



Driving styles and their associations with personality and motivation[☆]

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ABSTRACT

The associations between driving styles and the Big-Five personality factors and perceived costs and benefits of driving were examined in order to obtain a more comprehensive understanding of driving styles. Questionnaires tapping driving style, personality traits, motivations for driving, and background variables were completed by 320 drivers (150 men and 170 women). The results show that each driving style is associated with a unique set of sociodemographic, personality, and motivational factors. The reckless and angry styles were both endorsed more by men than women, by younger drivers, and by those displaying higher levels of Extroversion and thrill seeking, and lower levels of Agreeableness and Conscientiousness. However, whereas the reckless style was also predicted by the perceived costs of driving-related distress, as well as higher perceived risk to life among those with higher education, the angry style was also predicted by perceptions of both control and annoyance among more educated drivers. The anxious style was endorsed more by women, and by drivers lower on Conscientiousness and higher on Neuroticism. Individuals reporting this style regard driving as a cause of distress and annoyance, and, depending on their level of education, perceive it as entailing more risk to life and as a potential damage to their self-image (higher education), or as providing more opportunities for impression management (lower education). The careful driving style was endorsed more by women, and associated with higher Agreeableness, Conscientiousness, and Openness, along with higher pleasure (especially among younger drivers), but lower thrill seeking and worries about damage to self-esteem. The discussion focuses on the importance of looking at driving styles and their predictors holistically in order to design practical interventions suited to different profiles of drivers.

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1. Introduction

The human factor in driving consists of two elements: driving skills and driving style. Driving style refers to the way a person chooses to drive or to their customary driving mode, including features such as speed, headway, and habitual levels of attentiveness and assertiveness, and is expected to be influenced by attitudes and beliefs regarding driving, as well as by more general needs and values (Elander et al., 1993). Taubman-Ben-Ari et al. (2004) suggested four broad driving styles which are conceptualized in the multidimensional driving style inventory (MDSI): (1) the *reckless and careless style*, which refers to deliberate violations of safe driving norms and thrill seeking while driving, and is characterized by high speed, illegal passing, and so on; (2) the *anxious style*, which relates to feelings of alertness and tension, along with ineffective

relaxation activities when driving; (3) the *angry and hostile style*, which refers to expressions of irritation, rage, and hostile attitudes and acts on the road, and is typified by a tendency for aggressive behavior, such as cursing or flashing lights at other drivers; and (4) the *patient and careful style*, an adaptive style that includes planning ahead, attention to the road, patience, courtesy, calmness, and obedience to traffic regulations. These styles were found to correlate with performance measures collected in a simulator (i.e., driving speed, number of driving maneuvers, passing gaps; Farah et al., 2009). They were also found to be related to various demographic and personality variables on the one hand, and to driving-related measures on the other (Taubman-Ben-Ari et al., 2004).

Basic demographics and certain personality traits have long been cited as central causes of risky driving and traffic crashes (Holland et al., 2010). Some of the major characteristics that have been shown to predict risky driving are lower age and male gender (e.g., Shinar and Compton, 2004), less driving experience (e.g., Kweon and Kockelman, 2003), higher aggression (e.g., Dahlen et al., 2005; Deffenbacher et al., 2003; Ulleberg and Rundmo, 2003), anxiety (e.g., Olteal and Rundmo, 2006; Westerman and Haigney, 2000), and sensation seeking (e.g., Jonah, 1997; Schwebel et al., 2006; Ulleberg and Rundmo, 2003).

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The investigation of the relationships between the four driving styles and a host of personality and driving history elements (Taubman-Ben-Ari et al., 2004) found that higher self-esteem was associated with a higher careful style and a lower reckless style; higher sensation seeking was associated with a higher reckless style; lower extraversion was related to a higher anxious style; and higher trait anxiety and neuroticism were both associated with a higher anxious and lower careful style. In addition, the reckless and the anxious styles were most closely associated with a history of dangerous driving (previous involvement in car crashes and traffic violations), while the careful style reflected a more well-adjusted and safer driving. The results for gender were consistent with previous findings of gender differences in respect to driving, with women scoring higher on the anxious driving style and men scoring higher on the reckless style (Holland et al., 2010; Taubman-Ben-Ari et al., 2004). Holland et al. (2010) also found that those with more external locus of control scored higher on the anxious driving style. Notwithstanding the importance of these findings and their contribution to the literature, what appears to be lacking is an effort to present a fuller and more holistic picture of the associations between personality and driving styles. This was therefore one of the aims of the current study.

The large number of personality traits that have been examined, as well as the diversity of definitions and measurement modes, often make it difficult to achieve a comprehensive evaluation of personality in general, and its relation to driving in particular. Consequently, in the last two decades, scholars have looked for central traits which can be used to characterize individuals and contribute to a broader understanding of their personality (John and Srivastava, 1999). One of the most widely used constructs is the classic personality trait taxonomy of the Big Five, which represents diverse systems of personality in a single framework (John and Srivastava, 1999). This model offers an integrative overview of personality based on five dimensions, each of which encompasses a variety of specific traits: *Extraversion*, which refers to the tendency to be outgoing, chatty, assertive, active, adventurous, daring, energetic, and sensation-seeking, as opposed to withdrawn, shy, quiet, reserved, and reticent; *Agreeableness*, which relates to the tendency to be friendly, amiable, modest, courteous, at ease with others, flexible, forgiving, considerate, tolerant, kind, trustworthy, and cooperative, as well as the more humane aspects of personality, such as altruism and concern for others; *Openness*, including the tendency to be intellectually curious, have a vivid imagination, be open to new ideas and experiences, and be sensitive, inquisitive, and inventive; *Conscientiousness*, consisting of the tendency to be careful, thorough, responsible, efficient, organized, achievement-oriented, and moral; and *Neuroticism*, which relates to the tendency to be anxious, depressed, tense, nervous, fearful, angry, and insecure, as opposed to emotionally stable (Digman, 1990; McCrea and John, 1992; Mount and Barrick, 1995).

Research in a variety of fields has consistently confirmed the Big Five factors as relevant and valid dimensions of personality which reliably predict differences between individuals, and its theoretical and empirical importance have repeatedly been demonstrated (e.g., Buss, 1996). Several efforts have also been made to connect the Big Five factors with driving measures, showing, for example, relationships between driver stress and neuroticism (Dorn and Matthews, 1992), and between crash involvement and conscientiousness (e.g., Arthur and Graziano, 1996). However, to the best of our knowledge, no previous study has examined the associations between the Big Five personality factors and driving styles.

Furthermore, we believed that a comprehensive picture would not be produced by personality and demographics alone, but that it was also necessary to relate to another critical source of human behavior, namely motivational aspects. In considering the motivations for engaging in risky behaviors, scientists commonly

distinguish between benefits and costs (e.g., Caffray and Schneider, 2000; Cooper et al., 1998; Furby and Beyth-Marom, 1992). The benefits, or enhancement motivators, of risky behavior include the desires to show off, to achieve self-esteem, personal worth, control, and confidence, to gain a sense of competence and skill, to feel part of a group, and to experience thrill and sensation. Accordingly, risky driving has been found to serve as a source of heightened feelings of self-determination and personal efficacy (Donovan et al., 1988), and a means of testing limits or competing with other drivers (Gregersen and Bjurulf, 1996).

The costs of engaging in risky behavior include the fear of harming oneself, the concern of significant others, regret for one's behavior, and helplessness (Taubman et al., 1996), as well as the potential social costs of embarrassment and failure (Moore and Gullone, 1996). Decisions regarding risk taking may also be driven by attempts to cope with or avoid negative emotions and stress (e.g., Richards et al., 1996). However, it is important to note that being able to acknowledge costs and benefits does not necessarily imply engagement in a rational weighing of these factors when deciding whether to drive carefully or recklessly. A behavior may be adopted despite the costs, or even because of them (Taubman-Ben-Ari, 2008). Taubman-Ben-Ari (2008) conceptualized four benefits and four costs of driving. In this conceptualization, the benefits of driving consist of: impression management, tapping the tendency to express ability and self-worth and to make efforts to impress others; pleasure, relating to the tendency to feel enjoyment and freedom and to be able to relieve tension and to grow calm when driving; thrill, which refers to driving-related stimulation, sensation, and risk seeking; and sense of control, relating to the tendency to feel a sense of competency when driving and that one has control over the situation and the vehicle itself. The four costs of driving are: distress, i.e., the tendency to feel stress, anxiety, discomfort, and loss of control when driving; damage to self-esteem, which relates to the tendency to feel that driving harms one's self-esteem, brings out the negative aspects of one's personality, and damages personal relationships; annoyance, or a sense of burden and fatigue when driving; and life endangerment, relating to the tendency to perceive driving as a risk to one's own life or the lives of others.

Using a sample of young drivers, Taubman-Ben-Ari (2008) found that the perception of driving as an opportunity for thrills encourages reckless driving habits and increases involvement in car crashes. Moreover, whereas the perceived cost of distress increases involvement in car crashes, the perceived cost of damage to self-image reduces such occurrences. In addition, the benefit of thrill and the cost of annoyance contribute positively to involvement in traffic violations. Thus, counterintuitively, the findings indicated that certain perceived costs of driving, i.e., distress and annoyance, might contribute to higher involvement in reckless driving. The author concluded that the negative connotations of risky behavior that dominate adult thinking may not necessarily be shared by adolescents. In other words, costs, as well as benefits, may encourage youngsters to take risks when driving, because driving is a convenient outlet for their feelings, conflicts, and ambivalence toward the issues of life and death. The current study sought to examine the relationships between the costs and benefits of driving and driving styles in additional age groups in order to understand how motivations, as well as personality and demographics, contribute to driving style in a broader population.

In view of the literature, it was hypothesized that a positive relationship would be found between extraversion and both the reckless and angry driving styles, and a negative association between these two styles and both Agreeableness and Conscientiousness. In addition, it was predicted that positive associations would emerge between Agreeableness, Conscientiousness, and Openness on the one hand, and careful driving on the other, and between Neuroticism and the anxious driving style. No specific

hypotheses were formulated in regard to the relationships between costs and benefits and driving style because of the differences in sample characteristics between the previous study and the current investigation.

2. Method

2.1. Participants

The sample consisted of 320 light vehicles drivers (150 men and 170 women) from various geographical areas in Israel, ranging in age from 18 to 60 ($M=35.13$, $SD=11.53$), who volunteered to participate in the study. Participants had 0.1–45 years of licensure ($M=14.92$, $SD=9.79$; women had 0.1–38 years of licensure, $M=14.14$, $SD=9.2$; men had 0.1–45 years of licensure, $M=15.8$, $SD=10.38$); and they drove 0.5–370 km per week ($M=81.18$, $SD=68.79$; women drove 0.5–365 km per week, $M=65.03$, $SD=56.81$; men drove 0.5–370 km per week, $M=96.86$, $SD=75.66$). Of these, 53% were married, 39% were single, and the rest were either divorced (7%) or widowed (1%). About half had children, and approximately two-thirds had an academic degree. No differences were found between men and women in their family status, having children, or level of education. They were recruited via convenience sampling all over Israel, through workplaces, academic institutions, and high schools. All the participants gave their informed consent to take part in the study.

2.2. Procedure and instruments

Three hundred and forty nine drivers were asked to complete a packet of four questionnaires in the following order: driving costs and benefits scale, the Big Five personality scale, the MDSI, and background data inventory. Upon completion, the questionnaires were returned to the researchers in sealed envelopes to ensure confidentiality. Completing all questionnaires took about 20 min. Three hundred and twenty questionnaires were returned.

Driving Costs and Benefits Questionnaire (Taubman-Ben-Ari, 2008), tapping subjective perceptions of the costs and benefits of driving. The questionnaire consists of two 21-item subscales, one assessing benefits and the other costs, and each relating to four factors. The driving benefits include: impression management (7 items; Cronbach's alpha .84); pleasure (5 items; Cronbach's alpha .85); thrill (5 items; Cronbach's alpha .79); and sense of control (4 items; Cronbach's alpha .73), and the driving costs consist of: distress (7 items; Cronbach's alpha .82); damage to self-esteem (7 items; Cronbach's alpha .73); annoyance (4 items; Cronbach's alpha .85); and life endangerment (3 items; Cronbach's alpha .79). Participants were asked to rate the extent to which each item reflects their feelings and attitudes toward driving, using a 7-point scale ranging from 1 (*not at all*) to 7 (*very much*). A score was assigned to each participant on each of the 8 factors by averaging his or her ratings on the relevant items.

The Big Five Personality Factors (John and Srivastava, 1999), a scale consisting of 44 items assessing five personality constructs: extraversion (8 items; e.g., "I like to talk a lot"); Agreeableness (9 items; e.g., "I start arguments with others"); Openness (10 items; e.g., "I have a vivid imagination"); Conscientiousness (9 items; e.g., "I am exacting in my work"), and Neuroticism (8 items; e.g., "I get stressed out easily"). Participants are asked to indicate the extent to which they consider each item to be descriptive of them, using a 5-point Likert-type scale ranging from 1 (*not at all*) to 5 (*very much*). Cronbach's alphas in the current study were .70 for Extraversion, .68 for Agreeableness, .75 for Openness, .79 for Conscientiousness, and .79 for Neuroticism. Each participant's scores on the items in each subscale were averaged, yielding five scale scores.

Multidimensional Driving Style Inventory (MDSI; Taubman-Ben-Ari et al., 2004), a validated and reliable 44-item self-report scale that assesses four broad driving styles: reckless and careless (11 items, Cronbach's alpha .80); anxious (19 items, Cronbach's alpha .82); angry and hostile (5 items, Cronbach's alpha .81); and patient and careful (9 items, Cronbach's alpha .68). Following several other applications of the inventory (e.g., Miller and Taubman-Ben-Ari, 2010; Taubman-Ben-Ari, 2011; Taubman-Ben-Ari et al., 2005), we used the four factor solution here as well (by combining the eight original factors to the four broad styles: risky and high velocity factors are gathered to represent the Reckless style, the careful and patient factors represent the Careful style, the distress-reduction, dissociative, and anxious factors represent the Anxious style, and the angry factor is the same). Participants were asked to rate the extent to which each item fits their feelings, thoughts, and behavior as drivers, indicating their answers on a 6-point scale ranging from 1 (*not at all*) to 6 (*very much*). Four driving style scores were computed for each participant by averaging their responses to the items in each factor, with higher scores indicating higher endorsement of the relevant style.

Sociodemographic data and driving history. These were tapped by means of a questionnaire asking the participants to report their age, gender, marital status, education, and the average number of kms they drive per week.

3. Results

3.1. Driving styles and sociodemographic factors

In order to examine the differences in the reported driving styles between men and women, a one-way MANOVA was performed. The analysis revealed a significant main effect for gender, $F(4,314)=8.02$, $p<.001$, $Eta^2=.11$. ANOVAs conducted for each driving style indicated significant gender differences in all four styles: reckless, $F(1,318)=9.82$, $p<.01$, $Eta^2=.03$; anxious, $F(1,318)=13.46$, $p<.001$, $Eta^2=.04$; angry, $F(1,318)=6.08$, $p<.01$, $Eta^2=.02$; and careful, $F(1,318)=7.07$, $p<.01$, $Eta^2=.02$. Men reported higher reckless ($M=2.22$, $SD=.64$) and angry ($M=2.22$, $SD=.64$) driving styles than women ($M=2.01$, $SD=.61$; $M=2.02$, $SD=.86$, for reckless and angry, respectively), while women were higher on the anxious ($M=2.11$, $SD=.58$) and careful ($M=4.84$, $SD=.56$) driving styles than men ($M=1.89$, $SD=.47$; $M=4.66$, $SD=.64$, for anxious and careful, respectively).

Next, we examined the associations between the four driving styles and both age and exposure (kms driven per week), using Pearson correlations. The analyses showed that higher age was related to lower reported reckless, $r(319)=-.23$, $p=.000$, and angry, $r(319)=-.24$, $p=.000$, driving styles, and with higher endorsement of the careful style, $r(319)=.16$, $p=.001$. Exposure was negatively related to the anxious driving style, $r(320)=-.17$, $p=.001$.

Finally, it is worth noticing that *t*-test indicated that men drive more kms per week ($M=96.86$, $SD=75.66$) than women ($M=65.03$, $SD=56.81$). In addition, Pearson correlations between age and exposure were $r(139)=.22$, $p=.008$ for men, and $r(136)=-.10$, $p=.25$ for women, indicating that only for men, the older they are, the more they drive per week.

3.2. Driving styles, personality, and motivation

Pearson correlations were calculated between the driving styles and the personality and motivational factors. The results appear in Table 1.

Table 1 shows that, as predicted, significant inverse correlations were found between Agreeableness and Conscientiousness on the one hand, and both the reckless and the angry driving styles

Table 1

Pearson correlations between driving styles, the Big Five personality dimensions, and the costs and benefits of driving.

	Driving styles			
	Reckless	Anxious	Angry	Careful
Big Five factors				
Extraversion	.06	.01	.04	.05
Agreeableness	-.30***	-.09	-.32***	.26***
Conscientiousness	-.28***	-.24***	-.24***	.33***
Neuroticism	.10	.26***	.11	-.08
Openness	-.04	.09	-.08	.23***
Benefits of driving				
Impression management	.35***	.10	.24***	-.13*
Pleasure	.28***	-.17**	.20***	.08
Thrill	.54***	.02	.38***	-.30***
Sense of control	.20***	-.05	.15**	.06
Costs of driving				
Distress	.01	.63***	.03	-.08
Damage to self-image	.40***	.35***	.31***	-.35***
Annoyance	-.01	.51***	-.02	-.09
Life endangerment	.15**	.40***	.11	-.06

* $p < .05$.

** $p < .01$.

*** $p < .001$.

on the other. Significant positive correlations were found between the three factors of Agreeableness, Conscientiousness, and Openness and the careful style, as well as between Neuroticism and the anxious driving style. In addition, a negative association emerged between Conscientiousness and the anxious style.

The correlations between the costs and benefits of driving and driving styles indicated that the reckless and angry driving styles were significantly and positively related to all four benefits: impression management, thrill, pleasure, and control. The same two styles were also significantly and positively associated with the cost of damage to self-esteem, and the reckless style was positively, though weakly, related to endangerment to life. The careful driving style was significantly associated with impression management, thrill seeking, and damage to self-esteem. Finally, the anxious driving style was positively related to all four costs, distress, damage to self-esteem, annoyance, and life-endangerment, and inversely related to pleasure.

Examination of the correlations between the benefits of driving and the personality factors revealed that Extraversion was positively associated with the benefits of impression management, pleasure, control, $r(320) = .16, .17, .21, p = .01$, respectively; Agreeableness and Conscientiousness were both related to lower thrill seeking, $r(320) = -.23, -.18, p = .01$, respectively; and Openness was connected to higher pleasure, $r(320) = .17, p = .01$. Examination of the correlations between the costs of driving and the personality factors revealed that Conscientiousness was negatively associated with the costs of distress, damage to self-esteem, and annoyance, $r(320) = -.17, -.24, -.16, p = .01$, respectively; Neuroticism was positively associated with the costs of distress, damage to self-esteem, annoyance, and life endangerment, $r(320) = .34, .28, .25, .18, p = .001$, respectively; and Agreeableness was related to lower damage to self-esteem, $r(320) = -.21, p = .001$.

3.3. The contribution of sociodemographic, personality, and motivation factors to driving styles

A series of four hierarchical regressions was conducted to examine the unique and combined contribution of each of the study variables to the explained variance in each of the driving styles. In the first four steps of each regression, the variables were entered in a forced order: sociodemographic variables (gender, age, education) in Step 1; exposure in Step 2; the personality factors in Step 3; and the motivational factors in Step 4. In Step 5, the

interactions between the variables were added using a stepwise method, so that only interactions showing significant ($p < .05$) contributions were entered in the equation. The results appear in Table 2.

As can be seen from Table 2, the study variables explained a total of 39.7% of the variance in the reckless style, 45.5% in the anxious style, 31.1% in the angry style, and 34.2% in the careful style.

In the analysis for the reckless driving style, significant contributions were found for gender and age in Step 1, indicating that men and younger drivers tended to endorse the reckless style more than women and older drivers. No significant contribution was found for exposure in Step 2. Higher Extraversion and lower levels of both Agreeableness and Conscientiousness in Step 3, and a higher perception of the benefit of thrill and lower perception of the cost of distress in Step 4, all contributed significantly to higher reports of the reckless style. In Step 5, a single significant interaction emerged: education \times life endangerment.

Simple slope analyses (Aiken and West, 1991) conducted to examine the source of this interaction revealed that life endangerment was significantly associated with the reckless driving style among drivers with a higher level of education, $b = 13, p = .01$, but not among those with less education, $b = -.01, p = .81$. Thus, whereas among more educated drivers, perceived risk to life was related to higher endorsement of the reckless driving style, no such relation was found among less educated individuals.

In the analysis for the anxious driving style, a significant contribution was found for gender in Step 1, indicating that women reported higher anxious style than men. Greater exposure in Step 2, and higher Neuroticism and lower Conscientiousness in Step 3 contributed to higher reports of the anxious driving style. Whereas no benefits of driving predicted this style in Step 4, significant contributions were found for the higher perceived costs of distress and burden. Four significant interactions emerged in Step 5: education \times life endangerment; education \times impression management; education \times damage to self-esteem; and education \times agreeableness.

Simple slope analyses conducted to examine the source of these interactions revealed that life endangerment and damage to self-image were significantly associated with increased anxious driving style among drivers with higher levels of education, $b = 10, p = .02$; $b = 11, p = .04$, respectively, but not among those with less education, $b = -.02, p = .58$; $b = -.06, p = .28$, respectively. Thus, more educated drivers who perceived driving to entail more risk to life and damage to one's self-image tended to endorse a more anxious driving style, but no such relation was found for drivers with less education. Furthermore, impression management was significantly associated with increased anxious driving style among less educated drivers, $b = 14, p = .01$, but not among their more educated counterparts, $b = -.03, p = .58$, while Agreeableness was significantly associated with decreased anxious driving style for drivers with lower levels of education, $b = -.09, p = .02$, but not for those with more education, $b = .02, p = .64$. In other words, less educated drivers who reported a higher perception of driving as serving impression management and who were less characterized by Agreeableness were more likely to endorse the anxious driving style.

In the analysis for the angry driving style, gender and age in Step 1 made significant contributions, indicating that men and younger drivers tended to endorse the angry style more than women and older drivers. No significant contribution was found for exposure in Step 2. Higher Extraversion and lower levels of both Agreeableness and Conscientiousness in Step 3, and higher perceived thrill in Step 4, all contributed significantly to the angry style. In Step 5, two significant interactions emerged: education \times sense of control; and education \times annoyance.

Simple slope analyses conducted to examine the source of these interactions revealed that both sense of control and

Table 2
Hierarchical regression coefficients (beta weights) for the prediction of driving Styles.

	Driving style			
	Reckless	Anxious	Angry	Careful
Step 1				
Gender	-.17**	.18**	-.14*	.12*
Age	-.21***	-.09	-.22***	.14*
Education	-.03	.03	.05	.01
ΔR^2	8.2***	3.9**	7.4***	3.7*
Step 2				
Exposure	.05	-.13*	-.01	.03
ΔR^2	0.3	1.6*	0	0.1
Step 3				
Big-Five factors				
Extraversion	.12*	-.04	.14*	-.03
Agreeableness	-.18**	-.03	-.23***	.18**
Conscientiousness	-.20***	-.20**	-.17**	.26***
Neuroticism	.02	.15*	.02	-.01
Openness	-.03	.04	-.09	.23***
ΔR^2	9.6***	7.9***	11.3***	16.4***
Step 4				
Benefits of driving				
Impression management	.09	.14	.05	-.03
Pleasure	.06	-.04	-.01	.25**
Thrill	.35***	-.05	.21*	-.30**
Sense of control	-.08	-.01	.04	.12
Costs of driving				
Distress	-.22**	.37***	-.16	.01
Damage to self-image	.13	-.02	.10	-.17*
Annoyance	.11	.17*	.09	.08
Life endangerment	.09	.09	.07	.05
ΔR^2	20.4***	27.2***	8***	11.8***
Step 5				
Education \times life endangerment	.12*	.11*	–	–
Education \times impression management	–	-.17**	–	–
Education \times damage to self-esteem	–	.16**	–	–
Education \times agreeableness	–	.10*	–	–
Education \times sense of control	–	–	.18***	–
Education \times annoyance	–	–	.15**	–
Age \times pleasure	–	–	–	-.16**
ΔR^2	1.2*	4.9**	3.3**	2.3*
R^2	39.7***	45.5***	31.1***	34.2***

* $p < .05$.

** $p < .01$.

*** $p < .001$.

annoyance were significantly associated with increased angry driving style among drivers with higher levels of education, $b = .18$, $p = .05$; $b = .25$, $p = .01$, respectively, but not among those with less education, $b = -.14$, $p = .14$; $b = -.05$, $p = .61$, respectively. Thus, whereas more educated drivers who perceived driving to entail more sense of control and annoyance tended to endorse a more angry driving style, no such relation was found for drivers with less education.

In the final regression analysis, conducted for the careful driving style, significant contributions were found for gender and age in Step 1, indicating that women and older drivers tended to endorse this style more than men and younger drivers. No significant contribution was found for exposure in Step 2. Higher Agreeableness, Conscientiousness, and Openness in Step 3, and higher perceived pleasure and lower perceived thrill, along with a lower perception of the cost of damage to self-esteem in Step 4, all contributed significantly to greater endorsement of the careful style. In Step 5, a single significant interaction emerged: age \times pleasure.

In the examination of the source of this interaction, simple slope analyses revealed that pleasure was significantly associated with increased careful driving style among younger drivers, $b = .27$, $p = .00$, but not among older drivers, $b = .07$, $p = .25$. Thus, whereas younger drivers who perceived driving to entail more pleasure tended to endorse a more careful driving style, no such relation was found for older drivers.

4. Discussion

The current study sought to increase understanding of the factors that may be associated with the endorsement of the four driving styles: reckless, angry, anxious, and careful. In order to provide as comprehensive a picture as possible, the two integrative systems of personality and motivations were examined as well as basic sociodemographic variables.

The findings are consistent with the results of previous studies showing that men and women differ in their driving styles, with men reporting higher reckless and angry styles, and women reporting higher anxious and careful styles (e.g., Holland et al., 2010; Shinar and Compton, 2004; Taubman-Ben-Ari et al., 2004). Age was also found here to be a basic predictor, so that higher age was associated with lower endorsement of the reckless and angry styles and a higher report of the careful style, findings which are similarly in accord with those of previous investigations (e.g., Shinar and Compton, 2004; Taubman-Ben-Ari et al., 2004).

The most intriguing findings of the current study, however, relate to the personality and motivational factors. The results indicate that both the reckless and the angry driving styles are associated with a lower tendency for the personality characteristics of Agreeableness and Conscientiousness. Individuals who endorsed these driving styles also reported a higher perception of all four benefits of driving, seeing in driving a higher potential for

impression management, pleasure, thrill seeking, and a sense of control. In addition, they shared a higher perception of the costs of damage to self-image as drivers.

If we consider all the factors which contributed uniquely to these styles, we find that both are endorsed to a higher degree by men and younger people who are characterized by the personality dimensions of higher Extraversion and lower Agreeableness and Conscientiousness, and motivated by thrill seeking in driving. However, the reckless style was predicted additionally by a lower perception of distress in driving, and for more educated individuals, by a higher perception of risk to life as well. Angry driving, on the other hand, was also predicted by a higher sense of control and a higher perception of driving as a burden, but only among more educated drivers. In other words, the reckless and angry driving styles are associated with the tendency to be daring, sensation seekers, and assertive, with a lower tolerance and concern for others. In terms of motivation, both styles are associated with thrill seeking, but in the risky style this is combined with lower levels of distress and, for people with more education, a higher perception of the potential danger to their lives, whereas in the angry style it is combined, for people with a higher level of education, with the perceived benefit of control and the perceived cost of annoyance. These findings are consistent with the results of earlier research which showed, for example, that driving anger and sensation seeking were the most profound predictors of unsafe driving, including aggressive and risky driving (e.g., Dahlen et al., 2005; Deffenbacher et al., 2003; Schwebel et al., 2006), and that Conscientiousness predicted crash involvement (e.g., Arthur and Graziano, 1996).

Though it may seem that the careful style is simply the opposite of the reckless style, the results indicate that the picture is more complex. First, it is endorsed more by women and older people. Secondly, the personality characteristics of higher Agreeableness, Conscientiousness, and Openness all contribute to a higher report of the careful style. Finally, this style is associated with a lower perception of both the costs and benefits of driving. Thus, a lower need for impression management, lower thrill seeking, and lower perceived damage to self-image, are all related to higher endorsement of the careful driving style. In other words, those who drive carefully are more aware of other people's well being, and are less preoccupied with their own worries and anxieties. They drive carefully not because they are concerned with the risk to their lives, or as a way to achieve secondary gains such as sensation and excitement, but out of a mature concern for being kind, sensitive, understanding, cooperative, generous, and accepting of others. They might be said to value carefulness in and of itself, and to apply moral standards to their driving. Interestingly, younger drivers were also found to be motivated to drive carefully by the pleasure they derive from being behind the wheel (in contrast to thrill seeking, which characterizes risky and angry drivers). Previous studies have also found higher levels of Conscientiousness (Arthur and Doverspike, 2001; Arthur and Graziano, 1996) and lower sensation seeking (e.g., Jonah, 1997; Schwebel et al., 2006) to be related to reduced risky driving behavior.

A different picture emerges for drivers who endorse the anxious style. For them, higher Neuroticism and lower Conscientiousness, along with a lower perception of pleasure derived from driving and higher perceived costs, are all associated with higher anxious driving. Among drivers with more education, a greater perception of driving as a risk to life and as potentially damaging to self-esteem is related to higher endorsement of the anxious style, whereas among less educated drivers, the perception of driving as an opportunity to manage impression and lower levels of Agreeableness are associated with a higher endorsement of this driving style. In addition, anxious driving is related to lower exposure. Although we cannot draw conclusions regarding causality in this kind of study, it is possible that these people simply prefer to drive as little as possible, as

anxious drivers distinctly display a tendency to perceive driving as evoking distress and annoyance and as a threat to life and to their self-image. As mentioned before, this style is endorsed by women more than by men, thus might signpost a cluster more characteristic of them, both in terms of preference for driving at all and in terms of driving style.

Thus, people who endorse the anxious style are characterized by being tense, nervous, and fearful to begin with, as they are low on Conscientiousness and therefore not particularly careful or responsible. These tendencies are intensified by driving, as they perceive it to evoke distress and annoyance. In addition, for people with a higher level of education, anxious driving is enhanced by their perception of driving as a threat to their life and self-image, whereas for those with less education, it is amplified by their desire to make a good impression on others and their being less flexible and considerate. This description of the anxious driver is consistent with previous findings, showing, for example, an association between driver stress and Neuroticism, as well as with low levels of affection (Dorn and Matthews, 1992; Matthews et al., 1991).

The current study represents the first attempt to integrate sociodemographic, personality, and motivational factors in order to provide a fuller picture of the antecedents of the four driving styles. In addition, the results indicate the importance of distinguishing between these driving styles, as each one of them was found to be predicted by a unique set of dimensions.

Nevertheless, certain limitations of the study should be noted. First, it relied on self-reports of personality, motivations, and driving behaviors, and thus may suffer from social desirability and other self-serving biases. However, it is important to note that a recent study comparing self-reports and actual driving found them to be strongly correlated (Boufous et al., 2010), and another study found driving-related self-reports to be unbiased by social desirability (Sullman and Taylor, 2010). Secondly, a convenience sample was used here. Although we made efforts to include people of different ages, geographical areas, etc., a large proportion of the sample consisted of drivers with a high level of education. Though education was not found to be directly related to the four driving styles, and though it seems that the findings did indicate the potential differences between people with different levels of education through the interaction effects, future investigations would do well to replicate the results using representative samples. Thirdly, the percentage of the explained variance points to the fact that much more proportion is unexplained than explained. Thus, though the independent variables explained 31.1–45.5% of the variance of the different driving styles, it is evident that other independent variables which were not considered currently, might contribute to a better explanation of driving. Finally, the study did not examine crash history of participants, thus we are unable to relate personality and motivation to this variable. Nevertheless, the use of past involvement in traffic crashes is not without prices, because crashes are rare occasions, are vulnerable to impression management, and generally considered an unreliable measure (e.g., Olteidal and Rundmo, 2006; Ulleberg and Rundmo, 2003). In sum, it is important to further investigate the associations between self-reports of driving styles and behaviors, on one hand, and real driving measures, on the other, to constantly improve our ability to make use of valid measures for risky driving.

Despite the limitations, the current findings demonstrate the importance of adopting a multi-dimensional and holistic approach when relating to drivers. Safe driving interventions that take into account the differing needs, motivations, personality traits, and actual behavior of different groups of drivers can be expected to be more effective than any unidimensional strategy. It appears evident that what might influence one group may not work at all with another, or may even encourage greater involvement in risky behavior. For example, it is possible that threat appeals which

aim at moderating risky driving would put even greater stress and anxiety on the anxious drivers, making their ability to cope and manage driving more challenging. On the other hand, the same appeals might evoke sensation seekers and angry drivers to drive in even a more dangerous way, in order to satisfy their need to test the limits and express their aggressiveness. Attempts to use moral appeals to moderate risky driving might work with careful drivers, who are more attuned to moral messages, but who are also more cautious in driving to begin with. Such appeals might pass unnoticed for other drivers, who are not driven to behave according to moral guidance. In other words, more extensive knowledge regarding different motivations and personality traits, which might guide people's decisions on the road, might serve as a useful tool for intervention planning. The study provides further evidence of the need for a determined policy of purpose-designed driver education that includes not only technical mastery of the vehicle and familiarity with traffic signs and regulations but also fostering safety motivations and encouragement of consideration of other drivers' needs. Attention should be directed at a more differential mode of approaching drivers in media campaigns and other interventions, that draws on the factors that might not only prevent them from driving recklessly, but might also encourage them to drive in a more careful and considerate manner.

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