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Differential Impact of Personality Traits on Distracted Driving Behaviors in Teens and Older Adults

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Abstract

Objective—To determine the impact of personality on distracted driving behaviors.

Method—Participants included 120 drivers (48 teens, 72 older adults) who completed the 45-item Big Five Personality questionnaire assessing self-reported personality factors and the Questionnaire Assessing Distracted Driving (QUADD) assessing the frequency of distracted driving behaviors. Associations for all five personality traits with each outcome (e.g. number of times texting on the phone, talking on the phone, and interacting with the phone while driving) were analyzed separately for teens and older adults using negative binomial or Poisson regressions that controlled for age, gender and education.

Results—In teens, higher levels of openness and conscientiousness were predictive of greater reported texting frequency and interacting with a phone while driving, while lower levels of agreeableness was predictive of fewer reported instances of texting and interacting with a phone while driving. In older adults, greater extraversion was predictive of greater reported talking on and interacting with a phone while driving. Other personality factors were not significantly associated with distracted driving behaviors.

Conclusions—Personality traits may be important predictors of distracted driving behaviors, though specific traits associated with distracted driving may vary across age groups. The relationship between personality and distracted driving behaviors provides a unique opportunity to target drivers who are more likely to engage in distracted driving behavior, thereby increasing the effectiveness of educational campaigns and improving driving safety.

Keywords

Distracted driving; Big Five Personality; Texting; Teen drivers; Older drivers; driving safety

1.0 Introduction

Motor vehicle collisions (MVCs) are one of the leading causes of death for individuals across the lifespan, with 15- to 20- year olds drivers accounting for 9% and drivers over the age of 65 accounting for 17% of all fatal crashes (Centers for Disease Control and Prevention [CDC], 2015). The underlying factors increasing crash risk for younger and older drivers are likely different, though one emerging concern for both groups is the use of electronic devices behind the wheel. Distracted driving (i.e., driving while performing a secondary task) is involved in nearly 50% of crashes, translating to one million injury-producing crashes with 10% of these crashes involving a fatality (National Highway Traffic Safety Administration [NHTSA], 2015). At any point during the day, about 660,000 drivers are using their cell phones in some manner while driving (NHTSA, 2013). To date, it is unclear what factors may influence an individual's decision to engage in distracted driving behaviors; however, personality traits have been hypothesized to partially underlie the decision to drive distracted among young and middle aged drivers (Constantinou, Panayiotou, Konstantinou, Loutsiou-Ladd, & Kapardis, 2011; Jonah, 1997).

Although a substantial literature has examined the impact of demographics, health, sensory and cognitive functioning on driving behaviors, the influence of personality on driving behaviors is relatively understudied. One of the most widely accepted models of personality, and the focus of this study, is McCrae and Costa's "Big Five" personality model. According to this model, everyone falls within a continuum for each of five factors, namely: openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism (OCEAN; (Costa Jr. & McCrae, 1992)). Each of these factors can be divided into subgroup traits found in individuals who demonstrate high levels of each factor. For example, traits associated with the openness factor include fantasy, actions, and ideas. Extraversion traits include, excitement seeking, activity, and warmth. Traits of neuroticism include anxiety, hostility, and impulsiveness (Costa Jr. & McCrae, 1992). Conscientiousness traits include order, dutifulness, and self-discipline, while agreeable traits include trust, altruism, and compliance (McCrae & Costa Jr., 1997). Self-monitoring, or the ability to regulate one's behavior and reflect inwardly about actions (Snyder, 1974), has been found to be high in individuals with elevated scores on the personality scales of conscientiousness and agreeableness (Costa Jr. & McCrae, 1992). Cassidy (2005) found that extraversion has strong associations with susceptibility to peer influences.

Personality factors are closely related to driving behaviors in general, as well as common distracted driving activities, such as use of a cell phone while driving (Clarke & Robertson, 2005; J. Ehsani et al., 2013). Greater levels of self-monitoring have been found in individuals who have higher cell phone use and in individuals with higher levels of conscientiousness and agreeableness. Thus, it is possible that higher levels of conscientiousness and agreeableness may also transfer to increased risk of phone use while driving via greater self-monitoring behaviors (Lane & Manner, 2011; Takao, Takahashi, & Kitamura, 2009). As such, it is likely that such traits may transfer to increased risk of cell phone use while driving. Surprisingly, little work has been conducted investigating the impact of personality factors on distracted driving across the lifespan. To date, only Lane and colleagues (2011) examined personality traits and phone usage across the lifespan. They

found that greater levels of extraversion were related to problem phone usage in mobile phone users aged 18-77. Despite its possible link to increased distracted driving behavior, it is still unclear what role personality traits may play in the tendency to engage in distracted driving.

To our knowledge, this is the first study to examine the relationships between the Big Five personality factors and self-reported distracted driving behaviors in both younger and older adults. Based on previous research, it is hypothesized that higher levels of extraversion, openness to experience, and agreeableness will be associated with higher reported levels of distracted driving behaviors (J. P. Ehsani, Bingham, Ionides, & Childers, 2014; Takao et al., 2009). Due to previous findings of overall lowered conscientiousness and agreeableness scores in adolescents with a gradual increase through adulthood, it is hypothesized that older adults will have higher levels of both conscientiousness and agreeableness than teens (Soto, John, Gosling, & Potter, 2011). It is further hypothesized that higher conscientiousness and agreeableness in older adults will be related to lower reports of texting and driving in this group lower frequencies of such behaviors are associated with altruistic behaviors and compliance with social norms (Soto et al., 2011). It has also been found that older adults have a lower level of texting and driving which implies that they will continue this social norm while behind the wheel (Anstey, Wood, Lord, & Walker, 2005).

2.0 Materials and Method

2.1 Participants

The current study used data from the Senior and Adolescent Naturalistic Driving Study (SANDS), which investigated the driving behavior of 120 licensed drivers separated in two age groups: teens (aged 16-19 years) and older adults (aged 65-85 years). Forty-eight teens ($M_{\text{age}} = 17.38$ years, $SD = 1.10$) and 72 older adults ($M_{\text{age}} = 72.29$ years, $SD = 5.36$) participated. Eligibility criteria included 1) being between the ages of 16 and 19 years or 65 years and older, 2) having a valid driver's license, 3) being the primary driver of a vehicle with liability insurance, and 4) owning a cell phone with texting capabilities.

2.2 Procedure

All study procedures were approved by a university Institutional Review Board (IRB). Data collection occurred from 2013-2014 in one state that had previously banned text messaging. Data included demographic information, a baseline assessment, two weeks of normal activities, and a follow-up assessment. Upon completion of the study, participants were monetarily compensated.

2.3 Materials

2.3.1 Demographics Questionnaire—Self-reported data was collected on age, gender, and ethnicity from both age groups.

2.3.2 Questionnaire Assessing Distracted Driving (QUADD)—The QUADD assesses self-reported distracted driving behaviors including: texting, talking on a cell phone, and interacting with the phone while driving. Participants rated their frequency of each

activity while driving by reporting number of times per day they engaged in the activity over the last two weeks. Example questions included: “In the last two weeks, how many times per day did you interact with a cell phone (touch, talk, hold, etc.) while driving?,” “In the last two weeks, how many times per day did you talk on a “hands-held” cell phone while driving?,” and “In the last two weeks, how many times per day did you send a text on a cell phone while driving?”. This measure has acceptable internal reliability ($\alpha = 0.70$) (Welburn et al., 2011).

2.3.3 Big Five Personality—The Big Five Personality (John, 1989) is a 45-item paper-and-pencil test assessing the degree to which a person believes that hypothetical situations apply to them using a Likert Scale (1 = strongly disagree; 5 = strongly agree). Example statements included: “is inventive” for openness, “makes plans and follows through with them” for conscientiousness, “is outgoing, sociable” for extraversion, “is considerate and kind to everyone” for agreeableness and “worries a lot” for neuroticism. Items are categorized into five factors, and a sum score is calculated for each of the Big Five personality factors: (1) openness, (2) conscientiousness, (3) extraversion, (4) agreeableness, and (5) neuroticism. This measure has good Internal reliability ($\alpha = .83$), as well as good discriminant and convergent validity (John & Srivastava, 1989).

2.4 Data Analysis

Descriptive statistics were obtained for the participant demographics, Big Five Personality traits, and self-reported engagement in distracted driving. Independent samples *t*-tests assessed group differences between the teens and older adults on the Big Five Personality factors and distracted driving behavior frequencies. Associations for the five personality traits were analyzed separately for teens and older adults using negative binomial or Poisson regressions depending on model fit as determined by Akaike Information Criteria (AIC), AIC Corrected (AICC) and Schwarz Bayesian Information Criteria (BIC) (Morel & Neerchal, 2012). All 5 Big Five Personality factor scores were included together as predictors for each of the 3 self-reported distracted driving outcomes (texting while driving, talking on a cell phone while driving and interacting with a phone while driving) for a total of 3 models for each age group. Age and gender were included as covariates in each model. Within group differences in education were found among the adolescents ($F(1,46) = 2632.80, p < .001$) and older adults ($F(1,71) = 2442.72, p < .001$), so education was also included as a covariate in each model. Rate ratios (RR) and 95% confidence intervals (CI) were calculated to quantify the relationship between each Big Five Personality factor and each distracted driving condition. Analyses were conducted in SAS 9.3 (SAS, 2011) with $\alpha = .05$, where $p < .05$ was considered significant for all analyses.

3.0 Results

3.1 Participant Characteristics

Of the 120 participants recruited, one teen was excluded due to incomplete data for the Big Five Personality inventory. The resulting sample size was 47 teens ($M_{age} = 17.38, SD = 1.11$; 60% female, 72% Caucasian) and 72 older adults ($M_{age} = 72.29, SD = 5.36$; 56%

female, 85% Caucasian). See Table 1 for descriptive statistics for participants, Big Five Personality factors, and self-reported distracted driving engagement.

3.2 Personality: Big Five Factors

As compared to teens, older adults reported significantly higher conscientiousness ($t(75.82) = -3.64, p = .001$) and higher agreeableness ($t(79.44) = -3.58, p = .001$). Compared to older adults, teens reported significantly greater extraversion ($t(117) = 2.14, p = .03$) and higher neuroticism ($t(64.35) = 3.90, p = .0002$). No significant differences were found between teens and older adults on openness to experience. There is no evidence of multicollinearity (i.e., $r = .80$) among the Big Five Factors in either age group (See Table 2).

3.3 Self-reported engagement in distracted driving

Teens reported significantly more instances of interacting with the phone ($t(50.61) = 4.25, p < .0001$) and more instances of texting while driving compared to older adults ($t(46.175) = 3.87, p = .0003$). No significant differences were found between teens and older adults on the number of instances of talking on the phone while driving.

3.4 Personality and self-reported engagement in distracted driving

3.4.1 Teens—Texting while driving was significantly associated with greater openness ($\chi^2(1) = 6.64, p = .001$), greater conscientiousness ($\chi^2(1) = 8.29, p = .004$), and less agreeableness ($\chi^2(1) = 7.72, p = .006$). Every 10 point increase in openness was associated with a 22% increase in the self-reported number of instances texting and driving; every 10 point increase in conscientiousness was associated with a 21% increase in self-reported number of instances texting and driving; and every 10 point increase in agreeableness was associated with a 16% reduction in self-reported number of instances texting and driving. Age, gender, and education were not statistically significant predictors of self-reported number of instances texting and driving.

The number of instances of interacting with the phone while driving was significantly associated with greater openness ($\chi^2(1) = 4.13, p = .04$), greater conscientiousness ($\chi^2(1) = 5.85, p = .02$), and less agreeableness ($\chi^2(1) = 8.42, p = .004$). Each additional 10 points in reported openness was associated with a 13% increase in the number of instances interacting with the phone while driving; every 10 point increase in conscientiousness was associated with a 12% increase in the number of instances interacting with phone while driving; and each additional 10 points in agreeableness was associated with a 13% decrease in the number of instances interacting with the phone while driving (See Figure 1). Age, gender, and education were not statistically significant predictors of reported number of instances interacting with the phone while driving.

There were no significant associations between self-reported instances of talking while driving and any of the Big Five personality traits or age, gender, and education for teens. See Table 3 for RRs and 95% CIs for each Big Five Personality factor and self-reported distracted driving behaviors in teens.

3.4.2 Older Adults—When adjusting for age, gender, and education, greater extraversion was significantly associated with self-reported instances of talking on a cell phone ($\chi^2(1) = 4.50, p = .03$) and interacting with a phone while driving ($\chi^2(1) = 6.96, p = .01$). A 10-point increase in extraversion scores in older adults was associated with approximately a 20% percent increase in both instances of talking on the phone and interacting with the phone while driving. Additionally, greater openness to experience was significantly associated with self-reported instances of interacting with a phone while driving ($\chi^2(1) = 5.33, p = .02$), such that each 10 point increase in openness scores was associated with an 11% decrease in instances of interacting with the phone while driving (See Figure 2). There was limited variability for texting in this older adults sample resulting dropping this variable from our analyses (i.e., only three older adults reported having texted while driving). Age, gender, and education were not significant predictors of instances of self-reported talking or interacting with the phone. See Table 4 for the results of RRs and 95% CIs for Big Five Personality factors and self-reported engagement in distracted driving behaviors in older adults.

4.0 Discussion

To our knowledge, this is the first study to examine the impact of personality on distracted driving in two high risk groups- adolescents and older adults. The hypothesis that higher extraversion, agreeableness and openness to experience would be associated with greater self-reported levels of distracted driving behaviors across both age groups was partially supported. For teen drivers, openness to experience was associated with an increase in two of the distracted driving behaviors: texting and interacting with a cell phone while driving. This finding may provide partial explanation for prior work finding that individuals high in sensation seeking and impulsiveness (traits often associated with the openness and extraversion factors) report more MVCs and driving violations (McCrae & Costa Jr., 1997) (Dahlen, Martin, Ragan, & Kuhlman, 2005). Based on previous research suggesting that those high in extraversion are more susceptible to peer influence (Costa Jr. & McCrae, 1992) it was hypothesized that drivers high in extraversion would be more likely to engage in texting and driving behavior, especially teen drivers who are more often influenced by peer relationships (Cassidy, 2005). Extraversion however, was only associated with an increase in talking and interacting with a cell phone while driving behaviors among older drivers. Unexpectedly, and contrary to findings of previous work (J. P. Ehsani et al., 2015), conscientious teen drivers were more likely to report engaging in texting and interacting with their cell phone while driving. Because individuals scoring high in conscientiousness typically endorse organized, dependable and even obsessive traits (Goldberg, 1990), it was expected that high scores in this personality trait would result in fewer instances of engaging in distracted driving behaviors; specifically texting and interacting with a cell phone (McCrae & Costa Jr., 1997). However, it may be that these individuals feel the need to respond immediately to text messages from peers, even in a potentially dangerous context, such as driving in a car, in order to maintain peers' perception of their dependability. Our findings are further supported by previous work by Lane and Manner (2011) indicating that conscientious younger adults are more likely to find their cell phone useful and therefore use it more often in various situations.

Contrary to the original hypothesis, agreeableness was associated with a decrease in reported texting and interacting with a phone while driving in teens. The compassionate and cooperative nature, including respect for rules set by authority figures, of individuals who score high in agreeableness may make such individuals less likely to engage in distracted driving behaviors due to road regulations and concern for safety (McCrae & Costa Jr., 1997; Soto et al., 2011). However, further research on this topic is needed to evaluate the mechanisms behind this relationship.

The current study was among the first to examine the direct relationship between the Big Five Personality traits and self-reported distracted driving behaviors. There are several limitations that should be addressed by future research in this area. Due to the small subset of older adults who reported texting and driving in the study, analyses of the relationship between personality and texting while driving in older adults was unfeasible. The low frequency of reported texting and driving in this population may be in part due to recognized changes in cognitive and motor abilities required to text while driving (Anstey et al., 2005; Lindley, Harper, & Sellen, 2009; Owsley et al., 1998), or may be due to an increase in levels of conscientiousness and agreeableness traits, such as self-discipline and compliance, as associated with aging (Soto et al., 2011). Finally, it is also possible that older adults prefer other forms of communication and engage in lower rates of texting (i.e., not just when driving) (Lindley et al., 2009). Second, a larger sample size of teen drivers is also needed to research smaller, yet important effects identified in previous research such as the impact of extraversion (Cassidy, 2005), that may impact an individual's likelihood of engaging in driving distracted. Lastly, individuals are often prone to underreport certain behaviors such as texting and driving, which is not only dangerous, but also illegal in the data collection state for those who have only been licensed for 6 months or less. After 6 months, texting and driving is no longer a primary law, meaning that a driver is legally able to text and drive unless another road law is broken whilst doing so. For this reason, future research should implement naturalistic methods of data collection, such as in-vehicle driving cameras, which have shown great promise in driving research (Klauer, Dingus, Neale, Sudweeks, & Ramsey, 2006), to evaluate distracted driving behaviors and associate them to each individual's personality traits extending the work of Ehsani et al. (2015). This design may provide a more clear and objective picture of the true relationship between personality and likelihood to engage in distracted driving behaviors.

5.0 Conclusion

Personality traits may be important predictors of distracted driving behaviors in both teens and older adults. The relationship between personality and distracted driving behaviors provides a unique opportunity to target drivers who are more likely to engage in distracted driving behavior. The current research shows limited support that different Big Five personality traits are predictive of the likelihood of engaging in varying forms of cell phone-related distracted driving across the lifespan, thereby opening up a novel area of research to increase the effectiveness of educational campaigns and improve safety for both young and older drivers. This may include advertisements that would appeal to drivers with specific personality traits (e.g., openness to experience) associated with a higher risk of engaging in distracted driving behaviors. It may be that the most effective strategies will focus on efforts

to target teen drivers who are the most frequent users of technology behind the wheel. However, such trends may change with the baby boomer generation which has higher rates of technology usage compared to previous generations. Additional research is warranted to determine the specific educational programs that are most effective for individuals of varying personality traits.

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Highlights

- This study considered how personality relates to engagement in distracted driving.
- More conscientious and open teens showed higher rates of distracted driving.
- More agreeable teens exhibited lower engagement in distracted driving.
- Extraverted older adults were more likely to engage in distracted driving.

Figure 1.

Rate Ratios and 95% CIs of self-reported engagement in distracted driving behaviors by personality in **teens** adjusted for age, gender, and education. Greater openness and conscientiousness were significantly associated with increases in instances of texting and interacting with the phone while driving, while lower agreeableness was significantly associated with decreases in instances of texting and interacting with the phone while driving.

Figure 2.

Rate Ratios and 95% CIs of self-reported engagement in distracted driving behaviors by personality in **older adults** adjusted for age, gender, and education. Greater extraversion was significantly associated with increased instances of talking on the phone and interacting with the phone while driving.

Table 1
Sample Descriptives, Big Five Personality Traits, and Self-Reported Distracted Driving Behaviors

Variable	Teens			Older Adults			<i>t</i> or χ^2	<i>p</i>
	<i>M</i> (<i>SD</i>)	<i>n</i> (%)	Range	<i>M</i> (<i>SD</i>)	<i>n</i> (%)	Range		
Age	17.38 (1.11)		16-19	72.29 (5.36)		65-85	-84.20	<.001
Gender (Female)		28 (60%)			40 (56%)		0.19	.67
Ethnicity (Caucasian)		34 (72%)			61 (84%)		7.14	.13
Highest level of Education	10.98 (1.47)		9-13	14.5 (2.49)		9-20	-9.70	<.001
Big Five Personality Factors								
Openness	33.34 (23.06)		0-90	41.03 (27.16)		1-90	-1.60	.11
Conscientiousness	58.83 (27.05)		8-97	75.39 (19.17)		30-97	-3.64	.001
Extraversion	62.66 (26.27)		3-97	53.42 (20.76)		9-91	2.14	.03
Agreeableness	51.87 (27.87)		0-97	68.90 (21.03)		14-97	-3.58	.001
Neuroticism	36.13 (28.93)		1-96	18.14 (15.92)		1-76	3.90	<.001

Note. Bold indicates $p < .05$; Highest level of education was measured as years of education where 13 = vocational/some college, 14 = associates degree, 16 = college degree, 17 = some professional school after degree, 18 = master's degree, and 20 = doctoral degree.

Table 2

Correlations Among Big 5 Personality Factors by Age Group

Big 5 Personality Factor	Adolescents					Older Adults				
	O	C	E	A	N	O	C	E	A	N
Openness		-.12	-.17	.13	.04		.13	.47	.04	-.22
Conscientiousness			.14	.37	-.35			.09	.42	.42
Extraversion				.15	-.47			.08	-.24	
Agreeableness					-.34					-.42
Neuroticism										

Note: Bold indicates $p < .05$

Table 3
Rate Ratios of Self-Reported Distracted Driving Behaviors by Personality Factors in Teens ($n = 47$)

Personality Factor	Talking while driving		Texting while driving		Interacting with phone while driving	
	RR (SE)	95% CI	RR (SE)	95% CI	RR (SE)	95% CI
Openness	1.08 (0.09)	0.92-1.28	1.22 (0.09)	1.05-1.41	1.13 (0.07)	1.01-1.26
Conscientiousness	1.05 (0.07)	0.91-1.20	1.21 (0.08)	1.07-1.38	1.12 (0.05)	1.02-1.23
Extraversion	1.17 (0.10)	0.99-1.37	1.08 (0.09)	0.93-1.27	1.01 (0.06)	0.91-1.13
Agreeableness	0.96 (0.07)	0.84-1.11	0.84 (0.05)	0.75-0.95	0.87 (0.04)	0.79-0.95
Neuroticism	1.11 (0.09)	0.95-1.29	1.10 (0.07)	0.95-1.28	1.02 (0.06)	0.91-1.14
Age	1.45 (0.37)	0.88-2.39	0.82 (0.20)	0.50-1.33	1.10 (0.21)	0.76-1.60
Gender = Male	1.11 (0.43)	0.52-2.38	1.27 (0.45)	0.64-2.55	1.04 (0.28)	0.62-1.74
Education	0.91 (0.16)	0.64-1.30	1.08 (0.21)	0.74-1.58	0.97 (0.14)	0.73-1.28

Note. Bold indicates significant association. RR = Rate Ratio, SE = Standard Error, CI = Confidence Intervals

Table 4
Rate Ratios of Self-Reported Distracted Driving Behaviors by Personality Factors in Older Adults (*n* = 72)

Personality Factor	Talking while driving		Interacting with phone while driving	
	RR (SE)	95% CI	RR (SE)	95% CI
Openness	0.92 (0.06)	0.81-1.04	0.89 (0.05)	0.80-0.98
Conscientiousness	0.97 (0.08)	0.83-1.14	0.97 (0.07)	0.85-1.10
Extraversion	1.19 (0.10)	1.01-1.41	1.20 (0.09)	1.02-1.39
Agreeableness	0.99 (0.07)	0.87-1.13	0.99 (0.06)	0.88-1.11
Neuroticism	0.85 (0.09)	0.69-1.06	0.98 (0.08)	0.83-1.14
Age	0.97 (0.03)	0.92-1.03	0.97 (0.02)	0.92-1.01
Gender = Male	1.61 (0.45)	0.93-2.78	1.37 (0.32)	0.86-2.16
Education	0.98 (0.06)	0.87-1.12	1.03 (0.05)	0.93-1.14

Note. Bold indicates significant association. RR = Rate Ratio, SE = Standard Error, CI = Confidence Interval