The association between personality and aggressive driving: A meta-analysis

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The aim of the present paper was to synthesize previous results on the relationship between personality (from the perspective of the Big Five Model and Alternative Five model) and aggressive driving. Secondly, we aimed at identifying the model of personality with the highest level of association to aggressive driving. The statistical analyses were conducted exclusively for those dimensions of personality that overlap (i.e., Neuroticism vs. Neuroticism-Anxiety, Extraversion vs. Sociability, Agreeableness vs. Aggression - Hostility). We searched for empirical studies with (1) cross-sectional design, (2) all the data needed for the meta-analytical computations, and (3) written in English. Database searches revealed a sample of 78 articles out of which 16 were eligible. The total sample of participants was of 6,721. Using a random effects framework, regarding the Big Five Model, we found a weak effect size for the relationship between Neuroticism and aggressive driving ($r = .26$, $p < .001$), a very weak relationship between Extraversion and aggressive driving ($r = .07$, $p = .03$), and a weak effect size for Agreeableness and aggressive driving ($r = -.26$, $p < .001$). Regarding the Alternative Five model, we identified a weak effect size for Neuroticism – Anxiety ($r = .21$, $p = .05$), marginally significant and weak effect for Sociability ($r = .21$, $p = .06$), and a moderate effect size for Aggression – Hostility and aggressive driving ($r = .41$, $p = .00$). The comparison between the two models of personality revealed that the AFM is more related to aggressive driving than BFM.

Keywords: Aggressive driving, the Big Five model, the Alternative Five model.

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Introduction

In the United States, motor vehicle accidents contribute to the category of unintentional injuries, which is the leading cause of death among persons between the ages of 1 and 44 (Heron, 2011; National Highway Traffic Safety Administration, 2007; Xu, Kochanek, Murhpy & Betzaida, 2010). The National Highway Traffic Safety Administration estimates that at least one-third of all motor vehicle accidents in the United States can be partially attributed to aggressive driving (Martinez, 1997). Last year only in the European Union there were 1.104.660 road accident victims (fatalities and injuries) with Romania being in the top of the list (European Commission – Annual Accident Report 2015). This fits the consensus in the research literature that aggressive driving increases the risk of motor vehicle accidents (Chliaoutakis et al., 2002; Galovski, Malta & Blanchard, 2006).

Given the massive cost of motor vehicle accidents and the importance of aggressive driving as a contributing factor, efforts to understand and ultimately prevent aggressive driving are of vital importance (Dahlen, Edwards, Tubré, Zyphur & Warren, 2012).

It is of high interest for both theorists and practitioners to review this particular area of transportation psychology and to determine the degree to which a specific result has been successfully replicated by a high number of studies. This would help theorists to revise definitions of specific concepts or improve the research methodologies. On the other hand, practitioners would benefit in knowing a central result on a specific theme, for example, to improve or modify the methods of testing people that apply for driver's license.

There are two presumed causal factors for this type of behaviour (i.e., aggressive driving): (1) situational factors and (2) individual factors. The present paper investigated a category of *individual factors* that could be associated with aggressive driving. Our choice in selecting the individual factors that could associate with aggressive driving is based on the fact that literature is more abundant in this regard, and on the fact that they account a significant percent (36%) of the variance in aggressive behaviours (e.g., Dahlen et al., 2012). These factors refer to personality, considered from two perspectives: Big Five Model (BFM; McCrae & Costa, 1987) and Alternative Five Model (AFM; Zuckerman, Kuhlman, Joireman, Teta,

& Kraft, 1993). For the current meta-analysis, we selected only three personality dimensions from each taxonomy. The reasons why we selected these two particular taxonomies are twofold: (1) both perspectives (especially the BFM) are widely used and culturally generalizable (Roland, 2002; Rossier et al., 2007); (2) BFM and AFM have documented overlaps (Zuckerman et al., 1993). Specifically, Zuckerman et al. (1993) demonstrated strong similarities through factor analysis between Extraversion vs. Sociability, Neuroticism vs. Neuroticism – Anxiety, Agreeableness vs. Aggression – Hostility (the first mention from the pairs is from FFM and the second from AFM). Thus, we want to explore which of the factors from the two theoretical perspectives that overlap is stronger associated with aggressive driving.

Hence, beside the goal of exploring the magnitude of the relationships between the personality dimensions and aggressive driving, it was also possible to assess which of them is more strongly related to the criterion.

The Five – factor model of personality

The Big Five model (McCrae & Costa, 1987) resulted from a lexical approach, and consists of 5 personality dimensions: Neuroticism, Agreeableness, Extraversion, Openness, and Conscientiousness.

Neuroticism corresponds to negative emotions such as fear, sadness, awkwardness, anger, guilt and disgust. Regarding the relationship between neuroticism and aggressive driving, the literature shows different levels of association. More precisely, some authors revealed a weak positive association (Benfield, Szlemko, & Bell, 2007; Britt & Garrity, 2006; Harris et al., 2014; Taubman – Ben-Ari, & Yehiel, 2012). Other authors showed an average positive association (Dahlen et al., 2012; Jovanović, Lipovac, Stanojević & Stanojević, 2011; Dahlen & White, 2006) and others identified a strong level of association (Qu et al., 2015; Aniței, Chraif, Burtăverde, & Mihăilă, 2014).

Extraversion refers to those individuals who are sociable, confident, active, talkative and who feel at ease among people and large groups. Some authors revealed a low positive association between extraversion and aggressive driving (Dahlen et al., 2012; Jovanović et al., 2011; Benfield et al., 2007; Britt & Garrity, 2006; Harris et al., 2014; Dahlen & White, 2006) and others showed that there is no association at all between these concepts (Dahlen & White, 2006).

Agreeableness is an interpersonal dimension, its essential aspects being altruism and cooperative behaviour. Dahlen and White (2006), and Britt and Garrity (2006) identified a low negative association between agreeableness and aggressive driving. Other authors also found an average negative association (Benfield et al., 2007; Aniței et al., 2014; Harris et al., 2014; Taubman – Ben-Ari, & Yehiel, 2012) and, furthermore, a high level of association between these constructs (Qu et al., 2015).

Building on the aforementioned theoretical arguments, we formulated the following questions:

Question 1: Is there a relationship between neuroticism and aggressive driving?

Question 2: Is there a relationship between extraversion and aggressive driving?

Question 3: Is there a relationship between agreeableness and aggressive driving?

The Alternative Five model of personality

The personality traits that comprise the Alternative Five model (Zuckerman et al., 1993) are Impulsive Sensation – Seeking, Aggression – Hostility, Neuroticism – Anxiety, Activity, and Sociability. These traits are basic personality dimensions, which resulted from a biological approach.

Neuroticism – Anxiety includes negative affective states, feelings of anxiety, emotional distress, hostility, excessive concerns, lack of self-confidence and sensitivity to criticism. Previous literature shows weak positive correlation with aggressive driving (Sârbescu, Costea, & Rusu, 2012; Sârbescu, 2012) and an average positive correlation, respectively (Poó & Ledesma, 2013).

Sociability represents those individuals who are likely to spend more time with friends, who engage in recreational activities and who often have an aversion to solitary activities. Previous results show weak positive associations with aggressive driving (Sârbescu, 2012; Sârbescu et al., 2012) and others show an association of an average value with this driving behaviour (Poó & Ledesma, 2013).

Aggression – Hostility refers to the propensity to adopt aggressive, reckless, antisocial, hateful and rude behaviours. Aggression – Hostility appears to have higher levels of associations than its equivalent (i.e., agreeableness). Specifically, Poó and Ledesma (2013) found an average positive association, and Sârbescu (2012) and Sârbescu et al. (2012) spotted a strong level of association.

Regarding the mixed results of previous literature, we formulated the next three questions:

Question 4: Is there a relationship between neuroticism – anxiety and aggressive driving?

Question 5: Is there a relationship between sociability and aggressive driving?

Question 6: Is there a relationship between aggression – hostility and aggressive driving?

Besides our attempt to synthesize previous results regarding the two models of personality and aggressive driving, we were also willing to identify the model of personality with the highest level of association to aggressive driving.

Method

Eligibility criteria

The eligibility criteria for this study were: (1) to report the correlations between personality from the perspective of the Big Five model or/and from the standpoint of the Alternative Five and aggressive driving, (2) English to be the primary language of the research articles.

Literature search and study selection

We conducted the literature search on several databases (e.g., PsycINFO, Google Scholar), using the following keywords: "Big Five Model" (Personality, Extraversion, Agreeableness, Neuroticism,) "Alternative Five Model" (Aggression-Hostility, Sociability, Neuroticism-Anxiety), "aggressive driving" and "dangerous driving".

Throughout the literature search, we selected only those studies that mentioned at least two variables of interest (i.e., driving behaviour - aggressive driving; and personality - Big Five Model / Alternative Five model). This process was conducted in June 2016 and yielded 78 titles. Seventy-three were retrieved in full-text (we had no

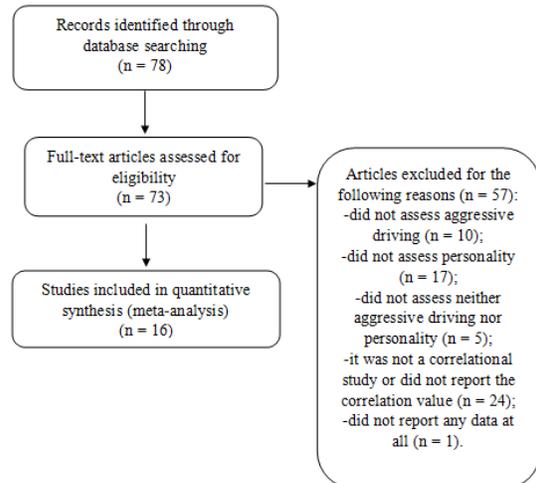access to 5 of them) and were analyzed for eligibility by the first author. For more details, see Figure 1.

Figure 1. The flow-chart of the included studies

Study coding and data collection process

To accomplish this step, all authors extracted independently the studies' characteristics and the first author conducted a second independent verification. The following characteristics were extracted: identification data (author(s) and year of publication), sample size, sample type, mean age of the participants, the percentage of male participants, the nationality of the participants, instruments that measured the variables of interest (the Big Five model, the Alternative Five model, and aggressive driving), and r value.

Statistical analysis

To calculate the statistical indicators, we used Comprehensive Meta-Analysis version 2.0 software (Borenstein, Hedges, Higgins, & Rothstein, 2005). For an exhaustive analysis of the articles included in this meta-analysis, we assumed the random effects model (due to the mixed characteristics of the studies).

We took into account the following indicators: k (the number of studies included in the meta-analysis); N (the total number of the participants for each relationship); r value (which indicates the degree of association between the variables); z-score (indicates whether the observed result is robust); the lower limit and upper limit (the values of which will be found with a 95% certainty the average effect among the population of the studies); the indicators of homogeneity, namely I^2 and Q (which shows the degree of variation in the magnitude of effect sizes from one study to another), and $Q_{between}$ (which shows whether there is a significant difference between the two models of personality).

Regarding the publication bias, we considered the Funnel Plot – a plot of a measure of study size (usually standard error or precision) on the vertical axis as a function of effect size on the horizontal axis.

Results

Study characteristics

We selected the essential features of the included studies, in order to offer a better explanation of the results.

Most of these features seemed quite mixed. That is, the samples included 6,721 students and other different categories of participants (e.g., general population - Jovanović et al., 2011; or field offices of the Office of Motor Vehicles – Dahlen et al., 2012), with mean ages between 18.71 and 37.89, and the gender distributions varying from 36% to 90.9% males. For an overview, see Appendix.

Mean effect size analysis

Regarding the Big Five model of personality, we found a weak effect size for the relationship between neuroticism and aggressive driving (r = .26, p < .001), a very weak relationship between extraversion and aggressive driving (r = .07, p = .03), and a weak effect size for agreeableness and aggressive driving (r = -.26, p < .001).

Regarding the Alternative Five model, we identified a weak effect size for neuroticism – anxiety (r = .21, p = .05), marginally significant weak effect for sociability (r = .21, p = .06), and a moderate effect size for aggression – hostility and aggressive driving (r = .41, p =.00).

The interpretation of these results is based on Evans' (1996) categorization of the levels of r values.

Despite the high number of robust relationships that we identified between these concepts, almost all of them (excepting aggression – hostility) did not share a common effect size (i.e., there was a high level of heterogeneity as revealed by the elevated levels of I^2 in combination with a statistically significant Q).

Q between index showed us there is no difference between neuroticism and neuroticism – anxiety and aggressive driving, but there is a difference regarding the effect sizes between extraversion and sociability in relationship to aggressive driving, and also between agreeableness and aggression – hostility as related to aggressive driving. In both cases the AFM dimensions exhibited stronger associations with the criteria than the BFM dimensions. For a better understanding of these results, see Table 1.

Moderator analysis

In order to explain the high level of heterogeneity of our results, we conducted moderation analyses. We found some significant moderators exclusively for the BFM, but because of the small number of included studies (i.e. three) we were not able to perform such analysis for the AFM. More precisely, for the relationship between neuroticism and aggressive driving, the nationality of the participants and the operationalization of personality seemed to explain some of the heterogeneity (for an overview, see Table 2). Therefore, there is a tendency towards stronger effects for the participants situated in European Union than for those in other states. Moreover, the relationship was also stronger in the studies that used exclusively International Personality Item Pool (IPIP; Goldberg, 1999) as compared to other Big Five personality measures (e.g., The Big Five Personality Factors, NEO-PI-R etc).

The $Q_{between}$ index showed non-significant effects between nationality (i.e., EU) or personality measure (i.e., IPIP) with regard to extraversion trait.

Regarding the relationship between agreeableness and aggressive driving, we found a significantly stronger mean effect for the studies that measured personality with other instruments than IPIP.

Publication bias

In order to investigate the presence of publication bias, we visually examined the funnel plots (see Figure 2).

Unfortunately, we found high levels of asymmetry for all the links.

Table 1. Effect sizes for the different dimensions of personality and aggressive driving

The link between variables	k	N	r	Z	95% CI	I²	Q	Q between
N – AD	13	5321	.26	6.63**	.19 – .33	86.02	85.83**	0.25
N-Anx – AD	3	1400	.21	1.93*	-.00 – .41	92.48	26.61**	
E – AD	12	5026	.07	2.15*	.01 – .12	72.43	39.91**	4.29*
Sy – AD	3	1400	.21	1.91	-.01 – .41	92.46	26.52**	
A - AD	12	3683	-.26	-9.33**	-.31 - 0.21	60.82	28.08**	160.40**
Agg-Host – AD	3	1400	.41	13.16**	.36 – .47	24.77	2.66	

Notes: *p<.05; **p<.01; k= number of studies; r= mean effect size; z score= the ratio of weighted arithmetic average and standard error of mean; 95% CI= Confidence Interval with a certainty of 95%; I²= index of inconsistency effects; Q value= heterogeneity index; E=Extraversion, Sy=Sociability; N=Neuroticism, N-Anx=Neuroticism-Anxiety; A=Agreeableness, Agg-Host=Aggression-Hostility; AD=Aggressive Driving.

Table 2. Effect sizes for moderator categories

Moderator	Variables	Category	k	N	r	95% CI	Q	Q between	P
Nationality	N – AD	EU	3	1998	.30**	.25 - .34	4.45	13.44	.00
		Others	10	3323	.20**	.17 - .23	67.94**		
	E – AD	EU	3	1998	.11**	.07 - .16	14.61**	.43	.52
		Others	9	3028	.09**	.06 - 13	24.87**		
	A – AD	USA	4	1770	-.23**	-.27 - -.19	7.17	4.98	.08
		Others	7	1749	-.30**	-.34 - -.25	15.92**		
Personality measure	N – AD	IPIP	6	2824	.29**	.25 - .32	6.84	18.37	.00
		Others	7	2497	.18**	.14 - .21	60.62**		
	E – AD	IPIP	6	2824	.11**	.08 - .15	22.35**	.91	.34
		Others	6	2112	.09**	.04 - .13	16.65**		
	A – AD	IPIP	5	1186	-.20**	-.26 - -.15	6.28	6.68	.01
		Others	7	2497	-.29**	-.32 - -.25	15.11*		

Notes: *p<.05; **p<.01; k=number of studies; N=total number of participants; r=correlation value; 95% CI= Confidence Interval with a certainty of 95%; Q=heterogeneity index; Q_between=the difference between the two variables; p=the significance threshold; N=Neuroticism; E=Extraversion; A=Agreeableness; AD=Aggressive Driving.
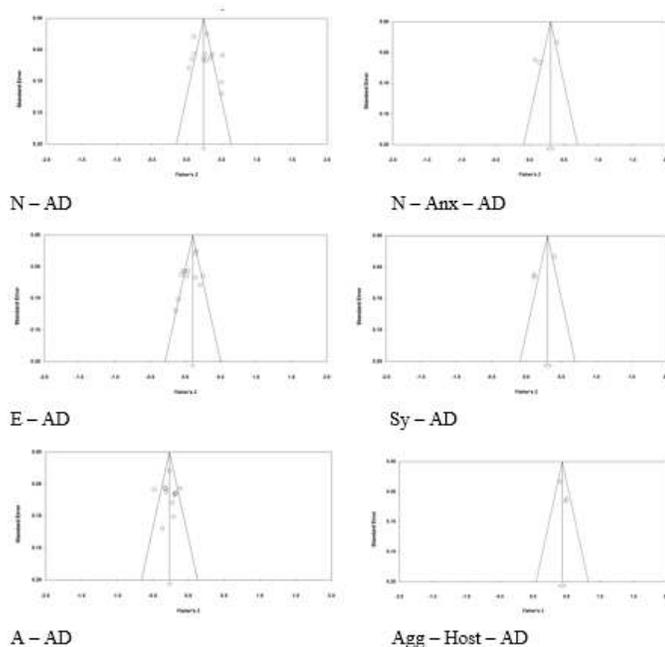

N – AD

N – Anx – AD

E – AD

Sy – AD

A – AD

Agg – Host – AD

Figure 2. The funnel plot for each relationship

Discussion

The primary aim of this study was to synthesize the previous results with regard to personality traits that have a correspondent in each of the model of personality (i.e., BFM and AFM) in relation with aggressive driving. Secondly, we wanted to identify which of these models is stronger associated to the criterion.

As mentioned in the introduction, a previous study found that personality variables accounted for 36% of the variance in aggressive driving behaviours (Dahlen et al., 2012), hence a moderate towards strong effect. However, our meta-analysis showed that, for the three dimensions that overlap between BFM and AFM, the relationships range between very small to moderate. We will further discuss each of our findings separately.

Neuroticism and aggressive driving exhibited a weak association. One possible explanation for this result could be the Bettencourt et al.'s (2006) assertion that neuroticism is a special kind of aggression termed "reactive aggression" that arises in provocative situations, not in the neutral ones. Moreover, the increased heterogeneity of the included effects suggests that there could be many other factors that can be accountable for the way this association manifests. The moderator analyses that we conducted can partially clarify this assumption.

We found that nationality acted as a moderator. Namely, it seems that European residents with high neuroticism are more prone to such behaviours than other types of nationalities. Our interpretation of this result is based on the fact that some of these countries (e.g., Romania, Serbia) are characterized by a rising stress level, where the social support systems fail to offer the aid to the people who need it the most. For example, Ge et al. (2014) demonstrated in their study that global stress has a significant impact on dangerous driving behaviour and that it diminishes the driver's ability to concentrate on driving. Furthermore, these countries are collectivists, thus this ideology restrain the individuality and diversity by insisting upon a common social identity. Additionally, there are two types of collectivism, horizontal and vertical collectivism. Vertical collectivism is based on hierarchical structures of power and is therefore based on centralization. Both of them can alienate the individual and break his or her personal identity, which can lead to frustration and all characteristics typical to a high neuroticism and, in turn, to a high level of aggressive behaviours (inclusively while driving).

We also found a higher and homogeneous score when IPIP was used as a measure for personality. This is not surprising since this instrument has gained a high level of reliability and validity across cultures (e.g., Mlačić & Goldberg, 2007).

Regarding extraversion, we found a very weak level of association with aggressive driving. This finding is in line with Harris et al.'s (2014) assumption that this dimension of personality may be the most enigmatic of the Big Five dimensions to relate to aggressive driving. They also claimed that despite the fact that extraversion is defined, in part, by assertive and impulsive behaviour and positively associated with a variety of unsafe driving behaviours, the relationship between extraversion and aggressive driving remains fragmented and contradictory. Nonetheless, we succeeded to find that in reality there is a very weak level of association exclusively between these two concepts, and we found no significant moderators for this relationship.

We also found a weak level of association between agreeableness and aggressive driving. The moderator analyses showed that there is no difference between the residents of the USA and those of other nationalities. In turn, it seems that the operationalization of personality acted as an artifact. More precisely, the mean effect size resulted from the studies that used IPIP was significantly lower than the one based on all other measures. Agreeableness is an interpersonal dimension which requires altruism and cooperative behaviours. The negative poles of these two sub-dimensions are relevant with regard to aggressive driving. Other instruments used in the included studies, such as NEO-PI-R (Jovanović et al., 2011) or Big Five Adjective Checklist (Britt & Garrity, 2006), have broader operationalizations inclusively for the aforementioned facets. Therefore, this could be one reason for which we have found higher mean effect size for latter ones.

Moving to the AFM, we identified a weak positive association between neuroticism – anxiety and aggressive driving (i.e., there is a small chance as people who constantly feel negative affective states to appeal to aggressive behaviours towards other traffic participants). There are several explanations for this result. Firstly, it is very likely that feelings alone are not enough in determination of a specific negative behaviour towards others (e.g., yelling at a driver). Feeling negative affective states and having negative automatic thoughts simultaneously could determine the driver to behave aggressive in traffic. For example, having a high level of anxiety (i.e., the affective state) and being tired with concern to the traffic agglomeration (the negative thoughts) can push the individual to some contravening behaviours (showing the finger to another driver).

Secondly, there are situational factors that could alter this result (e.g., the existence and the status of the passengers in the car). For example, the constant endorsements made by an experienced passenger (the situational factor), together with a high level of anxiety of the novice driver (both personal and state traits) can push the driver to reckless actions towards other drivers using his or her own vehicle.

We also found a weak and non-significant association between sociability and the criterion. Being sociable requires spending time with friends and engaging in recreational activities which does not match with driving activities. More specifically, one does not have so many opportunities to be highly sociable in traffic compared to, for example, a party situation. Hence, this interpretation could explain the non-significant relationship between sociability and aggressive driving.

An exception of the pattern of these results is the one related to aggression – hostility and aggressive driving. This result is of moderate intensity. It seems that individuals who have this trait at a higher level are more likely to engage in aggressive behaviours while driving. This is not surprising since human aggression is an inborn trait (McDougall, 2015) which is quite similar with Zuckerman's biological approach with regard to his taxonomy. Thus, aggression itself is sufficient in determination of any type of aggressive behaviour, even aggressive driving.

Comparing the two models of personality, it seemed that between neuroticism and neuroticism-anxiety there is no statistical difference. Both of them have the same level of association with aggressive driving. Regarding

extraversion and sociability, the latter has a significantly stronger association to aggressive driving. Moreover, aggression-hostility has a significantly stronger association with aggressive driving than agreeableness.

One possible explanation is related to the low number of studies of the AFM (three studies). This fact has both advantages and disadvantages. The advantage is that the value of the correlations are higher, which means that personality accounted a high level of percent of the variance in aggressive driving behaviours. The disadvantage is that we cannot generalize these results.

Another possible explanation is related to the biological approach of AFM taxonomy, which is very similar in terms of emotions and feelings to aggressive behaviours, in this case, while driving. The present theoretical analysis resulted in an empirical discovery: aggression – hostility has the strongest association to aggressive driving. Besides high accessibility to guns (O' Donnell, 1995), global warming, and the widespread exposure to violent entertainment media (Bushman & Huesmann, 2001) there is the biological approach that arbitrate negative behaviours towards others.

Human aggression is any behaviour directed toward another individual with the intention to cause harm. On the other hand, hostile aggression has historically been conceived as being impulsive, thoughtless (i.e., unplanned), driven by anger, having the ultimate motive of harming the target, and occurring as a reaction to some perceived provocation. It is sometimes called affective, impulsive, or reactive aggression (Anderson & Bushman, 2002). These two distinct definitions contribute to an overview regarding the similarities and divergences between aggressive driving and aggression – hostility. As we can see, there are more similarities than differences between them. The only difference between them is the motive of harming, which is the main aim with regard to human aggression, and that last one with regard to hostile aggression. Therefore, there is no wonder why these two concepts relate to one another at such intensity.

Lastly, two of these studies took place in the same country (i.e., Romania). In this case, the target population is quite similar. This fact leads to significantly stronger association with aggressive driving than other studies with mixed samples.

Practical implications

The present study's results could be used in identifying novice drivers or at-risk professional drivers indirectly based on their personality profiles. Especially the AFM seems to have the most promising predictive value for aggressive driving. Therefore, the experts from transportation psychology should evaluate the possible risk for aggressive driving by using specific personality measures (e.g., ZKPQ).

Transportation psychology experts should also pay attention to other moderator analyses For example, European drivers are more prone to negative affective states than other nationalities Regarding the interventions aimed at decreasing the level of aggression, for example, group sessions of mindfulness on individualist states may not be as effective as in collectivist ones.

Limitations

Our results are highly heterogeneous, due to, for example, the high diversity of personality and aggressive driving operationalizations or the varied samples. Further, there is a high level of imbalance with regard to the two

models of personality (i.e., BFM and AFM). The BFM integrated 13 studies, whilst the AFM integrated only 3 studies. Thus, the interpretation of the results of AFM are hardly generalizable. For this reason, we conducted moderator analysis only on the BFM.

Ultimately, understanding the role of personality in predicting aggressive driving could be restrained by the fact that we did not take into account all of the dimensions of the two models of personality.

Future directions

We suggest that future research should investigate extensively the AFM in relationship with aggressive driving, since it seems to exhibit stronger associations with this sort of behaviour. Future meta-analyses on individual differences correlates of aggressive driving should also consider the other dimensions of BFM and AFM for a more comprehensive view (i.e, Conscientiousness, Openness; Activity and Impulsive – Sensation Seeking). For example, many previous studies found that sensation-seeking played an important role in predicting aggressive driving behaviour (e.g., Dahlen, Martin, Ragan & Kuhlman, 2005; Dahlen & White, 2006). Conscientiousness should not be neglected either. In this case even more studies show convergent results (e.g., Dahlen & White, 2006; Dahlen et al., 2012; Harris et al., 2014; Jovanović et al., 2011).

The BFM and AFM do not represent the single models of personality that predict aggressive driving. For example, future research could associate the Eysenck model to this criterion (Harris & Houston, 2010; Lajunen & Parker, 2001).

Additionally, situational factors could also play a role in determining the aggressive behaviour while driving. For instance, they could refer to the existence and status of passengers in the car (Porter & Berry, 2001), since groups are invariably more aggressive than individuals (Smith & Bond, 2006).

Conclusion

The attainment of the present paper contributes in an exhaustive manner to understanding the relationship between the two acknowledged models of personality and a particular category of driving behaviour, namely aggressive driving.

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Appendix
Study characteristics

Study	N	Sample	MAge	% male	Personality measures	Aggressive driving measures	Nationality
1.Britt & Garrity (2006)	164	Students	19	39	Big Five adjective checklist (John, Donahue, & Kettle, 1990)	Situational questions regarding three specific anger provoking situation when driving (tailgate, cut off, slow), created by the authors	USA
2.Aniței et al. (2014)	100	Students	20.68	36	IPIP-50 (Goldberg, 1992)	AVIS (Aggressive driving behaviour - Benesch, 2011)	Romania
3.Dahlen & White (2006)	312	Students	-	-	IPIP-50 (Goldberg, 1999)	Driving Survey (Deffenbacher et al., 2000); DAS (Deffenbacher et al., 1994)	USA
4.Benfield et al. (2007)	204	Students	18.71	41.37	The Big Five Inventory-54-item (John, & Srivastava, 1999)	DAX (Deffenbacher et al., 2002); DATQ (Driver Angry Thoughts Questionnaire - Deffenbacher, Petrilli, Lynch, Oetting, & Swaim, 2003); DAS (Deffenbacher et al., 2002)	USA
5.Harris et al. (2014)	1181	Students	-	-	Big Five Index (BFI; John, Donahue, & Kentle, 1991; John, Naumann, & Soto, 2008)	Aggressive Driving Behaviour Scale (Houston et al., 2003)	USA
6.Jovanović et al. (2011)	260	Other than students	32.5	52.7	NEO-PI-R-60 (Djurić-Jočić et al., 2004)	DAX (Deffenbacher et al., 2002); UKDAS (Lajunen et al., 1998)	Serbia
7.Dahlen et al. (2012)	308	Other than students	37.89	41.88	IPIP (Goldberg, 1999)	DAX (Deffenbacher et al., 2002); DAS-14 (Deffenbacher et al., 1994)	Australia
8.Sârbescu (2012)	262	Other than students	28.17	90.8	ZKPQ-99 (Zuckerman et al., 1993)	DAX (Deffenbacher et al., 2002)	Romania
9.Sarma et al. (2013)	1638	Other than students	35.95	55.1	IPIP-30 (Goldberg, 1999)	DAS (Deffenbacher et al., 1994)	Ireland
10.Qu et al. (2015)	295	Other than students	37.34	50.16	Big Five Inventory (John, & Srivastava, 1999)	DDDI (Dula, & Ballard, 2003)	China
11.Sârbescu et al. (2012)	230	Students + other types of	27.36	90.9	ZKPQ (Zuckerman et al., 1993)	DAX (Deffenbacher et al., 2002)	Romania

Study	N	Sample	MAge	% male	Personality measures	Aggressive driving measures	Nationality
12.Taubman - Ben-Ari & Yehiel (2012)	320	participants Students + other types of participants	35.13	46.88	The Big Five Personality Factors (John, & Srivastava, 1999)	Multidimensional Driving Style Inventory (Taubman-Ben-Ari et al., 2004)	Israel
13.Yang et al. (2013)	224	Students + other types of participants	-	36.6	IPIP (Goldberg, 1999)	DBQ	China
14.Poó & Ledesma (2013)	908	Students + other types of participants	36.2	57.7	ZKPQ-50-CC (Aluja et al., 2006)	Multidimensional Driving Style Inventory (Poó, 2013)	Argentina
15.Ge et al. (2014)	242	Students + other types of participants	35.75	49.27	IPIP (Goldberg et al., 2006)	DDDI (Dula & Ballard, 2003)	China
16.Schwebel et al. (2006)	73	Students	27.82	41	The Big Five Inventory (BFI; Benet-Martinez and John, 1998)	The Driving Anger Scale (DAS; Deffenbacher et al., 1994, 2001)	USA