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Associations between self-reported mindfulness, driving anger and aggressive driving

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ABSTRACT

Anger and aggression on the roads is associated with how drivers evaluate the driving situation and the behaviour of other drivers. Consequently, both can be exacerbated when these evaluations are made superficially and/or when drivers have pre-existing negative schemas regarding certain types of road situations or users. Mindfulness is likely to have negative associations with anger and aggression because it promotes opposing appraisals. That is, it encourages emotion-regulation and involves acceptance of, but not reaction to, the current situation. To examine these associations, a total of 309 drivers responded to an online questionnaire assessing mindfulness, driving anger and aggressive driving. The results showed that mindfulness shared negative relationships with driving anger and self-reported aggressive driving. However, when these relationships were examined simultaneously using Structural Equation Modelling, mindfulness was found to relate only to anger and this, in turn, predicted aggressive driving. Further analysis showed that driving anger mediates the relationship between mindfulness and aggressive driving. These results suggest that mindfulness training may provide a promising intervention for drivers prone to driving anger and subsequent aggression.

1. Introduction

Anger is likely in situations where one's goal is blocked and there is another individual who is perceived to have illegitimately caused this (Berkowitz, 1993). Coupled with this, angry individuals tend to have a more heuristic processing style, meaning the assessment of the circumstance may be more superficial and based on pre-existing stereotypes or mood, rather than the current circumstances themselves (Lerner & Keltner, 2001).

Research into driving anger has also shown that when angry, drivers make superficial assessments of the driving situation and may have pre-existing cognitions regarding some, if not all, other road users. For example, driving simulator studies have shown that anger provoked during one drive can influence the level of anger and how a driver responds to hazards in a subsequent drive (Stephens & Groeger, 2011). Further, drivers have also been found to respond differently to impediments according to who is impeding them, rather than why they are being impeded (Stephens & Groeger, 2014). Indeed, drivers tend to hold an inflated positive view of their own driving in comparison to other drivers (Groeger & Grande,

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1996) and this is likely to influence the judgements they make of other road users and predispose drivers to allocate blame to drivers for situations that may be out of their control.

Situations that are found to be the most anger provoking for drivers are consequently those that allow drivers to blame other road users directly. For example, Deffenbacher, Oetting, and Lynch (1994) created the trait Driving Anger Scale (DAS) that assesses a driver's tendency to become angry across six types of driving situations. These include assessments of other drivers' slow driving, hostility, illegal driving, discourtesy as well as police presence and general impediment. The majority of research using this scale has shown that a perceived discourtesy from others frequently elicits the highest level of driver anger. This can be another driver driving too closely, a driver cutting in front or a driver stealing a car park. Further, anger prone drivers (as determined by DAS scores) tend to incorporate more judgemental and hostile assessments of the driving situation and other road users (Deffenbacher, Petrilli, Lynch, Oetting, & Swaim, 2003) and are more likely to assess relatively benign situations as being anger provoking (Stephens & Groeger, 2009).

Anger prone drivers are also more likely to express their anger aggressively (Deffenbacher, Lynch, Oetting, & Swaim, 2002). This can occur on a continuum from sounding the horn when angry to chasing another driver with the intention of retribution. While research into driving anger has advanced considerably in the past couple of decades (Deffenbacher, Stephens, & Sullman, 2016), less focus has been paid toward understanding how to alleviate anger and aggression on the roads. Given the large role cognitive appraisals play in the anger-aggression relationship, interventions that promote less hostile thought processes pose a promising approach. Mindfulness, as a form of attention-regulation and metacognitive awareness, may help drivers to adopt a more adaptive, and less angry or aggressive, focus while driving.

Mindfulness is the practice of increased awareness and attention to the current moment (Bishop et al., 2004). It is defined as a form of cognitive awareness where individuals are encouraged to attend to cognitive, emotional and physical reactions to the present circumstance and be open and non-judgemental toward the current experience. For example, a person feeling anxious may recognise physical signs and shift their focus onto their breathing, acknowledging associated thoughts about the situation but mentally training himself or herself to not react to these thoughts. In this form of metacognition, an individual can work to reduce their level of anxiety. Mindfulness can be thought of as an emotion regulation strategy that promotes acceptance of the situation but not reacting to associated negative emotions or arousals (Chambers, Gullone, & Allen, 2009). For this reason, mindfulness has been used across a number of therapeutic interventions, such as but not limited to, the treatment of depression, anxiety and chronic pain (see Baer, 2003; Keng, Smoski, & Robins, 2011, for a review), which are increasingly being conceptualised as disorders of emotion regulation (Chambers et al., 2009).

Outside of the driving context mindfulness interventions have been shown to be effective in reducing anger by changing the evaluation processes individuals make, either through the anger-trigger or the appraisals related to the experience of and reaction to anger (Heppner et al., 2008; Wright, Day, & Howells, 2009). Indeed, mindfulness requires individuals to focus solely on the present and not react to any pre-existing negative schemas or past experiences that might encourage hostility. Research has shown that mindfulness has a negative relationship with anger, as well as anger rumination (Borders, Earleywine, & Jajodia, 2010) and ego involvement (Heppner et al., 2008); it is often these that exacerbate anger experience and expression, particularly in the driving environment. Mindful interventions have also been shown to down regulate sympathetic nervous system activation and amygdala activity (Murakami et al., 2015), both of which are prominent in anger and aggression.

In a recent review of the literature, Fix and Fix (2013) found strong support for mindfulness as an intervention for aggression. Further, when mindfulness is divided into various components, the non-judgemental element has shown the strongest relationships with reduced aggressive tendencies (Peters et al., 2015). Therefore, removing the blame aspect of the situation, as well as the hostile thought processes that are commonly linked with an anger provoking situation, is likely to alleviate the anger and subsequent aggressive responses within the driving context.

To date, research into associations with mindfulness and driving behaviour has focussed primarily around improving driver distraction. For example, Kass, VanWormer, Mikulas, Legan, and Bumgarner (2011) conducted a small driving simulator study and found that, when compared to drivers who had not, drivers who had undergone mindfulness training exhibited greater situational awareness of the driving environment and fewer simulated crashes. Trait mindfulness has also been associated with less frequent texting while driving in young drivers (Feldman, Greeson, Renna, & Robbins-Monteith, 2011). Interestingly, Feldman and colleagues found that this relationship was mediated by emotion-regulation abilities, whereby drivers used texting as a way to reduce negative emotions; demonstrating a clear link between driver affect and distraction.

There is some evidence from driving studies to show that changing the focus of the driver would reduce driving anger and subsequent driving aggression. In a series of simulator based studies, Stephens and Groeger (2009) found that asking drivers to focus on different elements of the driving task influenced how drivers behaved. In comparison to drivers focussing on frustrating and anger-provoking elements of the driving situation, drivers asked to rate the danger and difficultly of the situation drove in a more cautious manner. Deffenbacher et al. (2003) have also shown that drivers who have more adaptive thought processes report less anger across a variety of situations and are more likely to respond to anger in an adaptive manner. These adaptive responses are largely focussed around incorporating positive thought processes to reduce anger; e.g. *"I tell myself not to worry about it*". More broadly, rumination tendencies have also been associated with higher levels of driving anger and aggression (Suhr & Nesbit, 2013). Mindfulness helps to reduce rumination and default mental activity both of which are common in anger and poor emotional regulation.

Specific to mindfulness in driving, Kazemeini, Ghanbari-e-Hashem-Abadi, and Safarzadeh (2013) examined the influence of a mindfulness intervention in a sample of male taxi drivers in Iran. They found that participation in a mindfulness course

lead to reduced anger and self-reported aggression. Importantly, this effect was more pronounced than a cognitive based therapy (CBT) and the reduction in anger was still present at a one month follow up. It is therefore important to understand how mindfulness may be associated with anger and aggression in a non-professional sample of drivers that also includes female drivers. If similar associations are found, then mindfulness training is likely to be an effective intervention for drivers prone to anger and aggression.

The aim of the current study was to explore the associations between self-reported mindfulness, driving anger and aggressive driving. It was expected that drivers with higher levels of mindfulness would self-report lower levels of anger and aggression while driving.

2. Method

2.1. Participants

A total of 309 licensed drivers (82% female) provided complete datasets. Participants ranged in age from 18 to 86 years (M = 46.05 ± 13.77). All participants reported being an active driver, defined as driving at least two to three times per week. The majority of participants reported driving daily (56%), 34% reported driving four to six times per week and the remainder (10%) reported driving two to three times per week. Half (50%) of the sample reported that they drove 5001–15,000 km per annum, 12% drove less than this and the rest reported higher mileage (18%: 15,001–20,000; 11%: 20,001–25,000; 9%: >25,001).

2.2. Procedure

Participants were recruited via social media, which included the University newsletter, Facebook and Twitter pages. The study was also advertised on a mindfulness website. Potential participants were provided a link to an online survey hosted by Qualtrics, which included details about the study, online consent and the survey. The survey took approximately 20 min to complete and participants were offered the opportunity to provide their details, via a separate link, to enter a prize draw. The study was approved by the University Human Research Ethics Committee.

2.3. Materials

The survey included a number of demographic questions (e.g., age, gender, annual mileage) as well as information on mindfulness practices (e.g., current meditation, mindfulness app usage or practice etc.).

2.3.1. Driving Anger Scale (DAS; Deffenbacher et al., 1994)

The DAS is a 33-item scale designed to measure trait propensities to become angry while driving. Each item represents a potential anger-provoking driving experience that fits in one of six broader types of situations mentioned above: slow driving, illegal driving, progress impediment, police presence, hostile gestures and discourtesy. An example item is: *"Someone is driving more slowly than is reasonable for the traffic flow*". For each item, participants report the amount of anger they are likely to experience. Responses are on a five-point scale (1 = Not at all, 3 = Some, 5 = Very much). Subscale items are summed and averaged with higher scores indicating greater anger propensities. A total DAS score represents the overall likelihood for anger while driving. The DAS has demonstrated good internal reliability, with Cronbach α for each subscale and total score ranging from 0.80 to 0.92 (Deffenbacher et al., 1994). The validity of the DAS has been shown through correlations with the Trait Anger Scale (Deffenbacher et al., 1994).

2.3.2. Mindfulness Attention and Awareness Scale (MAAS; Brown & Ryan, 2003)

The MAAS is a 15-item scale that measures an individual's general self-awareness of mindful attention to the current moment. Each item describes an example of being mindful in specific situations. An example item is: *"I rush through activities without being really attentive to them*". Responses are rated on a six-point scale (1 = Almost always, 3 = Somewhat frequently, 6 = Almost never). Higher average scores indicate higher propensity of an individual toward mindful attention and awareness in their daily life. The MAAS has demonstrated good internal consistency Cronbach α = 0.87 (Brown & Ryan, 2003).

2.3.3. Freiburg Mindfulness Inventory (FMI; Walach, Buchheld, Buttenmuller, Kleinknecht, & Schmidt, 2006)

The FMI is a 14-item scale also measuring one's mindfulness. The FMI provides a more general measure of mindfulness than the MAAS, which focuses exclusively on attention and awareness in moments when an individual may or may not be mindful. In contrast, the FMI encapsulates other attitudinal and insightful aspects of mindfulness such as acceptance and self-compassion, for example *"I am friendly to myself when things go wrong*". Responses are rated on a four-point scale (1 = Rarely, 4 = Almost always). One item requires reverse coding. The items are summed to produce one mindfulness score, with higher scores indicating higher levels of mindfulness. The FMI has demonstrated good internal consistency with Cronbach α = 0.86 for both clinical and non-clinical samples (Walach et al., 2006).

2.3.4. Aggressive driving

Aggressive driving was measured with four items from the Driving Behaviour Questionnaire (DBQ) (Reason, Manstead, Stradling, Baxter, & Campbell, 1990). Participants respond to how frequently they have undertaken each driving behaviour in previous two years. The behaviours range on a continuum of aggression from: Sounding the horn in anger, following another driver too closely, doing to the other driver what they did to them, to chasing another driver with the intention of giving them a piece of your mind. Responses are on a six-point scale (1 = Never, 3 = Occasionally, 6 = Always).

2.4. Data handling and analysis

Missing data were treated with five percent trimmed mean imputation. This occurred in less than one percent of the cells. Prior to analysis, variables were checked for normality and all variables were within the normal range for skewness and kurtosis. Data were analysed using IBM© SPSS v.24 and AMOS v.24. Structural Equation Modelling (SEM) was used to examine the relationships between the mindfulness measures, driving anger propensities and aggressive driving. For the latent constructs from the MAAS, FMI and DAS, items were parcelled into three indicators for each construct to reduce the number of observed variables and for compatibility with the sample size (Little, Cunningham, Shahar, & Widaman, 2002). For the DAS, each indicator contained 11 items, with each parcel having items from each factor. For the MAAS scale, composite indicators included five items each. For the FMI, factors composites included four, four and six items.

Maximum Likelihood (ML) estimations were used for the SEM with Bootstrap analysis to account for non-normal multivariate distribution. Overall model fit was assessed with Chi-Square (χ^2), Comparative Fit Index (CFI) and Root Mean Square Error of Approximation (RMSEA) with 90% CI and pclose values with the Bollen-stine p value obtained through Bootstrap analysis on 2000 samples (Bollen & Stine, 1992) expected to be non-significant, however significant p values are common with large sample sizes (Byrne, 2013). Acceptable model fit is denoted by a non-significant χ^2 statistic with values >.90 and >.95 indicating good and exceptional fit, respectively, while acceptable RMSEA values equal or are less than .06 with a non-significant pclose (Hu & Bentler, 1999). Both a measurement model and full structural model were fitted.

3. Results

3.1. Means scores for driving anger, mindfulness and aggressive driving

Table 1 displays the mean scores across driving anger, mindfulness and aggressive driving variables. Overall, participants reported low anger tendencies with the total driving anger mean being 2.72 (±.66) out of a possible 5, suggesting drivers experience 'A little' to 'Some' anger while driving. The most angering situation was *Discourtesy* from other drivers, with drivers on average reporting 'Some' to 'Much' anger (M = 3.25 ± .80) in these types of situations. *Illegal driving* (M = 3.06 ± .93) and *Hostile gestures* (M = 2.95 ± 1.06) by others were also relatively anger provoking with drivers also reporting a tendency for 'Some' or 'Much' anger in these situations. This pattern of means aligns with the majority of published research using the DAS, with *Discourtesy* and *Hostile gestures* being consistently reported as the most anger-provoking types of situations on the road (Deffenbacher et al., 2016). In contrast, participants reported 'Hardly ever' engaging in *Aggressive behaviours* across all four variables of (M = 1.78 ± .56).

Independent t-tests compared mean scores for each variable presented in Table between gender. There were no significant differences between males and females for any of the variables.

When looking at the two mindfulness scales, on average for the MAAS, participants reported mindful attention and awareness 'Somewhat' frequently (scoring 55.18 ± 11.89 out of a possible 90). Similar frequencies were evident with the FMI scale, with the average total score indicating 'Occasional' mindfulness.

Table 1
Scale and Subscale Mean (SD), response ranges and internal consistency (Cronbach α).

		Total sample (N = 309)		Male (n = 54)	Female (n = 254)	Practicing mindful meditation (n = 97)	Not practicing mindful meditation (n = 212)
	α	Range	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
DAS Discourtesy	.90	1.44–5.00	3.25 (.80)	3.32 (.83)	3.23 (.80)	**3.08 (.81)**	**3.33 (.79)**
DAS Illegal driving	.84	1.00–5.00	3.06 (.93)	2.97 (.91)	3.08 (.94)	2.96 (.96)	3.11 (.92)
DAS Hostile gestures	.90	1.00–5.00	2.95 (1.06)	2.93 (1.07)	2.96 (1.06)	2.89 (1.00)	2.98 (1.08)
DAS Traffic obstructions	.86	1.00–5.00	2.53 (.80)	2.55 (.86)	2.53 (.78)	2.40 (.76)	2.59 (.81)
DAS Slow driving	.86	1.00–4.67	2.47 (.74)	2.58 (.84)	2.45 (.72)	**2.31 (.67)**	**2.55 (.77)**
DAS Police presence	.77	1.00–4.50	1.74 (.73)	1.82 (.78)	1.73 (.72)	1.70 (.69)	1.77 (.44)
Total DAS (mean)	.95	1.30–4.64	2.72 (.66)	2.77 (.72)	2.72 (.66)	*2.60 (.65)*	*2.78 (.66)*
Total MAAS (mean)	.91	1.73–5.87	3.68 (.79)	3.83 (.82)	3.65 (.79)	3.81 (.74)	3.61 (.81)
Total FMI (summed)	.84	18.00–52.00	33.49 (6.76)	33.80 (7.00)	33.43 (6.73)	*34.74 (6.82)*	*32.91 (6.67)*
Aggression	.60	1.00–4.50	1.78 (.56)	1.88 (.61)	1.75 (.55)	1.68 (.47)	1.82 (.59)

DAS = Driving Anger Scale (possible range: 1–5); MAAS = Mindfulness, Attention and Awareness Scale (possible range: 1–6); FMI = Freiburg Mindfulness Inventory (possible range: 14–56); Aggression (possible range: 1–6).
Figures in **bold** represent significant difference in means at p < .01 level. Figures in *italics* represent significant differences at p < .05 level.

The reported mindfulness frequencies can further be explained by the fact that the majority of the sample had not, and did not currently, practice mindfulness. For example, 43% of the sample had participated in a mindfulness course and of those 68% continued to practice mindfulness on a regular basis. Further, only 27% of the sample reported currently using a mindfulness app on a regular basis and 30% of the sample reported regularly practicing other forms of meditation.

Table 1 also shows trait driving anger and aggression compared between those who were actively practicing mindful meditation and those who were not. After applying Bonferroni adjustments for multiple comparisons, there were significant differences found between anger over slow drivers and anger over discourtesy from other drivers. As expected those who practiced mindfulness reported less anger over slow driving ($M = 2.31 \pm .67$) and discourtesy ($M = 3.08 \pm .81$) than those not practicing mindful meditation ($M = 2.55 \pm .77$; $t(307) = 2.58$, $p < .01$ and $M = 3.33 \pm .79$; $t(307) = 2.60$, $p < .01$, respectively).

3.2. Intercorrelations among variables

Table 2 shows the relationships between driving anger, mindfulness and aggressive driving. The relationship with these three variables and age was also examined. As is to be expected, driving anger propensities decreased with age, while positive relationships were observed between mindfulness and age. Mindfulness, for both MAAS and FMI scores, was negatively related to all anger variables as well as aggression. FMI and MAAS shared a moderate relationship ($r = .59$) (Cohen, 1992). With the exception of police presence, MAAS showed stronger relationships with driving anger variables than FMI, however these relationships were all relatively weak (ranging between −.21 and −.44)

3.3. Structural equation model of the relationships between driving anger, mindfulness and aggressive driving

The relationships between variables were examined simultaneously using SEM. Given the strong relationships between driving anger subscale means, driving anger was represented by the total DAS mean in the structural model (see Fig. 1). To respect the bivariate relationship between MAAS and FMI shown in Table 2, latent variables for these were allowed to correlate. The measurement model showed acceptable fit, signifying that the indicators loaded well onto the latent variables $\chi^2(24) = 64.92$, $p < .001$, CFI = .98, RMSEA = .07 (90% CI: .05, .09).

The SEM showed good fit to the data $\chi^2(59) = 102.29$, $p < .001$, CFI = .98, RMSEA = .05 (90% CI: .03, .06). Bollen-Stine p = .004. All indictors significantly loaded on their associated latent variable. As can be seen in Fig. 1, when MAAS and FMI were considered simultaneously, MAAS, but not FMI scores, significantly predicted driving anger and explained 16% of the variance in that variable. Driving anger in turn was a significant predictor of aggressive driving and the combination of mindfulness measured by MAAS and driving anger explained 44% of the variation in aggressive driving. Interestingly, mindfulness was not a direct predictor of aggressive driving, suggesting that the relationships between mindfulness, attention and awareness of the situation and aggressive behaviour was mediated by the level of anger experienced.

To examine whether driving anger was a mediator of the relationship between mindfulness and aggression, a final SEM was conducted regressing MAAS scores on to Aggression without driving anger in the model. The model showed good fit to the data $\chi^2(13) = 21.54$, $p = .062$, Bollen-Stine p = .10; CFI = .99, RMSEA = .05 (90% CI: .01, .09), pclose = .53. MAAS scores were a significant predictor of aggression when driving anger was not in the model ($r = -.29$) therefore indicating that driving anger mediates the relationship between mindfulness and aggressive driving.

Table 2
Intercorrelations among age, driving anger, mindfulness and aggressive driving.

	1. Age	2. Discourtesy	3. Illegal driving	4. Hostile gestures	5. Traffic obstructions	6. Slow driving	7. Police presence	8. Total DAS	9. Total MAAS	10. Total FMI
1. Age	–									
2. DAS Discourtesty	−.15**	–								
3. DAS Illegal driving	−.11	.63***	–							
4. DAS Hostile gestures	−.13*	.63***	.50***	–						
5. DAS Traffic obstructions	−.02	.73***	.49***	.61***	–					
6. DAS Slow driving	−.20***	.77***	.38***	.46***	.61***	–				
7. DAS Police presence	−.02	.48***	.20***	.43**	.59***	.47***	–			
8. Total DAS (mean)	−.14*	.93***	.68***	.74***	.87***	.81***	.63***	–		
9. Total MAAS (summed)	.22***	−.32***	−.21***	−.44**	−.27***	−.29***	−.15**	−.35***	–	
10. Total FMI (summed)	.15**	−.29***	−.21***	−.34**	−.23***	−.24***	−.19***	−.32***	.59***	
11. Aggression	−.15*	.50***	.21***	.35***	.38***	.56***	.33***	.51***	−.22***	−.21***

DAS = Driving Anger Scale; MAAS = Mindfulness, Attention and Awareness Scale; FMI = Freiburg Mindfulness Inventory.
*** $p \leq .001$.
** $p \leq .01$.
* $p < .05$.

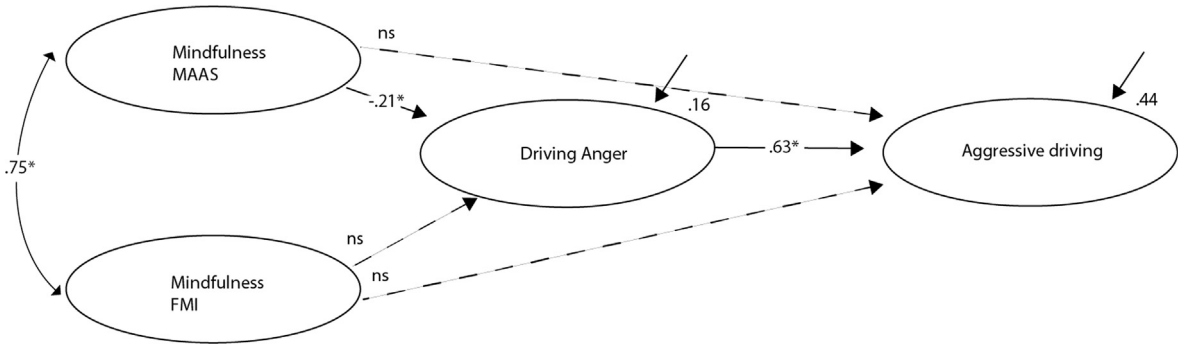

Fig. 1. Structural equation model of the relationships between mindfulness, driving anger and aggressive driving with standardised regression paths. Dashed lines represent non-significant regression paths.

4. Discussion

The aim of this study was to examine associations between mindfulness, driving anger and self-reported aggressive driving. We examined mindfulness using two complementary scales: The Mindfulness Attention and Awareness Scale (MAAS; Brown & Ryan, 2003) and the Freiburg Mindfulness Inventory (FMI; Walach et al., 2006), and in doing this, captured both attention and awareness based mindfulness (MAAS) and more global mindful attitudes (FMI). As was expected, mindfulness was negatively related to both driving anger and aggression, indicating that individuals with higher mindfulness propensities and more mindful attitudes tended to experience lower levels of anger across various driving situations and less aggressive expressions of anger while driving. When these relationships were examined simultaneously, we found that the relationship between mindfulness, when measured by the MAAS, and one's tendency to be aggressive was mediated by their driving anger.

The finding that the MAAS was more predictive of anger than the FMI aligns with the proposition made by Hanan, King, and Lewis (2011) that the MAAS is the most appropriate mindfulness measure for driving research. These researchers argued that the suitability of the MAAS comes from the fact that this scale measures how one attends to and perceives their current situation; rather than more attitudinal based scales. In our study, the MAAS was more strongly related to both driver anger and driving aggression than the FMI and these scales themselves were highly correlated, suggesting that mindful individuals score high on both, but it is the awareness and attention to situations that is most significantly associated with driving anger. This finding directly aligns with the theoretical research regarding anger causation, both within and beyond the driving environment. Most commonly, anger arises from assessments made about the current circumstance, in particular superficial assessments that can rely on hostile and judgemental beliefs about the perpetrator (Lerner & Keltner, 2001). Therefore, those who pay more attention to the current situation, and are aware of any internal judgemental thoughts about the external events, are less likely to become angered while driving and subsequently less likely to display anger aggressively.

Our study is the first published to explore associations between mindfulness, driving anger and driving aggression in a community sample of drivers. Therefore, while Kazemeini et al. (2013) have demonstrated that mindfulness interventions may be successful at reducing anger and aggression in professional male drivers, our results indicate that these interventions could be extended to the general population of drivers. More experimental research is needed, however, to explore the type and duration of mindfulness training that will have the largest impact on reducing anger and aggression on the roads.

While mindfulness training appears promising in reducing anger and aggression, the benefits of these types of interventions are likely to extend beyond anger and aggressive behaviour. Aggression has been associated with behaviours linked to increased crash risk (American Automobile Association, 2009). Not only do a higher percentage of aggressive drivers report crash involvement when compared to non-aggressive drivers, they also report more risky driving practices such as speeding, drink-driving and using a mobile phone while driving (Stephens & Fitzharris, 2017). Research has already identified the benefits of mindfulness on risky behaviours such as hazard awareness (Kass et al., 2011) and distraction with a mobile phone (Feldman et al., 2011). Therefore, training drivers to be aware and to attend more to the driving task is likely to influence a suite of hazardous behaviours, some of which include anger-based aggressive driving.

4.1. Limitations

The study is limited by the perceived weakness of social desirability response bias often linked with self-report methodology. However, as participants volunteered their participation, were assured anonymity and completed the survey in a location of their choosing, we expect any desirable responding to be low (Lajunen & Summala, 2003). Our sample also had an uneven gender split with 82% of the sample being female. Interestingly, when relationships between gender and self-reported driving anger are found, it is often females who report the tendency to become more angered across various situations (Deffenbacher et al., 2016). Notwithstanding this, our sample reported relatively low anger tendencies averaging 'A little' to 'Some' anger overall. Further studies would benefit from selecting drivers with a high propensity for driving anger and ensuring a more even gender distribution.

4.2. Summary and practical implications

Overall, the results have demonstrated that individuals with higher levels of mindfulness reported less anger across a variety of driving situations. Further, these individuals reported less aggressive expressions of their anger. Our findings indicate that mindfulness offers a promising intervention for drivers prone to high levels of anger and subsequent aggression. Given that aggression is often part of a larger pattern of dangerous driving behaviours, mindfulness training is likely to extend beyond aggression to other behaviours that increase the risk of harm for the driver and other road users. Further research in this area is warranted.

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