 18) to back up. All responses were recorded on a 5-point scale, but qualitative answers and comments were also collected to have a complete understanding of one's awareness of his/her own cognitive functioning. At the end, an open-ended question asked if there is any other traffic situations or driving tasks beyond the provided list that a participant found it became more difficult or challenging.

Compensatory Driving Behavior The second part of an interview was designed to examine if older drivers have made any changes in their driving behaviors as compensatory strategies as they age. First, during an open-ended question, participants were asked to report if they have changed their driving habits and behaviors in any ways in the past 5 to 10 years. After participants reported freely, then a list of potential compensatory driving strategies was provided, and participants were asked to indicate whether they had adopted each behavioral change of the provided list. The list of potential compensatory driving strategies was adopted from Staplin et al. (*7*) and the NHTSA guideline (*20*). In particular, the behaviors included in the NHTSA guideline are recommended to older drivers, specifically those who have the symptoms of decreased attention and reaction time. The compensatory driving behaviors included in the current study are mostly at a strategic level, which refers to a stage of planning of a trip (*11*). The compensatory driving behaviors include: 1) drive fewer miles, 2) make fewer trips per week, 3) drive slower than a speed limit, 4) drive with a passenger (i.e., avoid driving alone), 5) use adaptive equipment (e.g., seat cushion, special mirrors, etc.), 6) use assistive in-vehicle technologies (e.g., collision avoidance technology), 7) leave more room between one's own car and a car at the front to increase following distance, 8) take more time to scan the environments at intersections, 9) scan farther down the road continuously to anticipate future problems and plan actions in advance, and 10) plan the route before leaving. Participants were also asked if they have avoided or become more cautious in various traffic situations including 11) night driving, 12) unfamiliar areas, 13) when driving far from home, 14) high-speed roads, 15) freeways or expressways, 16) high traffic roads, 17) rush hours, 18) when changing lanes or merging, 19) bad weather (e.g., rain, snow, fog, etc.), and 20) unprotected left turns. While responses were recorded as yes (i.e., using the compensatory behavior) or no (i.e., not using the compensatory behavior), participants were also told to elaborate and further explain if they wanted.

Attentional Capability Test

The Attention Network Test (ANT; *21*) was used to measure older drivers' cognitive functioning. The ANT assesses the functional efficiency of three aspects of attentional functions; alerting, orienting, and executive attention (*15,21*). Efficiency in three attentional functions was assessed by differences in performance in trials with various cue and flanker conditions. Figure 1 describes the test procedure and three functional efficiencies (also see Fan et al. [*21*] for details of this task). The ANT was programmed and administered using E-Prime (Version 2.0, Psychology Software Tools, Pittsburgh, PA) on a PC, and was displayed on a monitor with the resolution of 800 x 600 pixels. Participants' accuracy and reaction time on each trial were recorded. Based on the recorded data, the efficiency of the three attentional functions (i.e., alerting, orienting, and executive) was calculated.

Procedure

After informed consent was given, participants received the instruction and practice trials at the beginning of ANT. The practice session consisted of a total of 24 trials. After the practice, two blocks of 96 experimental trials were administered. Each test block took approximately 5 - 7 minutes. Participants were allowed take a short break. Upon the completion of ANT and other computerized tasks (results not included in the current paper), a structured interview was conducted. Before the interview, participants received a description of the numeric scale used in the interview questions (for the script of the interview, see Choi 2016 [*22*]). Participants were asked to provide a numeric value according to the given scale for each non-open-ended question. When participants were unsure about the appropriate numeric value, they were allowed to give their answers in sentences, and an experimenter determined a numeric value that matched the most closely to the answer. An interview protocol was developed and used to train interviewers to maintain consistency across questions and responses. Conversations during the interview were also recorded using a voice recorder allowing an interviewer to confirm any uncertain answer after each interview was completed. The interview took about 10-30 minutes, with the entire experiment approximately 2 hours. Participants were debriefed at the end of the study and were compensated at a rate of $15 per hour. Given that this study was exploratory and for research purpose only, no feedback on driving performance or potential crash risks was not provided to individual drivers.

RESULTS

Cognitive Functioning

Older drivers' cognitive functioning was examined using ANT performance. The overall accuracy was high (*M* = .98, *SD* = .04), without any speed-accuracy trade-off (mean reaction time [RT] = 655.82 ms, *SD* = 86.67; correlation between accuracy and RT $r = .02$, $p = .87$). The attentional efficiency indices were computed based on RT: alerting (*M* = 29.93, *SD* = 33.63), orienting (*M* = 10.92, *SD* = 15.65), and executive (*M* = 122.79, *SD* = 54.84). In general, the three indices were not correlated, except a marginally significant association between the orienting and executive attentional functions ($r = -.22$, $p = .051$). This result suggests that the alerting, orienting, and executive functions tend to operate independently. Descriptive statistics and correlations are presented in Table 2.

Self-awareness of Functional Declines

Older driver's self-awareness of age-related functional declines was examined in three aspects: 1) *Everyday cognition*, 2) *Driving cognition*, and 3) *Driving task*. A summary of self-awareness scores of the three aspects, as well as, the correlations among the three are shown in Table 3. Self-awareness of cognitive declines both in the context of everyday activities (i.e., Everyday cognition: *M* = 2.26, *SD* = 2.19) and driving (i.e., Driving cognition: *M* = 2.19, *SD* = 1.10) was found to be low to moderate: ranges were between 2.02 and 2.61 on a scale of 1 to 5 where 1 represents definitely no changes and 5 definitely noticed changes. Self-awareness of declines in competency of a variety of driving tasks (i.e., Driving task: *M* = 1.83, *SD* = .62) was even lower. These results suggest that many older drivers believed their cognitive and driving performance had been relatively maintained. The positive correlations were observed among the self-awareness of declines in the three attentional functions, suggesting older drivers who were aware of cognitive declines, either in everyday life or during driving, were also likely to notice declines in driving skills.

Compensatory Driving Behaviors

Participants responded to the list of 20 compensatory driving strategies that could potentially improve driving safety. Because participants simply reported if they adopted each compensatory driving behavior (i.e., made changes in driving behaviors in such way), an overall score that counted how many compensatory driving behaviors they adopted out of the 20 behaviors was used. The results showed that participants had adopted an average of 10.46 compensatory driving strategies (*SD* = 4.05). Among the 20 strategies on the list, the compensatory behavior with the highest rate of adoption was "limiting or being more careful in night driving" (reported by 74 participants), followed by "limiting or being more careful during bad weather (e.g., rain, snow, fog; reported by 65 participants). Furthermore, older drivers were likely to self-regulate driving in difficult or challenging traffic conditions such as rush hour (n = 61), unfamiliar areas (n = 59), and high traffic roads (n = 59). A significant number of older drivers also responded that they were more likely to plan the route before each trip (n = 58).

Correlational analyses were conducted to examine relationships between the self-awareness ratings and the number of adopted compensatory driving behaviors (Figure 2). Self-awareness of declines in driving cognition ($r = .28$, $p < .05$), but not in everyday cognition ($r = .20$, $p = .07$), is significantly correlated with the number of compensatory driving behaviors adopted by the older drivers. Self-awareness of declines in driving tasks is also correlated with the number of compensatory driving behaviors ($r = .38$, $p < .05$). A hierarchical regression analysis further examined the extent to which self-awareness of age-related declines predicts older driver's adoption of compensatory behaviors. The model and the results are presented in Table 4. The first block of the model included the variables of age as well as the attentional functioning (i.e., ANT performance: overall RT and accuracy, and the alerting, orienting and executive indices). In the second block, self-awareness of declines in everyday and driving cognition were added. The first and the second block of predictors accounted for 7% and 16% of the variance in compensatory driving behaviors, respectively, but the models did not reach significant level (model 1: $F(6, 81) = .99$, $p = .44$; model 2: $F(8, 81) = 1.67$, $p = .12$). Among the predictors, the self-awareness of declines in driving cognition, but not everyday cognition, was positively and significantly related to compensatory behaviors, $\beta = .30$, $p < .05$, indicating that older drivers' self-awareness in cognitive declines in the context of driving might be a more meaningful factor for compensatory driving behaviors than self-awareness in everyday cognitive performance. Finally, self-awareness of functional declines in driving tasks was added to the third block and found to be a significant predictor of compensatory driving behaviors ($\beta = .34$, $p < .05$).

The follow-up analysis examined if the effect of self-awareness of declines in everyday cognition (a) on compensatory behaviors (b) was mediated by self-awareness of declines in driving tasks (c). The preliminary correlation analysis showed that all three variables were significantly correlated with one another (a-b: $r = .28$, $p < .05$; a-c: $r = .52$, $p < .01$; b-c: $r = .38$, $p < .01$), indicating that a mediational approach was appropriate to be conducted. The third model in which the self-awareness of declines in driving tasks was entered was found to be significant [$F(9, 81) = 2.36$, $p < .05$], and the amount of variance explained significantly increased to 23% ($\Delta R^2 = .07$, $p < .05$). With the addition of the self-awareness of declines in driving tasks in the third step, the self-awareness of declines in driving cognition no longer a statistically significant predictor ($\beta = .15$, $p = .30$), suggesting that the self-awareness of declines in driving tasks mediated the effect of self-awareness of declines in driving cognition on compensatory behaviors. Results from a follow-up Sobel test (*23*) indicated that the mediation effect is statistically significant ($t = 3.05$, $p <.01$).

Additional Observations from Interview Responses

Participants' comments made throughout the interview and to the open-ended questions were summarized to further understand self-awareness of functional declines and compensatory driving behaviors. Some participants reported various additional types of driving situations in which they have been experiencing difficulties, such as parallel parking, maneuvering a curve on a narrow road with a guard rail, and perceiving depth/distance while driving. Participants also commonly reported many of the driving challenges, such as driving at night, backing up, and reading signs, being primarily related to their physical or sensory declines such as vision deficits or neck movement problems. Interestingly, many participants also pointed out potential impacts of changes in traffic and driving conditions: traffic design had become more complicated; there have been increasing distractions during driving such as cell phone use; and more erratic drivers are on the road compared to the past. They believed that these changes have resulted in increasing difficulties in driving. Taken together, these responses suggest that older drivers are likely to be aware of contributing external factors and any functional declines that can be more directly perceived (e.g., increasing traffic and restricted neck movement). In contrast, they seemed to be less likely to be aware of the links between cognitive declines and driving performance.

Furthermore, a few participants provided comments regarding potential issues and limitations of the current findings. A few participants thought that self-reports would not accurately reflect functional declines especially when they find ways to completely avoid the situations that demand particular functions. For instance, one participant noted that he had always avoided multi-tasking while driving. Thus, he had no chance to observe whether there had been any decline in his ability to multi-task during driving.

We also observed a range of interesting responses to the open-ended question asking compensatory strategies. A few participants reported taking no more long drives alone, and instead having more breaks or switching drivers during a long trip. A number of participants also reported becoming more cautious in general, however, could not come up with any specific compensatory behavior that they've taken. This could imply a general attempt of behavioral change among older drivers yet a lack of knowledge on how to operationalize the attempt.

The interview also provides insights on the contributing factors that may limit older drivers' use of compensatory strategies. For instance, many participants noted that they would like to take advantage of advanced safety technologies such as collision avoidance system, however the features were not available in their current vehicles. Another interesting finding was that changes in lifestyle is also a critical factor impacting older drivers' driving. For instance, a participant noted that she was able to reduce driving because she moved to a retirement community within which many services are available, eliminating the need for her to travel outside of the community site.

DISCUSSION

The current study extends our understanding of the associations between self-awareness of age-related functional declines and compensatory driving behaviors among the older drivers. The results suggest that older drivers are likely to adopt compensatory driving behaviors to mitigate elevated crash risks when they become aware of functional declines as they age. Prior research had often observed a discrepancy or low correlation between older adults' cognitive performance in a controlled experimental environment and everyday task performance (e.g., *24*). This discrepancy might result from effective compensatory strategies that older adults use during everyday task performance. During driving, older adults may successfully cope with increased crash risks via adoption of self-regulations in driving.

The present findings suggest that older drivers are possibly over-confident about their driving skills, which may inhibit adoption of appropriate compensatory driving strategies. The results showed that older drivers believe their cognitive and driving performance is relatively well-maintained. In particular, a level of self-awareness of declines in driving competency was the lowest, compared to awareness of declines in cognitive functioning in everyday life including driving. This may be a result of overestimation of expertise when considering experience of many older drivers.

Interestingly, but not surprisingly, the results showed that older drivers' self-awareness of functional declines might play a more important role than actual functioning in the adoption of compensatory driving strategies. This finding suggests that improving self-awareness of functional declines that are critically associated with driving tasks is a key to promote older drivers' compensatory behaviors. Furthermore, self-awareness in functional declines in a rather abstract cognitive construct is less likely to lead to individuals' compensatory behavioral changes. In addition to improving self-awareness of functional declines, improving knowledge of compensatory driving behaviors among older drivers would be critical to promoting effective use of compensatory strategies. Because many older adults might not be familiar with effective compensatory driving strategies, they tend to drive more carefully in general although it is not necessarily effective to improve safety. Training or educational programs can be designed to improve older drivers' knowledge about their age-related functional declines and the relevant compensatory driving behaviors that they can adopt.

Furthermore, the interview responses provided implications for the importance of environmental factors in older drivers' driving behaviors. Environmental changes such as increased road traffic, the complexity of traffic design, and external distractors (e.g., cell phone, in-vehicle entertainment technology) may have impacted crash risks among older drivers who are less likely to be adaptive with those changes. Responses also suggest that accessibility to driver assistant technologies and support is critical for older drivers' driving safety. For instance, many older drivers would use driver assistant systems such as collision avoidance if they are available in their vehicles. Environments that are designed to be friendly to older drivers can also enhance older driver safety. Age-friendly communities, which are different from retirement communities or assisted living facilities, aim to provide the older population places supporting older adults with infrastructure and services that effectively accommodate their changing needs (*25,26*). Age-friendly communities can provide safe and comfort age-friendly vehicles, and also have road design and condition that are carefully developed for the older driver population. Age-friendly communities also can help driving competency by providing and promoting driving educations. These resources and supports would further encourage safe driving practices among older adults.

The main limitation of the current investigation is from limited objective measures and analysis for the compensatory driving behaviors. Participants self-reported whether they have changed their driving behaviors. However, the study did not examine whether they actually use the self-reported compensatory driving practices in a consistent or effective manner in their daily driving. There might be significant gaps between intentions of using compensatory driving strategies and adoptions in everyday driving. In addition, current study primarily examined the strategic-level compensatory driving behaviors. Older drivers may also control their driving behaviors at different levels such as tactical/maneuver levels (*11*). Thus, future research may need to investigate older drivers' compensatory driving behaviors more closely with performance measures in a simulated or actual driving. Daily diary or structured interview with detailed frequency scales can also be used to confirm and expand our current understanding developed using retrospective self-reports.

Our study evaluated the use of compensatory driving behaviors in a rather general and aggregated form. The list of compensatory behaviors provided to the participants was not exhaustive, and a precise role of each type of compensatory strategies in driving safety was not examined. The analyses assumed that the compensatory behaviors included in the list are unidirectional, and the impact of each behavior on driving safety is comparable. However, it is possible that certain compensatory behaviors may not always be beneficial, and the relations between certain compensatory behaviors and driving safety may be more complex than our general belief. For instance, if an older driver completely avoid certain traffic environments such as high-speed roads or freeways, it may reduce risks of involvement in speed-related crashes, but may increase total driving length and their exposure to local traffic, which possibly leads to increased risks in other types of crashes. Further investigation on individual compensatory behaviors is needed. In addition, associations were examined mainly using a correlational analysis with self-reports, which cannot inform about causal relationships.

Although the current study is based on self-reports, the findings of this study have important practical implications for interventions for older drivers. Self-awareness of functional declines was found to be a critical factor that influences older drivers' attitudes and acceptance of compensatory driving behaviors. Improving awareness of older drivers' functional declines should be one of the aims of older driver training and interventions. In addition, environmental designs and supports should also be considered to promote safe driving practices among the older drivers.

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TABLE 1 Participant Demographics and Self-reported Driving Measures

	Participants (n= 82)
Age range	65 – 92
Age (Mean)	73.16 (5.20)
Gender: Male | Female	50 | 32
Years licensed	56. 22 (5.58)
Driving per week (days)	6.15 (1.27)
Miles driven last year	9461.83 (5617.62)
# of Tickets/Citations[1]	.13 (.38)
# of Warnings[1]	.20 (.53)
# of Crashes[1]	.34 (.61)

[1] Number of occurrences in the past five years
note: the numbers in parentheses are SD for each mean.

TABLE 2 Descriptive Statistics and Correlations among ANT Measures

	Accuracy	RT	Alerting	Orienting	Executive
Mean (SD)	.98 (.03)	655.82 (87.21)	29.93 (33.63)	10.92 (15.65)	122.79 (54.84)
Accuracy	-				
RT	.02	-			
Alerting	-.37*	.18	-		
Orienting	.12	.13	.01	-	
Executive	-.39*	.16	-.02	-.22[a]	-

* Correlation is significant at $p < .05$
[a] marginally significant at $p = .051$

TABLE 3 Descriptive Statistics and Correlations among Self-awareness of Functioning

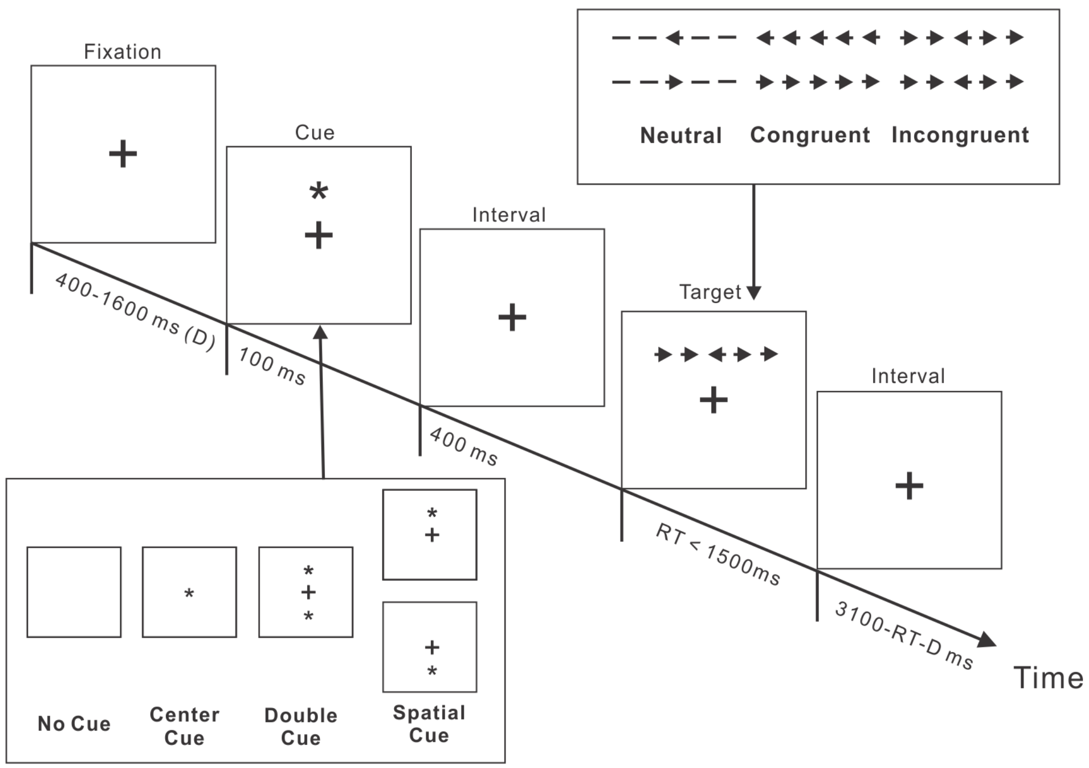
	Self-awareness of declines in:		
	Everyday cognition	**Driving cognition**	**Driving task**
Mean (SD)	2.26 (2.19)	2.19 (1.10)	1.83 (.62)
Median	2.00	2.00	1.72
Mode	1.00	1.00	1.00
Correlation			
Self-awareness of declines in:			
Everyday cognition	-		
Driving cognition	.62*	-	
Driving task	.47*	.52*	-

*significant correlation at $p < .001$

TABLE 4 Hierarchical Regression Analysis on Compensatory Driving Behaviors

Predictor	*B*	SE (*B*)	β	*p*	ΔR²
Step 1					.07
Age	.11	.10	.14	.26	
ANT accuracy	20.07	16.66	.16	.23	
ANT RT	.002	.01	.01	.94	
ANT Alerting	.02	.02	.18	.17	
ANT Orienting	-.03	.03	-.10	.41	
ANT Executive	.01	.01	.07	.57	
Step 2					**.08***
Age	.10	.10	.12	.33	
ANT accuracy	20.22	16.29	.16	.22	
ANT RT	-.002	.01	-.05	.70	
ANT Alerting	.02	.02	.17	.17	
ANT Orienting	-.04	.03	-.16	.16	
ANT Executive	.01	.01	.08	.52	
Self-awareness of declines in Everyday cognition	.05	.51	.01	.92	
Self-awareness of declines in Driving cognition	**1.09**	**.52**	**.30**	**.04***	
Step 3					**.07***
Age	.12	.09	.15	.20	
ANT accuracy	14.23	15.84	.12	.37	
ANT RT	-.001	.01	-.01	.92	
ANT Alerting	.02	.01	.13	.27	
ANT Orienting	-.04	.03	-.17	.14	
ANT Executive	.002	.01	.03	.84	
Self-awareness of declines in Everyday cognition	-.21	.50	-.06	.68	
Self-awareness of declines in Driving cognition	**.56**	**.54**	**.15**	**.30**	
Self-awareness of declines in Driving task	**2.20**	**.84**	**.34**	**.01***	

* significant at $p < .05$



- Alerting efficiency = RT(no-cue) – RT(double-cue)
- Orienting efficiency = RT(center-cue) – RT(spatial-cue)
- Executive efficiency = RT(incongruent) – RT(congruent)

FIGURE 1 Illustrations of ANT Procedures and Conditions.

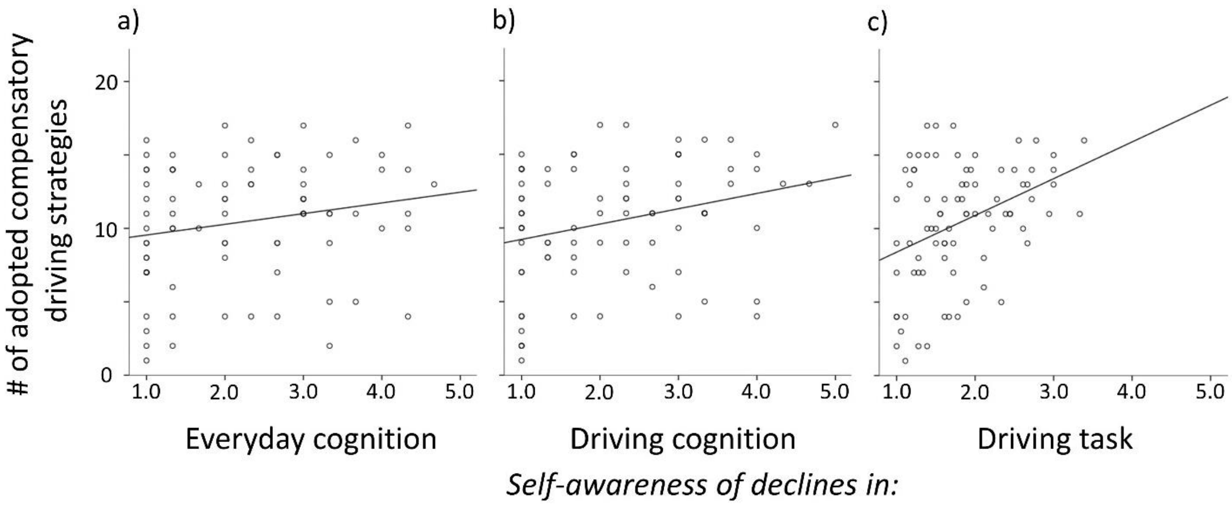


FIGURE 2 Correlations between the numbers of adopted compensatory driving behaviors and self-awareness of declines in a) everyday cognition, b) driving cognition, and c) driving task.