Acceptance of Highly Automated Vehicles: Weak or Absent Relationships with Desire for
Control, Illusion of Control, and Driving Styles

Michael A. Nees, Karli Herwig, and Lindsey Quigley

Lafayette College

Human Factors, Perception, & Cognition Lab

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Corresponding author:
Michael A. Nees
Lafayette College
Department of Psychology
Oechsle Hall
350 Hamilton Street
Easton, PA 18042
Ph: (610) 330 5290
neesm@lafayette.edu

Abstract

Participants (including an online sample and college undergraduates) completed a highly automated vehicle acceptance scale as well as: (1) the Multi-dimensional Driving Style Inventory (MDSI); (2) the Desirability of Control Scale; (3) an illusion of control scale; (4) an accident concern self-rating, (5) a speed questionnaire; (6) an accidents, violations and close-calls questionnaire; (7) a driving skill self-rating; and (8) a demographic questionnaire. Exploratory analyses showed that relationships between acceptance factors and other variables generally were weak or absent, although self-rated familiarity with automation technology and education may predict acceptance. Practical and theoretical implications are discussed.

Keywords: vehicle automation; technology acceptance; driving style; desire for control; illusion of control

Acceptance of Highly Automated Vehicles: Relationships with Desire for Control, Illusion of Control, and Driving Styles

Few studies have considered how psychological traits will impact acceptance of vehicle automation. Individual differences in personality, for example, may be helpful for predicting which drivers will tend to accept high automation. Charness et al. (2018) found some relationships between Big Five personality traits and three sub-dimensions of acceptance of highly automated vehicles (concern, eagerness to adopt, and willingness to relinquish control). Conscientiousness, for example, was associated with greater concern and less eagerness to adopt, whereas openness to new experiences was associated with greater eagerness to adopt and greater willingness to relinquish control. None of their models, however, accounted for more than 10% of the variance in the acceptance variables examined, which suggested that Big Five traits may not be especially useful for predicting acceptance.

Desire for Control and Illusion of Control

Perhaps other traits more proximal to the driving task would account for more variance in acceptance. Charness et al. (2018) and others (Lee & Kolodge, 2018) have identified the desire for control of the vehicle and willingness to relinquish control to automated systems as potentially important aspects of acceptance of vehicle automation. *Desire for control* is a personality trait defined by “the motive to control the event’s in one’s life” (Burger & Cooper, 1979). It is possible that people who are high in desire for control will be less willing than others to accept automation of driving—a task that involves high levels of individual control.

A related trait, the *illusion of control*, occurs when a person harbors an unwarranted belief that they can exercise control over situations characterized by randomness or low individual control. Although this is a distinct construct from desire for control, the two have been

shown to be positively correlated (Burger, 1986). Drivers have high levels of individual control over vehicles, but a subset of drivers possess illusory beliefs that they can control even random and uncontrollable aspects of driving.

Some evidence has suggested that drivers who score higher on measures of desire for control and illusion of control also tend to be risk-takers and aggressive drivers (Hammond & Horswill, 2001; Stephens & Ohtsuka, 2014). Perhaps the drivers whose removal from the driving task would most benefit society from a safety standpoint—assuming that vehicle automation performs at a high level of safety—will be among the drivers least likely to voluntarily accept high automation in vehicles. In fact, tentative evidence from two studies has suggested that desire for control is linked to responses indicating a person would not use a self-driving vehicle (Lee & Kolodge, 2018; Zmud et al., 2016), although two other studies showed that desire for control had no relationship with variables related to intention-to-use highly automated vehicles (Brell et al., 2019; Sener et al., 2019).

Driving Styles

Other factors also may predict reluctance to accept automation in vehicles. Researchers have identified global *driving styles*—individual differences in approaches to the driving task and attitudes about driving (e.g., angry, risky, and cautious driving styles, see Sagberg, Bianchi Piccinini, & Engström, 2015). Some driving styles may be associated with acceptance of high automation in vehicles (or a lack thereof). For example, one recent study found that higher negative affect (distress, hostility, nervousness, etc.) associated with manual driving was related to higher acceptance of vehicle automation (Raue et al., 2019).

Study Overview

The current study examined relationships between acceptance of high automation in vehicles, desire for control, illusion of control, and driving styles, as well as several corollary variables including accident concern, self-rated likelihood of being involved in an accident, self-rated driving skill, and self-reported accidents, violations, and close-calls. The approach was exploratory; relationships among all of the scales were examined.

Method

Participants

Participants ($N = 630$) were recruited from Amazon Mechanical Turk ($n = 500$) and undergraduate psychology courses at Lafayette College ($n = 130$). These numbers do not include potential participants who started and abandoned the survey ($n = 39$ from AMT; $n = 5$ from Lafayette) or failed to complete the survey in time to receive compensation ($n = 1$ from AMT). Mechanical Turk workers were required to be located in the United States, to have a task approval rating of greater than 99%, and to have at least 1000 previously approved tasks. The study description also indicated that the research was only open to licensed drivers. AMT participants were paid \$1.00 for their time. Lafayette College participants were compensated with course extra credit.

Two attention checks were included in the study. The first instructed participants to select the option “5” on a Likert response scale. For the second, participants responded to the prompt “I read and answered all questions in this survey to the best of my ability” on a scale from 1 (“strongly disagree”) to 7 (“strongly agree”). Of the 630 participants, 29 were excluded for various reasons, including failing the first attention check ($n = 14$), failing the second attending check (i.e., by giving a response < 6 on the scale, $n = 8$), providing nonsensical

responses in optional open-ended comments at the end of the study ($n = 1$), or meeting more than one of these criteria ($n = 6$). The final sample used in analyses was $N = 601$ (322 females, 277 males, 2 participants who preferred to not respond). The mean age in the sample was 35.27 years ($SD = 13.57$, $mdn = 32$, range = 18-75). Self-reported racial/ethnic backgrounds represented in the sample were white ($n = 502$), Asian ($n = 45$), black or African American ($n = 37$), Hispanic or Latino ($n = 33$), American Indian or Alaska Native ($n = 8$), Native Hawaiian or Pacific Islander ($n = 4$), other ($n = 3$), and prefer not to answer ($n = 4$). Participants were allowed to select more than one category, so these numbers sum to a number greater than the sample size. Participants' highest level of education attained included no high school diploma ($n = 4$), a high school diploma or GED ($n = 103$), some college with no degree ($n = 189$), an associate's or 2-year degree ($n = 55$), a bachelor's or 4-year degree ($n = 189$), a master's degree or post-bachelor's professional degree ($n = 53$), and a doctoral degree ($n = 8$). Participants reported $M = 18.06$ years of driving experience ($SD = 13.60$, $mdn = 15.00$, minimum = 1.00, maximum = 58.00). Participants reported driving $M = 7.19$ hours per week ($SD = 7.89$, $mdn = 5.00$, minimum = 0.00, maximum = 90.00). Participants reported the scenario that best described where they drive most often as urban/city driving ($n = 287$), rural/small town driving ($n = 219$), distance/interstate/freeway driving ($n = 80$), and other ($n = 15$). On a scale from 1 ("not familiar at all") to 7 ("extremely familiar"), participants rated their familiarity with the current state of technology related to vehicle automation and self-driving cars as $M = 3.70$ ($SD = 1.52$, $mdn = 4.00$). Participants reported having read $M = 3.94$ articles about self-driving cars in print or online ($SD = 8.60$, $mdn = 2.00$, minimum = 0.00, maximum = 100.00). Two-hundred-seventy-one participants reported owning or using a vehicle that had automated features including 243 instances of cruise control, 36 instances of adaptive cruise control, 33 instances of automatic

braking, 40 instances of automatic lane keeping or lane keeping assist, 12 instances of Autopilot or Level 2 systems (see SAE International, 2016), 2 instances of automatic headlights, and 2 responses for which the technology being described couldn't be determined.

Materials

The instruments used in this study were: (1) a 20-item Self-driving Car Acceptance Scale (see Nees, 2016; Nees & Zhang, 2020); (2) a 20-item desire for control scale (Burger & Cooper, 1979); (3) a 5-item illusion of control scale (Fast et al., 2009); (4) the 44-item Multidimensional Driving Styles Inventory (Taubman-Ben-Ari et al., 2004; Taubman-Ben-Ari & Skvirsky, 2016); (5) a 2-item accident concern scale (McKenna & Horswill, 2006); (6) a 1-item driving skill self-rating (McKenna & Horswill, 2006); (7) the 3-item driving speed questionnaire (French et al., 1993); (8) a 4-item accidents, violations, and close calls questionnaire; and (9) a demographics questionnaire. The full instruments are included in the Appendix.

Procedure

Data were collected in November, 2018. The survey was hosted on Qualtrics. Instruments were presented in a random order to each participant, with the exception of the demographics questionnaire, which was always presented last. Presentation of questions within a given instrument was randomized except for the demographics questionnaire.

Results

Factor analysis of scales. The dimensionality of scales was empirically determined with EFA using the same extraction, rotation, and interpretation approaches described in Study 1. Principle axis factoring was used to extract factors with eigenvalues greater than 1. Oblique (Promax) rotation was used. Only loadings $> .30$ were used to interpret the factors. For EFAs reported in this manuscript, the proportions of variance accounted for by factors are the rotation

sums of squared loadings divided by the number of variables in the analysis. Because oblique rotation was used and factors are correlated, these values should be interpreted with caution. They are not fully unique to each factor, and they cannot be summed to obtain a total variance explained by the EFA. Items with reverse scoring were not reversed before the EFA, so the signs (positive or negative) on loadings refer to items as written. Items with negative loadings were reversed before calculating Cronbach's alpha for reliability. All rotated factor pattern matrices are provided in the Appendix.

Multidimensional Driving Styles Inventory (MDSI). An EFA was conducted on 43 MDSI items, because MDSI question 2 was inadvertently omitted in the Qualtrics survey. Extraction left eight factors. Factor 1 was interpreted to reflect dissociative driving style ($n = 13$ items, 17% variance explained, $\alpha = .87$). Factor 2 was interpreted to reflect cautious driving style ($n = 6$ items, 13% variance explained, $\alpha = .85$). Factor 3 was interpreted to reflect anxious driving style ($n = 5$ items, 10% variance explained, $\alpha = .83$). Factor 4 was interpreted to reflect risky driving style ($n = 8$ items, 14% variance explained, $\alpha = .80$). Factor 5 was interpreted to reflect angry driving style ($n = 6$ items, 13% variance explained, $\alpha = .80$). Factor 6 was interpreted to reflect stress reduction driving style ($n = 4$ items, 7% variance explained, $\alpha = .70$). Due to low internal consistency reliability, factors 7 ($n = 3$ items, 5% variance explained, $\alpha = .64$) and 8 ($n = 3$ items, 3% variance explained, $\alpha = .54$) were not interpreted or analyzed further.

SCAS. The SCAS was examined to see if the same General Acceptance factor obtained in Nees and Zhang (2020) would replicate. An EFA was conducted on 20 SCAS-R items—one item that did not load on the General Acceptance factor in Nees and Zhang was accidentally included in the survey but omitted from analyses. Extraction left two factors. Factor 1 ($n = 19$ items, 62% variance explained, $\alpha = .96$) was interpreted to reflect/replicate the general

acceptance factor from Study 1—all items except one grouped on this factor with loadings of .30 or higher. Factor 2 ($n = 5$ items, 45% variance explained, $\alpha = .83$) was interpreted to reflect delayed acceptance of highly automated vehicles, because the highest item loading on this factor suggested that people who scored highly on this factor are more likely to accept high automation after others (e.g., early or late majority adopters; see Rogers, 2003). This factor also captured interest in ride-sharing (which, in accordance with delayed acceptance, requires others to adopt the technology first or concurrently), eco-benefits, and productivity. The correlation between the two factors was .78.

Desire for control scale (DCS). An EFA was conducted on 20 DCS items. Extraction left four factors. Factor 1 was interpreted to reflect a desire to lead or control others ($n = 7$ items, 21% variance explained, $\alpha = .79$). Factor 2 was interpreted to reflect the desire to be independent or avoid being controlled by others ($n = 4$ items, 18% variance explained, $\alpha = .80$). Factor 3 was interpreted to reflect a desire to proactively seek control ($n = 7$ items, 18% variance explained, $\alpha = .75$). Factor 4 was interpreted to reflect a desire to avoid making decisions ($n = 5$ items, 17% variance explained, $\alpha = .73$). Of note, all of the reverse-scored DCS items loaded on Factor 4. Although Factor 4 could reflect a methodological artifact, the DCS was written such that the reverse-scored items form a fairly coherent set of questions about avoiding decisions. For reporting purposes, this also means that the directional interpretation of this factor is reversed compared to the other 3 DCS factors (i.e., lower scores on Factor 4 indicate higher desire for control), so DCS Factor 4 is indicated as reverse-scored in correlation tables below.

Illusion of control scale (IOC). An EFA was conducted on 5 IOC items. Extraction left one factor, which was interpreted to reflect IOC ($n = 5$ items, 49% variance explained, $\alpha = .80$). All items loaded on the factor, with loadings ranging from .34 to .81.

Correlational analyses. For each of the factor analyses reported above, factor scores were computed using a regression approach, and correlational analyses were undertaken to look for relationships among the underlying constructs represented by the factor scores. Because of the large numbers of correlations examined, $\alpha < .01$ was used as the cutoff for interpreting relationships¹. Correlational analyses were separated to examine: (1) relationships of highly automated vehicle acceptance, intention-to-use, and familiarity variables (number of articles read about self-driving cars, self-rated familiarity with state of vehicle automation technology, and self-rated familiarity with Uber and Tesla fatalities) with driving styles, desire for control, and illusion of control (Table 1); and (2) relationships of highly automated vehicle acceptance with other driving outcomes (self-rated worry about being involved in an accident, self-rated likelihood of being involved in an accident, self-rated driving skill, average of speed questionnaire ratings, and sum of accidents, violations, and close-calls questionnaire) and demographic variables (age, education, and hours spent driving per week) (see Table 2).

¹ For the interested reader, for all tables shown in this study, correlations with $r > .08$ are significant at the more liberal $\alpha = .05$, whereas correlations $< .14$ are not significant following conservative Bonferroni corrections ($\alpha = .00065$).

Table 1. Correlations of SCAS-R Dimensions, Intention-to-use, and Vehicle Automation Familiarity Variables with Driving Style, Desire for Control, and Illusion of Control Dimensions.

	MDSI						DCS				
	Dissoc	Cautious	Anxious	Risky	Angry	StressRed	Lead	Indep	Proactive	Avoid(R)	IOC
General acceptance	<-.01	.03	.04	.09	.03	.07	-.06	-.06	-.02	.03	-.03
Delayed acceptance	.11*	-.03	.14**	.09	.08	.11*	-.07	-.09*	-.08	.16**	.05
Articles	-.16**	.11*	-.11*	-.05	-.11*	-.05	.02	.05	.12*	-.13*	-.12*
Familiar	-.16**	.16**	-.24**	.10	-.02	.12*	.17**	.12*	.17**	-.20**	.09
Uber/Tesla	-.12*	.09	-.18**	.07	-.01	.01	.09	.07	.08	-.14**	.06

Notes: $N = 601$. * $p < .01$, ** $p < .001$. Significance levels are reported for two-tailed Pearson correlations. See text for full descriptions of variables.

Table 2. Correlations of SCAS-R Dimensions with Accident Concern, Skill, Speed, Accident/Violations History, and Demographics.

	Accident Worry	Accident Prob	Skill	Speed	Accidents/Violations	Age	Education	Hours Driving	Articles	Familiar	Uber/Tesla
General acceptance	.03	-.02	.08	.03	.05	-.01	.13*	<-.01	.13**	.35**	.05
Delayed acceptance	.15**	.03	.01	.11*	.13*	-.13**	.09*	-.03	.07	.22**	-.02

Notes: $N = 601$. * $p < .01$, ** $p < .001$. Significance levels are reported for two-tailed Pearson correlations. See text for full descriptions of variables.

Discussion

The SCAS General Acceptance factor showed no significant relationships with driving styles, desire for control, or illusion of control (see Table 1). In general, we found little evidence to suggest that driving styles, desire for control, or illusion of control were related to acceptance of highly automated vehicles. The second SCAS-R factor, which we interpreted to reflect delayed acceptance of highly automated vehicles, did show significant, though weak, positive relationships with dissociative, anxious, and stress reduction driving styles, and this factor also was negatively correlated with desire to avoid being controlled and positively correlated with desire to avoid making decisions. This offers weak but suggestive evidence that drivers who may accept highly automated vehicles after others adopt (and who tend to be interested in ride-sharing, eco-benefits, and productivity benefits) may also tend to be more dissociative and anxious drivers who try to reduce to their stress while driving. These drivers also may tend to desire less control over decision-making and may try to avoid making decisions. This pattern of results was coherent and amenable to interpretation, but again, we observed only weak links of these variables with acceptance of highly automated vehicles.

The two SCAS-R factors also were examined for relationships with other driving and demographic variables (see Table 2). Both SCAS-R factors were significantly, weakly, positively correlated with education, which suggested that people with more education tend to be more accepting of high automation in vehicles. Both SCAS-R factors were significantly, moderately positively correlated with self-rated familiarity with the current state of vehicle automation, which suggested that people who feel more familiar with the technology tend to be more accepting of it. The first general acceptance dimension of the SCAS-R was also weakly correlated with the number of articles read about highly automated vehicles.

The second SCAS-R factor correlated positively with accident worry, tendency to drive at higher speeds, self-reported accidents/violations/close calls, education, and familiarity. This factor correlated negatively with age. These findings offered some weak evidence that younger people with greater accident worry, more accidents and/or violations, and a tendency to drive faster were more likely to indicate willingness for delayed acceptance of high automation in vehicles after family and friends have adopted.

The demographics questionnaire assessed familiarity with vehicle automation using the self-reported number of articles read about vehicle automation, self-rated familiarity with vehicle automation, and self-rated familiarity with the Uber and Tesla fatalities (see Table 1).

Dissociative and anxious driving styles were negatively correlated with all three measures of familiarity with vehicle automation, and cautious driving style was positively correlated with two measures of familiarity with vehicle automation. Stress reduction driving styles were positively correlated with self-rated familiarity, whereas angry driving styles were negatively correlated with the number of articles read about vehicle automation. Familiarity variables—especially self-rated familiarity—were generally positively related to greater desire for control. Of course, directionality and the influence of outside variables are indeterminate based on these correlational data, but this pattern of relationships offers potential interesting avenues for future research about vehicle automation information-seeking as a function of driving style.

We found no strong evidence that acceptance of high automation in vehicles is related to driving styles, though we observed some weak relationships to suggest that anxious, dissociative, and stress reduction driving styles might be associated with greater acceptance (especially after others have adopted highly automated vehicles). We also found some weak evidence to suggest that acceptance might tend to be higher among drivers who are younger, more worried about

accidents, frequent speeders, and more prone to violations, accidents, and/or close-calls.

Education showed a weak but consistent positive relationship with acceptance, and we found weak evidence of a negative relationship between age and acceptance, which also has been reported in previous research (Nees, 2016; Nielsen & Haustein, 2018). In results we reported previously (Nees & Zhang, 2020), items to measure acceptance and intention-to-use loaded on the same General Acceptance factor in the EFA. Although acceptance and intention-to-use have been described as distinct constructs, results from our lab continue to suggest that this distinction might be problematic for theory.

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Appendix: Study Instruments

Nees (2016) and Nees and Zhang (2020) Self-driving Car Acceptance Scale

This version is a shorter version based on the General Acceptance factor of the EFA reported in Nees & Zhang (2020).

Ratings are made on a scale from 1 (strongly disagree) to 7 (strongly agree).

Factor loadings in this study determined that items 7 and 15 would be reverse-scored. Item 16 cross-loaded on both factors and would be reverse-scored for Factor 1 only.

1. Self-driving cars will be safe.
2. A self-driving car would allow me to be more safe while in the car.
3. I would trust a self-driving car to get me to my destination.
4. Self-driving cars will be reliable.
5. Self-driving cars will reduce traffic problems.
6. Self-driving cars will reduce the stress of driving.
7. I do not think that computers should be driving cars. (R)
8. I would be interested in sharing a self-driving car with others instead of owning my own personal vehicle.
9. I would be willing to pay more for a self-driving car compared to what I would pay for a traditional car.
10. I would feel comfortable riding in a car that had no steering wheel.
11. The benefits of a self-driving car would outweigh the amount of money it would cost.
12. Self-driving cars would allow me to live a more environmentally-friendly lifestyle.
13. Self-driving cars will be easy to use.
14. A self-driving car would allow me to be more productive.
15. There are some driving scenarios that will be too difficult for a self-driving car to handle. (R)
16. I would be more likely to use self-driving cars after my friends or family have tried them. (R-F1 only)
17. I prefer using new technology instead of doing things “the old-fashioned way.”
18. I would like to own a self-driving car.
19. I would ride in a self-driving car.
20. I would borrow or rent a self-driving car.

Fast et al. (2009) Illusion of control scale

Ratings are made on a scale from 1 (“little or no control”) to 7 (“a great deal of control”).

1. To what extent are you able to have some control over what happens in the economy?
2. To what extent will our country look different in the future because of you?
3. To what extent can you influence politicians?
4. How much control do you have over what happens at your place of work?
5. To what extent are you able to have some control over what happens in the world?

Desirability of Control Scale (Burger & Cooper, 1979)

Ratings are made on a scale from 1 ("The statement does not apply to me at all") to 7 ("The statement always applies to me").

Reverse-scoring for items 7, 10, 16, 19, 20 was indicated in the original instrument.

1. I prefer a job where I have a lot of control over what I do and when I do it.
2. I enjoy political participation because I want to have as much of a say in running government as possible.
3. I try to avoid situations where someone else tells me what to do.
4. I would prefer to be a leader than a follower.
5. I enjoy being able to influence the actions of others.
6. I am careful to check everything on an automobile before I leave for a long trip.
7. Others usually know what is best for me. (R)
8. I enjoy making my own decisions.
9. I enjoy having control over my own destiny.
10. I would rather someone else take over the leadership role when I'm involved in a group project. (R)
11. I consider myself to be generally more capable of handling situations than others are.
12. I'd rather run my own business and make my own mistakes than listen to someone else's orders.
13. I like to get a good idea of what a job is all about before I begin.
14. When I see a problem, I prefer to do something about it rather than sit by and let it continue.
15. When it comes to orders, I would rather give them than receive them.
16. I wish I could push many of life's daily decisions off on someone else. (R)
17. When driving, I try to avoid putting myself in a situation where I could be hurt by another person's mistake.
18. I prefer to avoid situations where someone else has to tell me what it is I should be doing.
19. There are many situations in which I would prefer only one choice rather than having to make a decision. (R)
20. I like to wait and see if someone else is going to solve a problem so that I don't have to be bothered with it. (R)

Accident Concern Scale (McKenna & Horswill, 2006)

1. While driving, I sometimes feel worried that I will be involved in an accident.

Ratings are made on a scale from 1 ("strongly disagree") to 7 ("strongly agree").

2. How likely are you to be involved in accidents in the future compared with the average driver?

Ratings are made on a scale from 1 ("much less likely") to 7 ("much more likely"), with the midpoint labeled as "average."

Self-report Skill Rating Scale (McKenna & Horswill, 2006)

1. How skillful do you think you are compared with the average driver?

Ratings are made on a scale from 1 ("much less skillful") to 7 ("much more skillful"), with the midpoint labeled as "average."

Multidimensional Driving Style Inventory (Taubman-Ben-Ari et al., 2004)

Participants rated the extent to which each statement applies to their thoughts, feelings, and/or behavior during driving on a scale from 1 (“not at all”) to 7 (“very much”).

Numbering and reverse scoring here are from the original instrument.

Factor 1: dissociative driving style

[30] I misjudge the speed of an oncoming vehicle when passing.

[34] I intend to switch on the windscreen wipers, but switch on the lights instead.

[27] I forget that my lights are on full beam until flashed by another motorist.

[39] I nearly hit something due to misjudging my gap in a parking lot.

[36] I plan my route badly, so that I hit traffic that I could have avoided.

[35] I attempt to drive away from traffic lights in third gear (or on the neutral mode in automatic cars).

[15] I get lost in thoughts or distracted, and I fail to notice someone at a pedestrian crossing.

[11] I daydream to pass the time while driving.

Factor 2: anxious driving style

[31] I feel nervous while driving.

[33] I feel distressed while driving.

[10] Driving makes me feel frustrated.

[25] It worries me when driving in bad weather.

[7] On a clear freeway, I usually drive at or a little below the speed limit.

[4] I feel I have control over driving. (R)

[40] I feel comfortable while driving. (R)

Factor 3: risky driving style

[44] I enjoy the excitement of dangerous driving.

[6] I enjoy the sensation of driving on the limit.

[22] I like to take risks while driving.

[24] I like the thrill of flirting with death or disaster.

[20] I fix my hair/makeup while driving.

Factor 4: angry driving style

[12] I swear at other drivers.

[3] I blow my horn or “flash” the car in front as a way of expressing frustrations.

[28] When someone does something on the road that annoys me, I flash them with the high beam.

[43] I honk my horn at others.

[19] When someone tries to skirt in front of me on the road, I drive in an assertive way in order to prevent it.

Factor 5: high-velocity driving style

[16] In a traffic jam, I think about ways to get through the traffic faster.

[9] When in a traffic jam and the lane next to me starts to move, I try to move into that lane as soon as possible.

[17] When a traffic light turns green and the car in front of me doesn't get going immediately, I try to urge the driver to move on.

[2] I purposely tailgate other drivers.

[32] I get impatient during rush hours.

[5] I drive through traffic lights that have just turned red.

Factor 6: distress-reduction driving style

[37] I use muscle relaxation techniques while driving.

[8] While driving, I try to relax myself.

[1] I do relaxing activities while driving.

[26] I meditate while driving.

Factor 7: patient driving style

[18] At an intersection where I have to give right-of-way to oncoming traffic, I wait patiently for cross-traffic to pass.

[23] I base my driving behavior on the motto “better safe than sorry.”

[13] When a traffic light turns green and the car in front of me doesn’t get going, I just wait for a while until it moves.

[38] I plan long journeys in advance.

Factor 8: careful driving style

[42] I tend to drive cautiously.

[14] I drive cautiously.

[41] I am always ready to react to unexpected maneuvers by other drivers.

[21] I get distracted or preoccupied, realize the vehicle ahead has slowed down, and suddenly have to slam on the breaks to avoid a collision. (R)

[29] I get a thrill out of breaking the law. (R)

Speed Questionnaire (French et al., 1993; McKenna & Horswill, 2006)

Ratings were made on a scale from 1 (“never or very infrequently”) to 7 (“very frequently or always”).

1. How often do you exceed the 70 mph speed limit during a freeway journey?

2. How often do you drive fast?

3. How often do you exceed the speed limit in built-up areas?

Self-reported Violations and Accidents

Original to this study.

1. In the last three years, how many vehicle accidents have you been involved in as a driver in which you were fully or partially at fault?

2. In the last three years, how many near misses for vehicle accidents have you been involved in which you were fully or partially at fault? Near misses are driving incidents in which you thought an accident was going to happen, but an accident was avoided at the last second.

3. In the last three years, how many times have you been pulled over (i.e., stopped) by a police officer for committing moving violations? Moving violations include speeding, reckless driving, driving while intoxicated (DWI), driving under the influence (DUI), illegal lane changes, and failure to stop at a red light or traffic sign.

4. In the last three years, how many tickets and/or citations have you received for moving violations? Moving violations include speeding, reckless driving, driving while intoxicated (DWI), driving under the influence (DUI), illegal lane changes, and failure to stop at a red light or traffic sign.

MDSI Rotated Factor Pattern Matrix

<i>MDSI Items and Pattern Matrix (N = 601)</i>								
<i>Item</i>	F1	F2	F3	F4	F5	F6	F7	F8
[39] nearly hit something due to misjudging my space in a parking lot	.75							
[21] distracted or preoccupied, realize the vehicle ahead has slowed down and suddenly have to slam on the breaks to avoid a collision	.72							
[27] forget that my lights are on full beam (bright) until flashed by another motorist	.64							
[30] misjudge the speed of an oncoming vehicle when passing	.64							
[15] lost in thoughts or distracted, I fail to notice someone at the pedestrian crossings	.62							
[34] intend to switch on the windshield wipers, but switch on the lights instead	.50							
[20] fix my hair/ makeup while driving	.49							
[36] plan my route badly, so that I hit traffic that I could have avoided	.49							
[5] drive through traffic lights that have just turned red	.43							
[11] I daydream to pass the time while driving	.41							
[32] get impatient during rush hours	.33							
[14] drive cautiously		.88						
[42] tend to drive cautiously		.76						
[23] base my behavior on the motto "better safe than sorry"		.71						
[7] on a clear freeway, I usually drive at or a little below the speed limit		.51						
[41] always ready to react to unexpected maneuvers by other drivers	-.37	.38						.36
[18] at an intersection where I have to give right-of-way to oncoming traffic, I wait patiently for cross-traffic to pass		.37						
[10] driving makes me feel frustrated			.86					
[33] feel distressed while driving			.80					
[31] feel nervous while driving			.78					
[40] feel comfortable while driving			-.72					
[4] feel I have control over driving			-.47					
[25] it worries me when driving in bad weather			.45					
[24] like the thrill of flirting with death or disaster				.77				
[44] enjoy the excitement of dangerous driving				.73				
[22] like to take risks while driving				.66				
[29] get a thrill out of breaking the law				.61				
[35] attempt to drive away from traffic lights in the wrong gear (or in the neutral mode in automatic cars)	.38			.40				
[6] enjoy the sensation of driving on the limit								
[43] honk my horn at others					.89			
[3] blow my horn or "flash" the car in front as a way of expressing frustrations					.86			
[13] when a traffic light turns green and the car in front of me doesn't get going, I just wait for a while until it moves		.37			-.50			.30
[17] when a traffic light turns green and the car in front of me doesn't get going immediately, I try to urge the driver to move on					.48		.40	
[28] when someone does something on the road that annoys me, I flash them with the high beam					.47			
[12] swear at other drivers					.39			
[19] when someone tries to skirt in front of me on the road, I drive in an assertive way in order to prevent it								
[1] do relaxing activities while driving .						.74		
[37] use muscle relaxation techniques while driving .						.68		
[26] meditate while driving						.52		
[8] while driving, I try to relax myself						.51		
[16] in a traffic jam, I think about ways to get through the traffic faster							.60	
[9] when in a traffic jam and the lane next to me starts to move, I try to move into that lane as soon as possible							.54	
[38] plan long journeys in advance		.33						.41

SCAS Rotated Factor Pattern Matrix

<i>SCAS-R Items and Pattern Matrix</i>		
<i>Item</i>	F1	F2
1. Self-driving cars will be safe..	.96	
4. Self-driving cars will be reliable	.96	
10. I would feel comfortable riding in a car that had no steering wheel.	.91	
7. I do not think that computers should be driving cars.	-.88	
15. There are some driving scenarios that will be too difficult for a self-driving car to handle.	-.83	
3. I would trust a self-driving car to get me to my destination.	.81	
2. A self-driving car would allow me to be more safe while in the car.	.81	
18. I would like to own a self-driving car.	.78	
11. The benefits of a self-driving car would outweigh the amount of money it would cost.	.75	
13. Self-driving cars will be easy to use.	.75	
19. I would ride in a self-driving car.	.71	
9. I would be willing to pay more for a self-driving car compared to what I would pay for traditional car.	.69	
5. Self-driving cars will reduce traffic problems.	.69	
6. Self-driving cars will reduce the stress of driving.	.65	
20. I would borrow or rent a self-driving car.	.56	.34
17. I prefer using new technology instead of doing things "the old-fashioned way."	.47	
14. A self-driving car would allow me to be more productive.	.46	.41
16. I would be more likely to use self-driving cars after my friends or family have tried them.	-.35	.89
12. Self-driving cars would allow me to live a more environmentally-friendly lifestyle.	.37	.38
8. I would be interested in sharing a self-driving car with others instead of owning my own personal vehicle		.38

DCS Rotated Factor Pattern Matrix

<i>DCS Items and Pattern Matrix</i>				
<i>Item</i>	F1	F2	F3	F4 (R)
5. I enjoy being able to influence the actions of others.	.85			
4. I would prefer to be a leader than a follower.	.81			
15. When it comes to orders, I would rather give them than receive them.	.63	.38		
10. I would rather someone else take over the leadership role when I'm involved in a group project.	-.56			.35
11. I consider myself to be generally more capable of handling situations than others are.	.53			
2. I enjoy political participation because I want to have as much of a say in running government as possible.	.35			
3. I try to avoid situations where someone else tells me what to do.		.85		
18. I prefer to avoid situations where someone else has to tell me what it is I should be doing.		.79		
12. I'd rather run my own business and make my own mistakes than listen to someone else's orders.		.58		
13. I like to get a good idea of what a job is all about before I begin.			.66	
8. I enjoy making my own decisions.			.59	
17. When driving, I try to avoid putting myself in a situation where I could be hurt by another person's mistake.			.54	
14. When I see a problem, I prefer to do something about it rather than sit by and let it continue.	.36		.52	
9. I enjoy having control over my own destiny.			.50	
6. I am careful to check everything on an automobile before I leave for a long trip.			.40	
1. I prefer a job where I have a lot of control over what I do and when I do it.			.39	
19. There are many situations in which I would prefer only one choice rather than having to make a decision.				.75
16. I wish I could push many of life's daily decisions off on someone else.				.72
20. I like to wait and see if someone else is going to solve a problem so that I don't have to be bothered with it.				.65
7. Others usually know what is best for me.				.40