Should we be aiming to engage drivers more with others on-road? Driving moral disengagement and self-reported driving aggression

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Abstract

Aggressive driving behaviours may be associated with greater crash risk in situations where drivers engage in riskier types of behaviours such as following too closely. It also appears that many drivers who do not normally regard themselves as angry or aggressive report engaging in aggressive driving acts. Qualitative studies have suggested that drivers explain these behaviours with reference to justified retaliation or beliefs that such acts 'teach' other drivers a 'lesson' or to exercise better driving manners or etiquette. Drivers may also argue that their behaviour does not have a negative impact on others. Such descriptions of motives bear a strong resemblance to the psychological mechanisms of moral disengagement. Moral disengagement is where individuals detach themselves from their usual self-regulatory processes or morality in order to behave in ways that run counter to their normal moral standards. Moral disengagement offers a potential explanation of how apparently 'good' or moral people commit 'bad' or immoral behaviours. Categories of moral disengagement are: cognitively misinterpreting the behaviour (e.g euphemistic labelling); disconnecting with the target (e.g. attributing blame to the target); and distorting or denying the impact of the behaviour. An on-line survey with a convenience sample of general drivers (N = 294) was used to explore the potential utility of moral disengagement in explaining self-reported driving aggression over and above the explanatory power provided by constructs that are normally associated with self-reported on-road aggression. Hierarchical regression analysis was used with measures of trait anger, driving anger (DAS), moral disengagement, and driving moral disengagement (an adaptation of the measure of moral disengagement for the driving context). Results revealed that the independent variables together explained 37% of the variation in self-reported driving aggression (as measured by the Driving Anger Expression scale, DAX). Driving moral disengagement was a significant predictor of driving aggression (p < .001) after accounting for the contribution of age, gender, driving anger, and moral disengagement. Moreover, inspection of the beta weights suggested that driving moral disengagement (beta = .57) was the strongest predictor for this sample, accounting for 20% of the unique variance in driving aggression (sr^2 = .20). The pattern of results suggests drivers with higher tendencies to morally disengage in the driving context may respond to others more aggressively on-road. Moreover, driving moral disengagement appeared to add to our understanding of why some angry drivers do not respond aggressively on-road while others do. Seeking to prevent drivers from activating moral disengagement while driving may be worthy of exploration as a way of reducing non-violent, yet potentially still risky, forms of driving aggression.

Résumé

Les comportements de conduite agressive peuvent être associés à un risque accru d'accident dans des situations où les conducteurs ont des comportements plus risqués tels que suivre de trop près. Il apparaît également que de nombreux conducteurs qui ne se considèrent pas normalement colérique ou agressif rapportent se livrer à des actes de conduite agressive. Des études qualitatives ont suggéré que les conducteurs expliquent ces comportements en faisant référence à des représailles ou croyances justifié que ces actes inculqueront aux autres conducteurs une « leçon » ou encore leur apprendra à démontrer de meilleures manières ou une étiquette de conduite de meilleure qualité. Les conducteurs peuvent aussi faire valoir que leur comportement n'a pas d'impact négatif sur les autres. Ces descriptions de motifs portent une forte ressemblance avec les mécanismes psychologiques de désengagement moral. Le désengagement moral s'observe quand les individus se détachent de leurs processus d'autoréglementation habituel ou de leur moralité afin de se comporter de manière ayant à l'encontre de leurs valeurs morales normales. Le désengagement moral offre une explication potentielle sur la façon dont des personnes apparemment «bonne» ou de bonne morale commettent des actes « mauvais » ou ont des comportements immoraux. Les catégories de désengagement moral sont: la mésinterprétation cognitive du comportement (par exemple en matière d'étiquetage euphémisme); déconnexion avec la cible (par exemple attribuer le blâme à la cible); et la distorsion ou négation de l'impact du comportement.

Un sondage en ligne auprès d'un échantillon de commodité de conducteurs (N = 294) a été utilisé pour explorer l'utilité potentielle du désengagement moral pour expliquer l'agression de conduite auto-déclarée au-delà de l'explication fournie par les concepts normalement associée à l'agression auto rapporté sur la route.

Une analyse de régression hiérarchique a été utilisé avec des mesures de colère trait, la colère pendant la conduite (DAS), le désengagement moral, et le désengagement moral lors de la conduite (une adaptation de la mesure de désengagement moral pour le contexte de la conduite). Les résultats ont révélé qu'ensemble, les variables indépendantes expliquent 37% de la variation de l'agressivité auto déclarée lors de la conduite (telle que mesurée par l'échelle d'expression colérique de conduite [Driving Anger Expression scale, DAX]). Le désengagement moral lors de la conduite était un prédicteur important de l'agression de conduite ($p < 0,001$) après la prise en compte de la contribution de l'âge, du sexe, de la colère lors de la conduite, et le désengagement moral lors la conduite. De plus, l'inspection des poids bêta a suggéré que le désengagement moral envers la conduite (bêta = 0,57) était le meilleur prédicteur pour cet échantillon, représentant 20% de la variance unique dans l'agression lors de la conduite (SR2 = .20). Les résultats suggèrent que les conducteurs ayant des tendances plus élevés envers le désengagement moral dans le contexte de la conduite peuvent répondre aux autres de façon plus agressive sur la route. En outre, le désengagement moral lors de la conduite a apparemment ajouter à notre compréhension de la raison pour laquelle certains pilotes en colère ne répondent pas de manière agressive sur la route tandis que d'autres le font. Les pistes de solution cherchant à empêcher l'activation du désengagement moral du conducteur pendant la conduite devraient être explorées comme moyen de réduire les formes non-violentes, mais encore potentiellement risquée, d'agression lors de la conduite.

INTRODUCTION

Driving is an everyday activity that involves a relatively high level of interpersonal interaction, for the most part with unknown others. These interactions are frequently experienced as frustrating, and driving anger is also very common. Some drivers choose to express their anger and frustration in hostile or aggressive ways: over half of drivers surveyed in an annual driving survey in Australia admitted to responding to aggressive manoeuvres from other drivers with verbal aggression of rude gestures, and around 20% said they had retaliated by some with tailgating (following too closely) [1]. While 87% also believed that disregarding or ignoring others who behave aggressively on road is the best response, it appears that a large proportion behave in ways that are in opposition to their beliefs, when behind the wheel.

While media sensationalisation of extreme, and fortunately rare, driving aggression has ensured a high profile for acts of road violence, the consequences of non-violent and much more common aggressive driving behaviours such as hand gestures, horn honking and also use of a vehicle to impede or intimidate other drivers appears less well known among the driving public. However, driving anger has been found to be associated with an increase in crash involvement [2]. Similarly, trait anger and hostility have also been found to be associated with other driving behaviours that increase the risk of crashes, such as close following [3] and driving anger and aggression are also strongly associated [4]. Thus, the expression of anger as aggressive driving highlights the importance of exploring the behaviour and finding ways to address it. For the current research, driving aggression is taken to be "any behaviour directed at another road user and intended to cause a negative physical or psychological impact (such as injury, distress or discomfort, even if only mild) in an attempt to achieve a goal and that is accompanied by negative affect such as anger or rage" [5].

Research to date has focused on generating a model of driver aggression, in an attempt to determine the precursors that increase an individuals' propensity to be aggressive behind the wheel. One fruitful direction of recent research has been the application of the General Aggression Model (GAM) [6] to the driving context. This integrative conceptualisation of general aggression proposes that inputs from a social interactive situation, along with characteristics of the person, have an effect on the individual's affective, cognitive and arousal states. Together these then feed into a decision-making processing system that generates a behavioural response [6]. In the current research, the focus is on person-related factors, especially those that may affect the cognitions that drivers may generate and which then increase the likelihood of an aggressive driving response.

General trait anger and the more context-specific driving anger (that is, an individual's propensity to become angry while driving) are person-related factors that are positively correlated [7]. Spanish research utilising a sample of 198 university and community participants ranging from driving age to 73 years old found that responses on self-reported general trait anger and trait driving anger measures showed a moderate to strong correlation of .58 [8] suggesting that, although the constructs are related, they appear to capture different aspects of anger that are related to differences between contexts. Thus separate measures may be needed for each construct, depending on the context being explored [8]. Other evidence suggests that both trait anger and driving anger are related to self-reported aggressive behaviour while driving in different driving populations and across different countries such as New Zealand [9] the USA [10]. For instance, recent work in New Zealand found that in a sample of community drivers (N =

130), self-reported verbal expression of aggression was moderately correlated with self-reported use of a vehicle to express anger (as measured by the Driving Anger Expression Inventory (DAX) [9]. However, some studies have found more contradictory results, so that a question that still remains with regard to this relationship is that not all angry drivers behave aggressively when behind the wheel. Moreover, some studies have found that high levels of self-reported anger do not necessarily correspond to appreciable levels of self-reported driving aggression particularly for women [9,11,12].

It has been hypothesised that the circumstances that surround particular driving situations, such as how anonymous the driver believes himself or herself to be, may be one of the reasons for these seemingly contradictory findings [13]. Similarly, cognitions, especially attributions about the intentions or characteristics of other drivers, have been put forward as potential mediators of the relationship between tendency towards anger on road and driving behaviour [4,14-16]. That is, how a driver thinks about the behaviour of other drivers has been found to influence the tendency to report responding aggressively or choosing to respond in a non-aggressive way. While such studies have contributed to our understanding of aggressive driving, the area is still under researched [17].

Another potential explanation for the different behavioural responses of drivers who may be angry about another's driving is that some drivers may be more disengaged from their usual processes of self-censure in the driving context. That is, some drivers may have greater tendencies to moral disengagement. Moral disengagement is a construct developed by Albert Bandura [18] to explain the phenomenon where individuals detach from their usual self-regulatory process, or their 'moral compass', in order to perform behaviours that are in opposition to their normal moral standards, whilst still retaining a positive view of the self. Essentially, moral disengagement endeavours to explain why 'good' people do 'bad' things and how is it that otherwise normal individuals can detach from behaviours such as acts of violence in war and aggressive acts in opposition to their usual moral behaviour. Bandura postulated eight mechanisms that can be activated in order for an individual to selectively deactivate their moral standards and avoid the self-condemnation that might normally prevent them from behaving in particular ways [18]. These are moral justification, euphemistic labelling, advantageous comparison, displacement of responsibility, diffusion of responsibility, dehumanisation and attribution of blame [18]. The mechanisms fall into three broad categories, which are: cognitively misinterpreting the behaviour; disconnecting with the target; and distorting the impact of the behaviour [19].

Misinterpretation includes moral justification, where an action is rationalised in a more morally favourable way; euphemistic labelling, where the behaviour is relabelled using language that is more benign and finally advantageous comparison, where a behaviour is considered morally acceptable compared to an even more harmful behaviour. Dehumanisation and attribution of blame are a way to morally detach from a victim or aggressive behaviour. These mechanisms include lessening the human qualities of the target and reattributing the reason for the behaviour from the perpetrator to a target or victim. The displacement of responsibility, diffusion of responsibility and distortion of consequences comprise distorting mechanisms, where responsibility for the behaviour is displaced to another individual such as a leader, or responsibility is dispersed across a group (lessening accountability) or finally, the consequences of an action are downplayed so that they are perceived as less harmful [18].

The importance of moral disengagement and its applicability to road safety and aggressive driving behaviour is yet to be explored or theoretically established in the literature. However moral disengagement has been utilised to explain individual ability to carry out aggressive

behaviour required within an employment role, such as in military action and war [20] or in the legal execution process [21]. It has also been used to examine less extreme situations such as ethical decision-making in more everyday employment situations [22,23]. Recent work has found a positive relationship between moral disengagement and aggression in less extreme situations. Longitudinal research examined moral disengagement and aggressive behaviour in adolescents and young adults in everyday situations [23] finding that moral disengagement was an important predictor of self-reported aggressive behaviour over the four time periods. In addition, patterns in the findings suggested that the ability to selectively deactivate moral thought through specific cognitive mechanisms provided a pathway through which other person-related characteristics such as irritability and hostile rumination could contribute to aggressive behaviour.

Rather than being a stable trait that is unaffected by context or the previous experiences of an individual, tendency to moral disengagement may vary and be influenced by specific situations. In particular, White-Ajmani and Bursik [24] reported that, while moral disengagement and overall aggressive behaviour were positively correlated (as anticipated), the findings of their study suggested that moral disengagement is only an important precursor of future aggressive behaviour for situations where aggression is warranted, such as revenge scenarios Particular situational factors may also be more likely to facilitate moral disengagement in individuals who would not usually detach from their moral identity [19]. One such factor appears to be anonymity, or the extent to which an individual believes he or she is less identifiable to others, and is especially salient when surrounded by strangers [18]. Anonymity can also be thought of as the ability to decrease personal responsibility when in a group or as a part of collective action [21]. Driving, where individuals mostly remain anonymous to others on the road may provide a context that facilitates a tendency to morally disengage. The current study sought to explore whether the construct of moral disengagement contributes to the understanding of driver aggression. Further, there was an interest in whether moral disengagement might help explain the relationship between driving anger and driving aggression, since findings in this area have been mixed, particularly why some drivers report relatively high levels of driving anger, yet don't respond aggressively towards other drivers who potentially provoke them, while others do. We reasoned that, if a driver has a greater tendency towards morally disengaging from others, then when provoked to anger in the driving context, he or she might be more likely to use mechanisms of moral disengagement to both justify retaliatory aggressive actions towards those others and also avoid self-censure.

Drawing from the previous research regarding the contribution of situational and dispositional factors that contribute to driver aggression, the authors adapted the moral disengagement scale for the driving context. The new scale preserved the original eight moral disengagement mechanisms but modified the content and wording for driving scenarios instead of everyday situations. Trait driving anger, a factor that has previously been shown as associated with driving aggression, was operationalised as the extent to which everyday driving situations made the driver angry. Driving aggression was operationalised as how often a driver reacts or behaves in ways that express aggression, as a result of feeling angry while driving.

It was hypothesised that drivers with higher levels of trait driving anger (compared to those with lower levels of driving anger) would respond more aggressively to everyday driving events (H1). It was also hypothesised that drivers with a higher tendency towards driving moral disengagement (compared to those with lower tendencies) would respond more aggressively to everyday driving events (H2). Finally, it was hypothesised that driving moral disengagement would explain an additional and significant proportion of variation in driver aggression, once driving anger, gender, age and general moral disengagement had been accounted for (H3).

METHOD

Participants and the demographic characteristics of the sample

A cross-sectional, community and student sample of 359 drivers participated in the online survey, recruited through email promotion of the study and snowball sampling. A total of 26 first year university students received course credit for participation and all other participants had an opportunity to enter a random draw to win one of six gift vouchers (valued at $50 each). A total of 65 participants were excluded due to incomplete survey data, leaving 294 complete sets of responses. Participants reported their age range in one of six categories, 17-24 years (16.3%), 25-35 years (44.2%), 36-45 (20.4%), 46-55 years (9.9%), 56-65 years (7.8%) and 65 years and over (1.4%). Gender was also recorded comprising of 139 males (47.3%), 154 females (52.3%) and 1 person preferring to keep their gender anonymous (.3%).

Materials

UK Driving Anger Scale (DAS)

The shortened version of the driving anger scale [25] developed by Lajunen and Parker [26] containing 21 questions was used. The UK revision of the driving anger scale was selected due to the original version being less applicable to populations outside of the United States [26] the DAS, participants rate the likely level of anger in driving situations on a 5 point Likert scale (1 = *not at all angry*, 5 = *extremely angry*) in response to statements such as, 'someone speeds up when you try to pass them' (progress impeded subscale) or 'someone beeps at you about your driving' (direct hostility subscale). The UK DAS has three subscales: progress impeded; reckless driving; and direct hostility. Internal reliability is high (α=0.96) and test-retest reliability is good (α=0.83) [26].

Revised Driving Anger Expression Inventory (DAX)

The revised driving anger expression inventory [27] was used to measure the frequency of self-reported behavioural anger expression reactions of participants while driving. The revised scale uses 25 items to measure four different ways that people express anger on the road: use of vehicle, e.g. "Follow right behind for a long time"; verbal aggression, e.g. "Swear at the other driver aloud"; personal physical aggression, e.g. "Try to get out of the car and tell the other driver off"; and adaptive constructive, "Tell myself it's not worth getting mad at." A four-point Likert scale (1 = *almost never*, 4 = *almost always*) is used for responses. The revised DAX has been found to have a reliability of α = 0.75 to 0.88 [27]. Due to technical problems in uploading the questionnaire online, item three from the revised DAX was inadvertently excluded from the final version.

Moral Disengagement Scale (MD)

Moral disengagement in everyday situations was measured using Detert and colleagues' [19] 23-item adult revision of Bandura's original 32-item moral disengagement scale [28]. The revised scale assesses the extent to which participants agree or disagree with statements

reflecting the cognitions or beliefs associated with the eight mechanisms of moral disengagement. Items include, 'some people deserve to be treated like animals' (dehumanisation) and 'it's o.k. to steal to take care of your family's needs' (moral justification). Response options are on a five-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*) similar to that of Bandura's original measure [28].

Driving Moral Disengagement Scale (DMD)

This 23-item scale was purpose-designed to assess tendency towards moral disengagement in the driving context. The measure was adapted from the adult version of the moral disengagement scale (described above)[28] and retained the eight subscales [19]. Each item was designed to match the intent of the corresponding item and subscale in the MD. The scale was designed to give a measure of an individual's propensity towards moral disengagement in typical driving situations. Example items are: 'honking the horn loudly is just a way of letting off frustration' (euphemistic labelling); 'overly cautious drivers are a risk to everyone on the road (attribution of blame). Responses are on a five-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*). The above measures were supplemented by the collection of background information on age bracket, annual income band, average hours driving per week and highest level of education.

Procedure

An online survey was generated and pilot tested for length, grammar and workability online. Participants accessed the survey via an online link published through email, on social media and in a recruitment flyer. Consent was obtained from all participants by means of a check box at the start of the survey, which declared that the participant met the required eligibility criteria (Australian drivers' licence holders, driving a minimum of 2 hours per week). Participants were required to answer every question. Responses were collected anonymously online, separate from the prize draw information and prize winners were selected at random from the names of those who entered the draw. Ethical approval for the study was granted by the UHREC (approval number: 1500000494).

Results

The scores for the adaptive/constructive subscale from the Revised DAX were removed for all analyses (except the Cronbach's alpha score) as is standard practice when only the aggression-related subscales are required (for further explanation see [29]). The data was cleaned and screened, resulting in no deletion of cases. Assumptions for the statistical analyses used were met or were within acceptable ranges.

The mean, standard deviation, Cronbach's alpha coefficient and confidence intervals for the measures of driving anger, self-reported driving aggression, moral disengagement and driving moral disengagement are reported in Table 1. The item mean scores on the UK DAS indicated a modest level of self-reported anger in driving situations where other drivers are hostile towards the self, drive recklessly, or who interrupt the driving path ('cutting off').

Item mean scores on the DAX were slightly above the mid-point (4 point response scale), which supports an interpretation that the sample expresses some aggressive behaviour while driving (via verbal or physical means, or with the vehicle), a moderate amount of the time. Participant item mean scores were below the mid-point for the MD scale (5 point response scale), indicating overall low tendency to disengage from usual moral standards in everyday situations. Similarly the item mean score on the DMD scale is also below the mid-point, reflecting a general perception that drivers in the sample tended not to morally disengage in the driving context.

Study Variables	M	SD	α	Lower Limit	Upper Limit
				95% confidence interval	
UK Driving Anger Scale	2.9708	.66384	.905	2.8946	3.0470
Revised Driving Anger Expression Inventory	2.1977	.39436	.741	1.5405	1.6310
Moral Disengagement Scale	1.9936	.45373	.878	1.9514	2.0457
Driving Moral Disengagement Scale	2.1894	.50567	.874	2.2475	2.1314

Table 1 -Item mean scores, standard deviations and reliability of the measures of driving anger (UK DAS), self-reported behaviour (Revised DAX), moral disengagement in everyday situations (MD), and moral disengagement in the driving context (DMDS)

For investigation of the relationship between the MD and DMD scales, the Pearson's correlation coefficients for the eight subscales corresponding to the eight mechanisms of moral disengagement from the measures were generated (see Table 2). Results showed that all eight subscales from the MD and DMD measures had small to moderate positive relationships.

To assess the suitability of the purpose-designed measure of driving moral disengagement (DMD scale) for measuring the intended variable in the driving context, the intercorrelations between the DMD scale and the other driving measures were compared with those of the original, and previously validated MD scale [18,28]. Values for the new scale (DMD) suggested that it has robust reliability, with a Cronbach's alpha coefficient value (α = .878) similar to that of the MD scale (α = .874). In addition, MD and DMD were found to have a moderately strong, positive intercorrelation, r = .545, p < .05 (two-tailed) (see Table 3). Given the previous work suggesting that the MD scale for everyday situations has good reliability (α = .82), a sufficiently moderate to strong correlation between the MD and DMD can be interpreted as indicating that the two scales are measuring a similar construct. However, the intercorrelation value also suggests that the two scales are sufficiently different from one another to support the conclusion that they each capture unique aspects of moral disengagement. This suggests that moral disengagement may be different in the two different contexts, and supports the exploration of the DMD scale for investigating driving contexts.

Hypothesis one was to determine whether drivers with higher levels of trait driver anger would report more aggressive driving responses to hypothetical everyday driving events. Inspection of the intercorrelations (Table 3) revealed that, as expected, this hypothesis was supported: a

Subscales	Moral Justif.	Euphem. Labelling	Diffusion Responsiblty	Displacemnt Responsiblty	Distortion Conseqs.	Attributn. of Blame	Dehuma-nization	Advantag. Comparsn.
Moral Justification	.338**	.275**	.243**	.280**	.273**	.220**	.291**	.259**
Euphemistic Labelling	.349**	.368**	.301**	.403**	.394**	.276**	.307**	.336**
Diffusion of Responsibility	.190**	.205**	.212**	.213**	.170**	.109	.097	.185**
Displacement of Responsibility	.295**	.287**	.315**	.342**	.307**	.231**	.242**	.269**
Distortion of Consequences	.170**	.212**	.208**	.272**	.263**	.180**	.136*	.234**
Attribution of Blame	.116*	.184**	.074	.195**	.235**	.227**	.132*	.147*
Dehumanization	.265**	.345**	.198**	.360**	.399**	.334**	.496**	.416**
Advantageous Comparison	.255**	.200**	.178**	.303**	.366**	.185**	.236**	.333**

(Row group label, left side: Moral Disengagement)

* p < .05. ** p < .01 (two-tailed)

Table 2 – Intercorrelations (Pearson coefficients) between subscales of Moral Disengagement scale and Driving Moral Disengagement scale

moderate to strong, positive correlation (r = .378) was found between driving anger and driving aggression. This suggests that the more angry drivers in this sample were also those who were more likely to self-report that they would respond to other drivers' behaviours in an aggressive way, such as via body language, verbal abuse or through the use of the vehicle to intimidate.

Measures	UK Driving Anger Scale	Moral Disengagement Scale	Driving Moral Disengagement Scale	Revised Driving Anger Expression Inventory
UK Driving Anger Scale		.078	.276**	.378**
Moral Disengagement Scale			.545**	.198**
Driving Moral Disengagement Scale				.554**

** p < .01 (two-tailed)

Table 3 – Intercorrelations (Pearson coefficients) between measures of driving anger, moral disengagement, driving moral disengagement and driving aggression

Hypothesis two explored whether the propensity to morally disengage in driving situations would be associated with a greater tendency to self-report aggressive driving responses towards other drivers. Results supported this hypothesis, with a strongly positive correlation (r = .554) obtained for the association between the measure of driving moral disengagement and driving aggression

(see Table 3). This result is consistent with the previous literature, which found that general moral disengagement (as measured by the MD scale) was associated with greater individual propensity to behave aggressively in everyday situations [19,23].

Hypothesis three proposed that driving moral disengagement would explain a significant proportion of the variation in aggressive driving, over and above that normally accounted for by age, gender, driving anger, and general moral disengagement. That is, that propensity towards driving moral disengagement might help predict whether drivers are more likely to respond aggressively to other drivers on-road. Table 4 presents the regression analysis.

Age and gender were entered at Step 1 in order to statistically control for their contribution to the explanation of variance, and the model was significant, $F (2, 291) = 3.250$; $p < .05$. However, only age contributed significantly to the explanation of the variance in self-reported driving aggression, and at a modest level of 2%. The addition of moral disengagement (everyday situations) in Step 2 accounted for an additional 2.8% of the explained variance, $F (1, 290) = 9.384$; $p < .05$. Driving anger was entered at Step 3 and the overall model was significant, $F (1, 289) = 42.056$; $p < .001$, accounting for a total 16.1% (adjusted) of the variance. At this step, driving anger accounted for 12.0% of the unique variance in the DV. Finally, driving moral disengagement was entered at the 4th step and the full model accounted for a significant 36.6% (adjusted) of the variance in self-reported driving aggression in the sample, $F (1, 288) = 94.279$; $p < .001$. Driving anger and driving moral disengagement were the only significant predictors of driving aggression in the final model, with driving moral disengagement explaining 20% of the unique variance of driving aggression in this final model, while the contribution from driving anger was reduced to a more modest 4%.

Inspection of the beta weights suggests that driving moral disengagement (Beta = .568, $p < .001$), was the most important predictor, being more than twice as large as the next strongest predictor, driving anger, (Beta = .221, $p < .001$). Controlling for age, gender and general moral disengagement, driving anger accounted for 12% of the unique variance, while driving moral disengagement accounted for 20.4% of unique variance in driving aggression.

Discussion

The aim of the current study was to determine whether the construct of moral disengagement could contribute to the current understanding of mild aggressive behaviour by drivers. Results revealed a significant, positive relationship between higher tendency to agreement with statements reflecting moral disengagement from other drivers while driving and tendency towards greater self-reported driving aggression (albeit, for mildly aggressive behaviours in the main).

All three of the hypotheses from the current study were supported. The most substantial finding was that driving moral disengagement accounted for the strongest unique contribution to the final regression model, accounting for 20.4% of the unique variance in self-reported driving aggression (of a total of 36.6% adjusted explained variance). Such a pattern of results suggests that moral disengagement in the driving context may be a substantial contributing factor to self-reported tendency to respond to other drivers aggressively.

Driving anger was the second strongest (though much weaker) predictor of driving aggression in the regression, and accounted for 4% of the unique variance in the final model. The relationship between driving anger and the expression of that anger behaviourally on the road is well

established in the literature [7,8,10,30]. The significant and positive relationship found in the current study is consistent with these previous studies and with more recent research examining the relationship between driving anger and driving aggression in community-based samples [9]. The results from the current study add to the body of research on driver aggression by providing support for a similar correlational relationship in an Australian context with a community-based sample.

Variable	B	SE	Beta	t	p	sr^2	R	R^2	R^2_{adj}	ΔR^2
Step 1										
Age	-.049	.019	-.149*	-2.547	.011	.02				
Gender	-.009	.045	-.012	-.202	.840					
							.148	.022	.015*	.015*
Step 2										
Age	-.036	.020	-.108	-1.834	.068					
Gender	.025	.046	.032	.532	.595					
Moral Disengagement	.160	.052	.184**	3.063	.002	.03				
							.229	.053	.043**	.028**
Step 3										
Age	-.015	.019	-.044*	-.786	.433					
Gender	-.002	.043	-.003	-.055	.957					
Moral Disengagement	.140	.049	.161**	2.861	.005	.02				
Driver Anger	.212	.033	.356***	6.485	.000	.12				
							.416	.173	.161***	.133***
Step 4										
Age	-.003	.016	-.010	-.199	.842					
Gender	.053	.038	.068	1.385	.167					
Moral Disengagement	-.101	.049	-.117*	-2.058	.041	.01				
Driver Anger	.131	.030	.221***	4.439	.000	.04				
Driving Moral Disengagement	.443	.046	.568***	9.710	.000	.20				
							.614	.377	.366***	.205***

* p < .05. ** p < .01. *** p < .001

Table 4 – Results for the hierarchical regression of age, gender, moral disengagement, driving anger and driving moral disengagement on the dependent measure of driving aggression

Although driving anger was a significant predictor in the final model for driving aggression, the addition of driving moral disengagement in the final step substantially reduced the unique contribution from driving anger in the earlier models, from 12% to only 4%. Driving moral disengagement appears to be a more important predictor of driving aggression than driving anger, even when entered into the regression at a later step. However, it is unclear why this may be. An avenue for further research would thus be to explore the effect of driving moral disengagement on the relationship between driving anger and driving aggression.

Our results support White-Ajmani and Bursik's [24] contention in the literature that situational factors have an important influence on whether a person who has a higher propensity to morally disengage, behaves aggressively or not when the context permits. The large unique contribution from the measure of driving moral disengagement, especially given the weaker contributions from general moral disengagement and driving anger in the final model, supports the idea that elements of the driving context may increase the tendency to morally disengage from other drivers on road. It appears that drivers may not be acting out of general tendencies towards either anger or moral disengagement, but rather, tendencies specific to the driving context.

The results also suggest that tendency to morally disengage in the driving context may be useful in understanding the differences in drivers' levels of self-reported driving aggression given similar levels of driving anger. That is, those drivers who are both angry and also have greater tendencies towards moral disengagement when driving may be those more likely to then express their anger through aggressive driving acts, albeit at a non-extreme or milder level of behaviour. Conversely, these results also provide a potential explanation for why not all drivers who are angry behave aggressively: perhaps those who don't are better morally engaged while driving.

Moral disengagement has not previously been explored in relation to aggression in the driving context. However the relationship between moral disengagement and general aggressive behaviour has been researched in everyday situations [23]. It was expected that patterns for this relationship in results of the current study would be consistent with those reported in the literature, due to the fact that driving is an everyday activity thus, it could be expected that drivers carry into the driving context similar ways of approaching their motives for behaving aggressively in other everyday situations. While the results here support this conclusion, they also suggest that the driving context may be one that supports greater moral disengagement than everyday situations, in that moral disengagement for everyday situations had a significant and positive relationship with self-reported driving aggression, but this relationship was much weaker than that found between driving moral disengagement and the behavioural measure.

Age contributed 2.2% of unique variance to the explanation of driver aggression in the current study, suggesting that although age is a significant predictor, it makes only a small contribution to the explained variance in driver aggression in the sample utilised. An explanation for this might be the older mean age (almost 40% of the sample was aged 36-45 years or more), for this sample in comparison to age ranges usually found to self-report aggression while driving. Age and gender were entered into the analysis as the first model because these demographics have already been established in the literature as predictors of self-reported aggressive driving, with males more so than females, and younger drivers significantly more likely than older ones, to admit to aggressive driving behaviours [31].

The current study is the first time to the authors' knowledge that a driving-specific moral disengagement scale has been utilised in driving research, thus the scale was tested for reliability and also compared against the previously established measure of general moral disengagement [18]. The purpose-developed DMD scale was found to have good overall reliability. The positive, moderately strong intercorrelation between the measure of moral disengagement in everyday, more general situations and the new driving-specific measure suggests that the two measures are capturing the same underlying construct, but that the new measure offers additional capture of moral disengagement in the driving context. Thus results are promising, and suggest that further development of the DMD scale may be useful to research in the driving aggression area.

It is important to recognise some of the limitations of the current research. Self-report measures were used for this study, which can be problematic because they rely on the participant being self-aware enough to be able correctly answer the question in a way that reflects their true actions as well as willingness to be honest about this. The notion of honesty and also self-awareness is especially salient when asking participants to express opinions on matters that are socially undesirable, as there may be an inclination to respond in a socially acceptable way. Further to this, the level of driver anger experienced and the frequency of aggressive behaviours while driving were at the lower end of each scale. A possible explanation for this could be that the participants were unwilling to answer honestly with regard to their self-reported anger and self-reported aggressive behaviour. Alternatively, the low scores could also be due to the older age range of the sample. Generally, levels of driving anger and also aggression often decrease as age increases [31]. Finally, correlational analyses were utilised for the current study, which limits the inferences that can be drawn from the research findings, since these do not allow for conclusions as to causation.

This study has several strengths and implications for the future direction of aggressive behaviour in the driving context. A general driving sample was used rather than a university student one, making it more likely that results can be generalised to the wider driving community. The current study also addresses a gap in the current knowledge about milder, but still potentially problematic, aggressive driving behaviours such as following too closely or failing to leave enough room when merging. Future exploration of the moral disengagement mechanisms that are most relevant to the driving context would allow for the DMD scale to be refined. The identification of driving moral disengagement as a new, and apparently strong, significant predictor of driving aggression, provides a potentially fruitful basis for further exploration of the antecedents of aggressive driving behaviour.

Implications of the findings

Results reported above suggest that tendency to disengage from one's usual moral code or standard of behaviour may be an important factor that influences driver decisions about whether to respond aggressively to their frustrations or anger in relation to other drivers' behaviours. Our results suggest that effective interventions should aim to either keep drivers aware of their usual values or morals in relation to other drivers, or attempt to prevent the activation of cognitions that lead to disengagement from one's values/morals while driving. Mass education campaigns could thus aim to remind drivers of that the driving context is simply one of many everyday contexts, and not somehow exempt from decisions with a value or moral basis. More fine grained or detailed information about which of the underlying mechanisms of moral disengagement are most relevant to the driving context is needed to inform the development of mass educational messages, or to explore effective ways of influencing driver cognitions during the driving process.

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