Personality and Individual Differences 135 (2018) 207–211

Contents lists available at ScienceDirect

Personality and Individual Differences

journal homepage: www.elsevier.com/locate/paid

The moderating effect of trait anxiety on anxiety-related thoughts and actions whilst driving

M.P. Barnard*, P. Chapman

School of Psychology, University of Nottingham, Nottingham, United Kingdom, NG7 2RD

ARTICLE INFO

Keywords:
Driving anxiety
Trait anxiety
Stress
Questionnaire

ABSTRACT

Whilst there is evidence for the impact of driving anxiety on behaviour, less exists for the impact of trait anxiety and what does exist is inconclusive. The current study explored the possibility that trait anxiety interacts with driving anxiety to impact the frequency of negative on-road thoughts and behaviours. An online survey was administered to drivers, and the State-Trait Inventory for Cognitive and Somatic Anxiety, the Driving Cognitions Questionnaire, and the Driving Behaviour Survey, were completed. Moderation analyses suggested that in addition to an increase in social concerns and aggressive responses, high trait anxiety reduced positive associations between driving anxiety and exaggerated safety-cautious behaviours, as well as the general use of maladaptive reactions to stressful situations. As scores on these subscales were still higher regardless of the reduced associations, it is argued that both drivers with a generally anxious personality and those with high levels of driving-specific anxiety should be made aware of their potential to violate traffic norms in stressful situations.

1. Introduction

According to research and national statistics (Department for Transport, 2014; Dula & Geller, 2003), negative emotions increase the likelihood of dangerous driving behaviours and crash involvement. The UK's Department for Transport revealed that over 5000 crashes in 2013 were preceded by negative emotional experiences behind the wheel, with 1900 of these accounted for by nervousness, uncertainly or panic. This suggests that emotions associated with anxiety may be a significant risk factor for traffic crash involvement.

Those with an anxious driving style tend to feel distress and anxiety when driving, and express a lack of confidence in their skills (Taubman-Ben-Ari, Mikulincer, & Gillath, 2004). Whilst they often report lower levels of sensation-seeking, suggesting a reduced risk of crash involvement due to avoidance of high-risk situations (Ulleberg, 2001), empirical evidence suggests that this subgroup may be more dangerous on the road. Those associated with this driving style have shown lapses in attention and memory (Lucidi et al., 2010), a greater number of on-road errors (Taylor, Deane, & Podd, 2007), and a greater likelihood of crash involvement (Marengo, Settanni, & Vidotto, 2012).

Those with driving anxiety may perceive their abilities as insufficient to deal with the environment they have encountered, resulting in increased stress and use of emotion-focused coping (Lazarus & Folkman, 1984). Transportation research confirms this suggestion by demonstrating that increased levels of stress contribute towards increased errors, lapses, and dangerous driving (Ge et al., 2014; Rowden, Matthews, Watson, & Biggs, 2011). However, recent evidence has also acknowledged the relationship between personality and the appraisal-emotion relationship; neuroticism, a trait associated with anxiety, has demonstrated a moderating and exacerbating relationship between appraisals and negatively valenced emotions (Tong, 2010). Thus when evaluating the ways in which drivers cope with stressful situations, the role of personality should not be ignored.

Yet there is a lack of focus in, or consensus on, the relationship between trait anxiety and driving. Whilst self-report evidence associates higher trait anxiety with more violations, errors, and lapses (Pourabdian & Azmoon, 2013; Shahar, 2009), behavioural research looking at areas such as hazard perception (Barnard & Chapman, 2016) and speeding compliance (Stephens & Groeger, 2009) have found it has either no detrimental effects, or actually make drivers safer.

It is possible that trait anxiety, rather than consistently affecting driver behaviour, has more of an impact on the negative thoughts associated with driving. Processing theories such as Attentional Control Theory (Eysenck, Derakshan, Santos, & Calvo, 2007), propose that an increased occupation with worrisome thoughts reduces processing efficiency without necessarily impacting behaviours. Research into how this is associated with driving is limited, although it does accord with the observation that trait anxiety is associated with increased reaction

* Corresponding author.
E-mail addresses: Megan.Barnard1@nottingham.ac.uk (M.P. Barnard), Peter.Chapman@nottingham.ac.uk (P. Chapman).

https://doi.org/10.1016/j.paid.2018.07.027
Received 29 March 2018; Received in revised form 14 June 2018; Accepted 17 July 2018

times on *n*-back tasks as well as increased errors and lapses (Wong, Mahar, & Titchener, 2015).

Recent questionnaires assessing the effects of anxiety on driver behaviour have referred to some of the principles discussed within Attentional Control Theory. For example, recent research looking at the Driving Cognitions Questionnaire (DCQ- Ehlers et al., 2007) acknowledged the high probability of trait anxiety producing a higher frequency of dysfunctional thoughts in phobic participants (da Costa, de Carvalho, Cantini, da Rocha Freire, & Nardi, 2014). Furthermore, the Driving Behaviour Survey (DBS- Clapp et al., 2011) includes a subscale on anxiety-based performance deficits, defined as behaviours that occur due to an increase in worrisome or anxious thoughts that increase cognitive load. Notably, some of the previously discussed research emphasised an association between an anxious driving style and lapses in attention, suggesting that the principles of the theory could apply to anxious drivers, as well as those with dispositional anxiety.

What has received less focus in the literature is the way in which trait and state anxiety may interact with each other. This issue was highlighted in a recent review on anxiety (Wilt, Oehlberg, & Revelle, 2011). It was suggested that the dichotomisation of anxiety into these two dimensions may result in the potential to reduce our understanding of how they exist in a concurrent fashion. The idea of interaction has been supported more recently in research into phonological and set-shifting processing efficiencies (Edwards, Edwards, & Lyvers, 2015, 2016). Research within the field of transportation would benefit from a similar integration of personality and state. Whilst previous research has investigated the relationship between trait and driving anxiety, this has merely confirmed the existence of higher trait anxiety in those with driving anxiety (Taylor et al., 2007), without further exploration of the relationship between the two.

The present study explores the potential influences of both driving anxiety, as well as trait anxiety, on the frequency of negative thoughts and behaviours on the road. This was achieved using an online survey. We investigate whether the previous suggestions from Wilt et al. (2011) could be observed within an applied context. Additionally, we provide data to help practitioners understand whether the frequency of specific thoughts and actions is additionally affected by an anxious personality, rather than simply being anxious about driving. Based on the previous literature, it was hypothesised that trait anxiety could have a moderating effect on the frequency of negative thoughts associated with driving, as well as potentially on behaviours associated with worrisome or anxious thoughts.

2. Methods

2.1. Participants

Participants were approached using social media invitations, advertising on a local newspaper website, advertising on a local study recruitment website, and through a University volunteering database. The study was completed online, and a total of 320 participants with full driver's licences expressed interest in the survey by going to the web link associated with the survey; however, only 227 completed their responses, resulting in a 71% retention rate (149 females, 76 males). Their ages ranged from 17 to 81, with an average age of 35 (sd = 18.44). The majority were in employment or full-time study (80.2%), whilst the remainder of the sample was retired or unemployed (17.2%). Participants had held their full driving licence for 15.19 years (sd = 16.79), and drove 6229.22 miles per year (sd = 5904.19). Most reported driving at least a few times a week (69.46%). Ninety-five reported previous involvement in a crash in which they were the driver (41.85%).

2.2. Software

The survey was compiled and distributed to participants using LimeSurvey version 2.05, an online open source software tool which can be used to create and publish surveys, as well as compile respondent statistics and collate responses for analysis.

2.3. Measures

2.3.1. Demographic variables

The survey initially consisted of a standard information sheet and consent form, after which questions were asked regarding demographics and general driving behaviour. These included questions on licence duration, annual mileage and crash history. Once these had been completed, participants completed the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA-Grös, Antony, Simms, & McCabe, 2007), the DCQ, and the DBS.

2.3.2. State-Trait Anxiety for Cognitive and Somatic Anxiety

The STICSA is a 42-item questionnaire, 21 of each measuring state and trait anxiety. Items are distinguished according to whether they measure cognitive (10 items) or somatic symptoms of anxiety (11 items). Items are administered on a 1 to 4 Likert scale, with 1 meaning 'not at all' and 4 meaning 'very much'. Total scores for state and trait range from 21 to 84. In all cases, a higher score indicates higher anxiety levels. However, to measure the effects of driving anxiety, the phrasing of the state STICSA was changed; instead of asking participants how they felt "at this moment", they were asked how they felt whilst driving. Whilst previous research has used the State-Trait Anxiety Inventory (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) to obtain anxiety measures, recent research has suggested that the STICSA is more strongly correlated with anxiety than the STAI (Grös et al., 2007) Average driving anxiety scores were 29.43 (sd = 10.93) and average trait anxiety scores were 31.8 (sd = 11.3) Cronbach's α was 0.946 for driving anxiety, and 0.941 for trait anxiety, indicating good internal consistency.

2.3.3. Driving cognitions questionnaire

The DCQ is a 20-item questionnaire designed to assess the frequency of concerning thoughts whilst driving. Six items address social concerns, seven address accident concerns, and seven address panic concerns. Items are administered on a 5-point Likert scale, with "0" meaning "Never", and "4" meaning "Always". A minimum score of 0 and maximum score of 28 can be obtained for accident and panic concerns, whilst a maximum score of 24 can be obtained for social concerns. An overall maximum score of 80 can be obtained. In the current study, average scores for social, panic and accident concerns were 5.17 (sd = 4.9), 1.98 (sd = 3.48) and 6.34 (sd = 5.26) respectively, whilst the overall average score was 13.49 (sd = 12.26). Overall Cronbach's α was 0.941, and for social, accident and panic concerns were 0.866, 0.897, and 0.888 respectively.

2.3.4. Driving behaviour survey

The DBS is a 21-item questionnaire measuring the frequency of driving behaviours associated with a hypothetically stressful driving situation on three subscales consisting of seven items each. Anxiety-based performance deficits (ABPD) are related to changes in driving performance due to an anxiety-induced increase in cognitive load and include behaviours such as lane drifting and inappropriate speed adjustments. Exaggerated safety-cautious behaviours (ESCB) increase the perceived safety of a situation by maintaining larger headway distances and unnecessarily slowing down at traffic lights. Finally, the aggression subscale evaluates the 'fight' aspect of the fight-or-flight response and includes behaviours such as swearing and pounding on the steering wheel. Items are administered on a 7-point Likert scale, with 1 meaning "Never" and 7 meaning "Always". Item scores are averaged, meaning that for each subscale participants can obtain a minimum score of 1 and a maximum score of 7; this same principle is applied to the overall DBS score. Average scores for ABPD, ESCB behaviours, and aggression were

2.09 (sd = 0.9), 3.52 (sd = 1.25) and 2.2 (sd = 1.12) respectively, whilst the average overall score was 2.6 (sd = 0.84). Cronbach's α for the total score was 0.885, and for ABPD, ESCB, and aggressive reactions were 0.835, 0.846, and 0.862 respectively.

2.4. Procedure

After expressing interest in the survey, participants took an average of 10–15 min to complete it, after which a chance to win £50 in shopping vouchers was offered as an incentive. The survey was online for approximately 12 months and ethical approval for its administration was obtained from a local Ethics Committee.

3. Results

Subscale and overall scores for questionnaires were calculated manually; based on previous research (Taylor & Sullman, 2009), where there were no more than two or fewer items missing on a scale, mean item replacement accounted for this. Data from five participants were removed due to missing STICSA scores. Three further cases were also removed from DBS analysis.

Scores were subjected to a moderation analysis using PROCESS version 2.16.3 (Hayes, 2013), running in SPSS version 22. Driving anxiety was treated as a predictor variable, whilst trait anxiety was treated as a moderator variable. Demographic variables previously associated with higher levels of anxiety in previous transportation research were entered into moderation models as covariates. These included age, experience (defined as the amount of years since passing a driving test), gender, and cras involvement. The latter two were dummy coded to assume that the participant was female or had been previously involved in an accident. Interactions between driving and trait anxiety were explored using simple slopes analysis. Slopes were generated at ± 1 standard deviation of the mean of trait anxiety scores, and the Johnson-Neyman method was used to obtain a zone of significance. Bivariate correlations between variables, as well as output from post-hoc power analyses conducted in G*Power v3.1 (Faul, Erdfelder, Lang, & Buchner, 2007), are available as supplementary material.

3.1. DCQ

For all scores, levels of driving anxiety were a significant positive predictor (all ps < 0.001). Trait anxiety also acted as a significant positive predictor of social concerns (p < .01) and total DCQ scores (p < .05); however, it did not moderate the relationship between driving anxiety and DCQ scales. Additionally, those involved in an accident had lower DCQ social scores (see Table 1).

3.2. DBS

Levels of driving anxiety positively predicted ABPD scores, ESCB scores, and total DBS scores (all ps < .001, see Table 2). For the aggression subscale, age and gender were significant negative predictors. This suggested that female drivers, as well as older drivers, had lower aggression scores (ps < .05).

Trait anxiety was a positive predictor of ABPD scores, aggression scores, and total DBS scores (ps < .001). Trait anxiety acted as a positive predictor of aggression in the absence of a similar effect of driving anxiety (p = .36).

Interaction effects were found for ESCB and total DBS scores (ps < .05, see Figs. 1 and 2). Details on unstandardized slopes are available in Table 3. The Johnson-Neyman technique revealed that trait anxiety moderated the relationship between driving anxiety and scores, until trait anxiety scores were 20.91 points above the mean for ESCB, and 19.54 points above the mean for total DBS scores.

Table 1
Moderation analyses of subscales and total scores for the Driving Cognitions Questionnaire (confidence intervals presented in square brackets).

		B	*SE B*	*t*
DCQ panic	Intercept	0.79 [−0.19, 1.78]	0.5	1.59
	Age	0.02 [−0.01, 0.06]	0.02	1.11
	Experience	−0.01 [−0.07, 0.04]	0.03	−0.56
	Gender	0.2 [−0.35, 0.75]	0.28	0.72
	Accident involvement	−0.02 [−0.79, 0.74]	0.39	−0.06
	Driving anxiety	0.17 [0.12, 0.23]	0.03	6.07***
	Trait anxiety	0.01 [−0.03, 0.05]	0.02	0.41
	Driving × trait anxiety	0.003 [< 0.00001, 0.01]	0.001	1.96
DCQ accident	Intercept	7.07 [5.1, 9.04]	0.99	7.08***
	Age	−0.05 [−0.13, 0.03]	0.04	−1.31
	Experience	0.04 [−0.06, 0.13]	0.05	0.79
	Gender	−0.01 [−0.94, 0.91]	0.47	−0.03
	Accident involvement	0.4 [−0.67, 1.46]	0.54	0.74
	Driving anxiety	0.38 [0.27, 0.49]	0.05	6.98***
	Trait anxiety	0.03 [−0.05, 0.12]	0.04	0.83
	Driving × trait anxiety	0.001 [−0.004, 0.01]	0.003	0.45
DCQ social	Intercept	5.58 [4.15, 7]	0.72	7.71***
	Age	0.03 [−0.04, 0.09]	0.03	0.84
	Experience	−0.05 [−0.13, 0.01]	0.04	−1.66
	Gender	−0.04 [−0.08, 0.76]	0.41	−0.11
	Accident involvement	−1.5 [−2.36, −0.64]	0.44	−3.43***
	Driving anxiety	0.29 [0.2, 0.39]	0.05	6.18***
	Trait anxiety	0.1 [0.03, 0.17]	0.03	2.95**
	Driving × trait anxiety	−0.004 [−0.009, 0.001]	0.003	−1.46
DCQ total	Intercept	13.62 [10.54, 16.7]	1.56	8.72***
	Age	0.01 [−0.12, 0.14]	0.07	0.09
	Experience	−0.05 [−0.21, 0.12]	0.08	−0.55
	Gender	0.26 [−1.47, 1.99]	0.88	0.29
	Accident involvement	−1.21 [−3.37, 0.95]	1.09	−1.11
	Driving anxiety	0.83 [0.66, 1]	0.09	9.72***
	Trait anxiety	0.17 [0.03, 0.32]	0.07	2.34*
	Driving × trait anxiety	−0.002 [−0.01, 0.01]	0.004	−0.4

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

4. Discussion

The current study aimed to establish whether trait anxiety moderates the relationship between driving anxiety and the frequency of negative thoughts and behaviours on the road, in accordance with previous suggestions and findings (Wilt et al., 2011). We found that whilst trait anxiety did have a moderating effect, this was only for the frequency of reactive behaviours, and not the frequency of negative thoughts, as previously hypothesised.

Interactions included an increase in the frequency of ESCB behaviours, as well as an increase in general negative behaviours. However, rather than finding that personality exacerbated this relationship, as previously suggested (Tong, 2010), higher trait anxiety in fact reduced the associative strength between driving anxiety and these behaviours. Furthermore, the frequency of ESCB and total DBS behaviours were consistently higher for those with high trait anxiety than those with high driving anxiety but only low or average levels of trait anxiety (see Figs. 1 and 2). For ESCB behaviours, whilst those with high driving anxiety may be engaging in such behaviours as a means to increase perceptions of control (Baker, Litwack, Clapp, Beck, & Sloan, 2014), those with high trait anxiety may be doing so, and acting dangerously, without necessarily being anxious about driving. This would also apply to the use of maladaptive behaviours, as indicated by total DBS scores.

Table 2
Moderation analyses of subscales and total scores for the Driver Behaviour Questionnaire (confidence intervals presented in square brackets).

		B	*SE B*	*t*
DBS ABPD	Intercept	2.19 [1.74, 2.64]	0.23	9.61***
	Age	−0.001 [−0.02, 0.02]	0.01	−0.12
	Experience	−0.0004 [−0.02, 0.02]	0.01	−0.04
	Gender	0.01 [−0.21, 0.23]	0.11	0.1
	Accident involvement	−0.18 [−0.4, 0.05]	0.11	−1.57
	Driving anxiety	0.04 [0.02, 0.06]	0.01	4.34***
	Trait anxiety	0.02 [0.01, 0.03]	0.01	2.81**
	Driving × trait anxiety	−0.0003 [−0.001, 0.001]	0.001	−0.62
DBS ESCB	Intercept	3.73 [2.98, 4.49]	0.38	9.77***
	Age	−0.01 [−0.05, 0.03]	0.02	−0.49
	Experience	0.02 [−0.03, 0.06]	0.02	0.74
	Gender	−0.1 [−0.4, 0.23]	0.16	−0.59
	Accident involvement	−0.1 [−0.4, 0.3]	0.18	−0.36
	Driving anxiety	0.07 [0.04, 0.09]	0.01	4.44***
	Trait anxiety	0.01 [−0.01, 0.03]	0.01	0.85
	Driving × trait anxiety	−0.002 [−0.003, −0.0001]	0.001	−2.04*
DBS Agg	Intercept	3.01 [2.38, 3.65]	0.32	9.31***
	Age	−0.03 [−0.06, −0.003]	0.01	−2.19*
	Experience	0.03 [−0.0002, 0.05]	0.01	1.96
	Gender	−0.3 [−0.59, −0.02]	0.15	−2.1*
	Accident involvement	−0.05 [−0.34, 0.24]	0.15	−0.34
	Driving anxiety	0.01 [−0.02, 0.04]	0.01	0.92
	Trait anxiety	0.04 [0.02, 0.06]	0.01	3.34**
	Driving × trait anxiety	−0.001 [−0.003, 0.001]	0.001	−0.92
DBS total	Intercept	3.01 [2.59, 3.43]	0.21	14.02***
	Age	−0.01 [−0.03, 0.004]	0.01	−1.49
	Experience	0.01 [−0.006, 0.04]	0.01	1.4
	Gender	−0.14 [−0.35, 0.06]	0.1	−1.37
	Accident involvement	−0.07 [−0.28, 0.14]	0.11	−0.65
	Driving anxiety	0.04 [0.03, 0.06]	0.01	5.1***
	Trait anxiety	0.02 [0.01, 0.04]	0.01	3.23**
	Driving × trait anxiety	−0.001 [−0.002, −0.0001]	0.001	−2.14*

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

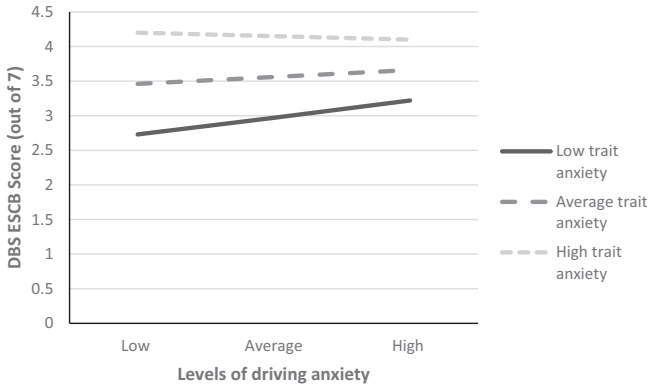

Fig. 1. The relationship between driving anxiety and ESCB scores, according to trait anxiety levels.

Practically, those with high trait anxiety may need to be made aware that their reactions to stressful situations may be causing danger and violating traffic norms. Whilst it cannot be determined from this study whether those with high trait anxiety are consciously adopting these behaviours, it has been suggested that unrecognised persistence of ESCB behaviours would negatively impact interventions such as exposure-based therapy (Clapp, Baker, Litwack, Sloan, & Beck, 2014). Several interventions could be put in place to increase such awareness,

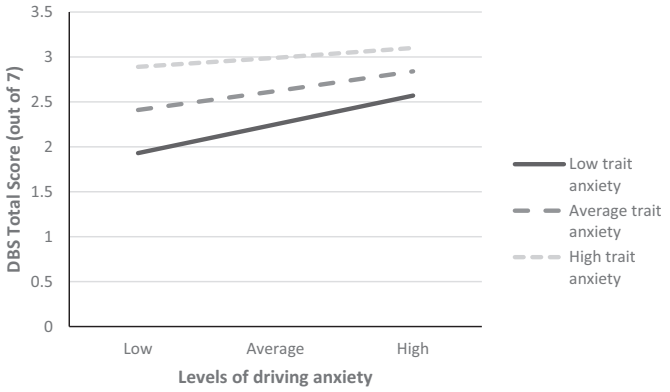

Fig. 2. The relationship between driving anxiety and total DBS scores, according to trait anxiety levels.

Table 3
Unstandardised slopes for significant interactions.

		Unstandardised slope	Standard error	*t*
DBS ESCB	Low trait anxiety	0.08	0.02	4.01***
	Average trait anxiety	0.07	0.01	4.44***
	High trait anxiety	0.05	0.01	4.03***
DBS total	Low trait anxiety	0.05	0.01	4.36***
	Average trait anxiety	0.04	0.01	5.1***
	High trait anxiety	0.03	0.01	4.54***

*** $p < .001$.

such as continuous feedback from vehicles.

Trait anxiety did not moderate concerns whilst driving, but still acted as a predictor of thoughts and behaviours. Some findings are in line with previous research (Deffenbacher, Huff, Lynch, Oetting, & Salvatore, 2000) and indicate that future interventions should seek to reduce feelings of reactive anger. Other findings, such as the relationship between trait anxiety and ABPD, could suggest maladaptive changes in behaviour due to an increase in cognitive load. This would support previous research (Clapp et al., 2011) and suggests that some of the specific behaviours that may need to be targeted by interventions for those with high trait anxiety include attention-based behaviours.

To accept this suggestion would imply that these behaviours are due to worrisome thoughts. The data from this study suggest that there are effects of trait anxiety on social and general concerns whilst driving, supporting previous research (Taylor & Deane, 2000), but it is also worth considering how these thoughts may impact behaviour. The DCQ asks participants to rate how frequently they experience certain thoughts whilst they are driving. As these data report thoughts during driving, this could indicate a form of mind wandering. Mind wandering results in dangerous driving behaviours (Yanko & Spalek, 2014); it is possible that those with high trait anxiety may be preoccupied with thoughts of unlikely events, such as others thinking they are a bad driver, resulting in unintentionally dangerous behaviours. Whilst research suggests those reporting anxiety whilst driving are no more likely to show mind wandering (Burdett, Charlton, & Starkey, 2016), this is from a state perspective; those high in neuroticism also report higher levels of mind wandering and poorer attentional control (Robison, Gath, & Unsworth, 2017), thus it is still possible that those high in trait anxiety may show similar behaviours behind the wheel.

Whilst these findings could have important implications, there are several limitations to consider. Firstly, the use of self-report data means that these results may not fully reflect on-road behaviour. Whilst there are some positive relationships between self-report and behavioural responses (Taubman-Ben-Ari, Eherenfreund-Hager, & Prato, 2016), to

our knowledge such data does not currently exist for the DCQ and DBS. Secondly, the use of retrospective data suggests that the data may need to be interpreted with caution. For example, accident data is often prone to distortions in memory due to forgetting (Maycock, Lockwood, & Lester, 1991) and inflations in intensity, depending on time since recall (Chapman & Underwood, 2000). Additionally, those higher in anxiety are more likely to recall threatening information (Mitte, 2008). For the current study, anxious participants could have used more negative experiences to influence recall, resulting in potential data bias. Finally, there may be issues with temporal stability. The data were collected over 12 months, in which time driver cognitions may have changed. To highlight this, initial DBS construction suggested issues in temporal stability for the aggression subscale (Clapp et al., 2011). Therefore, it is acknowledged that due to the chosen scales, there may be issues with reliability.

The current study suggested that whilst trait anxiety independently predicts certain concerns and maladaptive responses to stressful driving situations, it also has the potential to reduce positive associations between driving anxiety and ESCB behaviours. Due to consistently higher ESCB scores in high trait anxiety, this indicates that those high in anxiety could show driving behaviours violating traffic norms and increasing accident likelihood. Practically, this indicates that those with such a personality should not be ignored within the field of transportation, and measures seeking to help those with high driving anxiety may also benefit those with high trait anxiety.

Acknowledgements

This work was supported by the Engineering and Physical Sciences Research Council [grant number EP/P505658].

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.paid.2018.07.027.

References

Baker, A. S., Litwack, S. D., Clapp, J. D., Beck, G., & Sloan, D. M. (2014). The driving behavior survey as a measure of behavioral stress responses to MVA-related PTSD. *Behavior Therapy, 45*(3), 444–453. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/24800313.

Barnard, M. P., & Chapman, P. (2016). Are anxiety and fear separable emotions in driving? A laboratory study of behavioural and physiological responses to different driving environments. *Accident Analysis & Prevention, 86*, 99–107. https://doi.org/10.1016/j.aap.2015.10.021.

Burdett, B. R. D., Charlton, S. G., & Starkey, N. J. (2016). Not all minds wander equally: The influence of traits, states and road environment factors on self-reported mind wandering during everyday driving. *Accident Analysis & Prevention, 95*, 1–7. https://doi.org/10.1016/J.AAP.2016.06.012.

Chapman, P., & Underwood, G. (2000). Forgetting near-accidents: The roles of severity, culpability and experience in the poor recall of dangerous driving situations. *Applied Cognitive Psychology, 14*(1), 31–44. https://doi.org/10.1002/(SICI)1099-0720(200001)14:1<31::AID-ACP622>3.0.CO;2-9.

Clapp, J. D., Baker, A. S., Litwack, S. D., Sloan, D. M., & Beck, J. G. (2014). Properties of the Driving Behavior Survey among individuals with motor vehicle accident-related post-traumatic stress disorder. *Journal of Anxiety Disorders, 28*(1), 1–7. https://doi.org/10.1016/J.JANXDIS.2013.10.008.

Clapp, J. D., Olsen, S. A., Beck, J. G., Palyo, S. A., Grant, D. M., Gudmundsdottir, B., & Marques, L. (2011). The Driving Behavior Survey: Scale construction and validation. *Journal of Anxiety Disorders, 25*(1), 96–105. https://doi.org/10.1016/j.janxdis.2010.08.008.

da Costa, R. T., de Carvalho, M. R., Cantini, J., da Rocha Freire, R. C., & Nardi, A. E. (2014). Demographics, clinical characteristics and quality of life of Brazilian women with driving phobia. *Comprehensive Psychiatry, 55*(2), 374–379. https://doi.org/10.1016/J.COMPPSYCH.2013.08.003.

Deffenbacher, J. L., Huff, M. E., Lynch, R. S., Oetting, E. R., & Salvatore, N. F. (2000). Characteristics and treatment of high-anger drivers. *Journal of Counseling Psychology, 47*(1), 5–17. https://doi.org/10.1037/0022-0167.47.1.5.

Department for Transport (2014). *Contributory Factors in Reported Accidents by Severity, Great Britain.* 2013. Retrieved from https://www.gov.uk/government/publications/reported-road-casualties-great-britain-annual-report-2013.

Dula, C. S., & Geller, E. S. (2003). Risky, aggressive, or emotional driving: Addressing the need for consistent communication in research. *Journal of Safety Research, 34*(5), 559–566. https://doi.org/10.1016/J.JSR.2003.03.004.

Edwards, E. J., Edwards, M. S., & Lyvers, M. (2015). Cognitive trait anxiety, situational stress, and mental effort predict shifting efficiency: Implications for attentional control theory. *Emotion, 15*(3), 350–359. https://doi.org/10.1037/emo0000051.

Edwards, E. J., Edwards, M. S., & Lyvers, M. (2016). Interrelationships between trait anxiety, situational stress and mental effort predict phonological processing efficiency, but not effectiveness. *Emotion, 16*(5), 634–646. https://doi.org/10.1037/emo0000138.

Ehlers, A., Taylor, J. E., Ehring, T., Hofmann, S. G., Deane, F. P., Roth, W. T., & Podd, J. V. (2007). The Driving Cognitions Questionnaire: Development and preliminary psychometric properties. *Journal of Anxiety Disorders, 21*(4), 493–509. https://doi.org/10.1016/J.JANXDIS.2006.08.002.

Eysenck, M. W., Derakshan, N., Santos, R., & Calvo, M. G. (2007). Anxiety and cognitive performance: Attentional control theory. *Emotion, 7*(2), 336–353. https://doi.org/10.1037/1528-3542.7.2.336.

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*, 175–191.

Ge, Y., Qu, W., Jiang, C., Du, F., Sun, X., & Zhang, K. (2014). The effect of stress and personality on dangerous driving behavior among Chinese drivers. *Accident Analysis & Prevention, 73*, 34–40. https://doi.org/10.1016/J.AAP.2014.07.024.

Grös, D. F., Antony, M. M., Simms, L. J., & McCabe, R. E. (2007). Psychometric properties of the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA): Comparison to the State-Trait Anxiety Inventory (STAI). *Psychological Assessment, 19*(4), 369–381. https://doi.org/10.1037/1040-3590.19.4.369.

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach.* London: Guilford Publications.

Lazarus, R., & Folkman, S. (1984). *Stress, appraisal, and coping.* New York: Springer Publishng Company.

Lucidi, F., Giannini, A. M., Sgalla, R., Mallia, L., Devoto, A., & Reichmann, S. (2010). Young novice driver subtypes: Relationship to driving violations, errors and lapses. *Accident Analysis & Prevention, 42*(6), 1689–1696. https://doi.org/10.1016/J.AAP.2010.04.008.

Marengo, D., Settanni, M., & Vidotto, G. (2012). Drivers' subtypes in a sample of Italian adolescents: Relationship between personality measures and driving behaviors. *Transportation Research Part F: Traffic Psychology and Behaviour, 15*(5), 480–490. https://doi.org/10.1016/J.TRF.2012.04.001.

Maycock, G., Lockwood, C. R., & Lester, J. F. (1991). *The accident liability of car drivers.* Department of TRL Research Report 315. Crowthrone, UK.

Mitte, K. (2008). Memory bias for threatening information in anxiety and anxiety disorders: A meta-analytic review. *Psychological Bulletin, 134*(6), 886–911. https://doi.org/10.1037/a0013343.

Pourabdian, S., & Azmoon, H. (2013). The relationship between trait anxiety and driving behavior with regard to self-reported Iranian accident involving drivers. *International Journal of Preventive Medicine, 4*(10), 1115–1121. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/24319550.

Robison, M. K., Gath, K. I., & Unsworth, N. (2017). The neurotic wandering mind: An individual differences investigation of neuroticism, mind-wandering, and executive control. *Quarterly Journal of Experimental Psychology, 70*(4), 649–663. https://doi.org/10.1080/17470218.2016.1145706.

Rowden, P., Matthews, G., Watson, B., & Biggs, H. (2011). The relative impact of work-related stress, life stress and driving environment stress on driving outcomes. *Accident Analysis & Prevention, 43*(4), 1332–1340. https://doi.org/10.1016/J.AAP.2011.02.004.

Shahar, A. (2009). Self-reported driving behaviors as a function of trait anxiety. *Accident Analysis & Prevention, 41*(2), 241–245. https://doi.org/10.1016/J.AAP.2008.11.004.

Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P. R., & Jacobs, G. A. (1983). *Manual for the state-trait anxiety inventory.* Palo Alto, CA: Consulting Psychologists Press.

Stephens, A. N., & Groeger, J. A. (2009). Situational specificity of trait influences on drivers' evaluations and driving behaviour. *Transportation Research Part F: Traffic Psychology and Behaviour, 12*(1), 29–39. https://doi.org/10.1016/j.trf.2008.06.005.

Taubman-Ben-Ari, O., Eherenfreund-Hager, A., & Prato, C. G. (2016). The value of self-report measures as indicators of driving behaviors among young drivers. *Transportation Research Part F: Traffic Psychology and Behaviour, 39*, 33–42. https://doi.org/10.1016/J.TRF.2016.03.005.

Taubman-Ben-Ari, O., Mikulincer, M., & Gillath, O. (2004). The multidimensional driving style inventory—Scale construct and validation. *Accident Analysis & Prevention, 36*(3), 323–332. https://doi.org/10.1016/S0001-4575(03)00010-1.

Taylor, J. E., & Deane, F. P. (2000). Comparison and characteristics of Motor Vehicle Accident (MVA) and non-MVA driving fears. *Journal of Anxiety Disorders, 14*(3), 281–298. https://doi.org/10.1016/S0887-6185(99)00040-7.

Taylor, J. E., Deane, F. P., & Podd, J. V. (2007). Driving fear and driving skills: Comparison between fearful and control samples using standardised on-road assessment. *Behaviour Research and Therapy, 45*(4), 805–818. https://doi.org/10.1016/J.BRAT.2006.07.007.

Taylor, J. E., & Sullman, M. J. M. (2009). What does the Driving and Riding Avoidance Scale (DRAS) measure? *Journal of Anxiety Disorders, 23*(4), 504–510. https://doi.org/10.1016/J.JANXDIS.2008.10.006.

Tong, E. M. W. (2010). Personality influences in appraisal–emotion relationships: The role of neuroticism. *Journal of Personality, 78*(2), 393–418. https://doi.org/10.1111/j.1467-6494.2010.00620.x.

Ulleberg, P. (2001). Personality subtypes of young drivers. Relationship to risk-taking preferences, accident involvement, and response to a traffic safety campaign. *Transportation Research Part F: Traffic Psychology and Behaviour, 4*(4), 279–297. https://doi.org/10.1016/S1369-8478(01)00029-8.

Wilt, J., Oehlberg, K., & Revelle, W. (2011). Anxiety in personality. *Personality and Individual Differences, 50*(7), 987–993. https://doi.org/10.1016/J.PAID.2010.11.014.

Wong, I. Y., Mahar, D., & Titchener, K. (2015). Driven by distraction: Investigating the effects of anxiety on driving performance using the attentional control theory. *Journal of Risk Research, 18*(10), 1293–1306. https://doi.org/10.1080/13669877.2014.919516.

Yanko, M. R., & Spalek, T. M. (2014). Driving with the wandering mind. *Human Factors: The Journal of the Human Factors and Ergonomics Society, 56*(2), 260–269. https://doi.org/10.1177/0018720813495280.