Psychometric Properties of the Driving Behaviour Scale (DBS) among Polish Drivers

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Abstract

Anxiety can negatively affect an individual's psychological wellbeing and lead to mild-to-moderate functional impairment in various areas of their lives. Despite this, the relationship between anxiety and driving performance has received very little empirical attention. The Driving Behaviour Scale (Clapp et al., 2011) was developed as a measure of anxious driving behaviours to support research in this area. The current study details adaptation and validation of the Driving Behaviour Scale (DBS; Clapp et al., 2011) in 310 university students in Poland. The overall internal consistency for the DBS was 0.76, while the two subscales demonstrated acceptable internal consistency (safety/cautious = 0.75 and hostile/aggressive behaviours = 0.85). The reliability estimates for performance deficit returned a lower coefficient of 0.65. Factor analysis produced a three-factor solution that supported the original structure of the DBS. The DBS may be utilised as a measure of driving anxiety in samples drawn from the general population.

Keywords: driving anxiety, driving behaviour, motor vehicle accident, assessment

Psychometric Properties of the Driving Behaviour Scale among Polish Drivers

Anxiety can negatively affect an individual's psychological wellbeing and lead to mild-to-moderate functional impairment in various areas of their lives (e.g., Eysenck, 2014; Hickling & Blanchard, 1992; Taylor, Deane, & Podd, 2007). Anxiety is "an aversive emotional and motivational state occurring in threatening circumstances" (Eysenck, Derakshan, Santos, & Calvo, 2007, p. 336) and can be characterised as the inability of an individual to prompt a clear pattern of behaviour in order to eliminate or remove the event, object, or interpretation that leads to them feeling threatened (Power & Dalgleish, 1997). Whilst the repercussions anxiety may have on an individual's work performance (e.g., Haslam, Atkinson, Brown, & Haslam, 2005), social relationships and quality of life (e.g., Barrera & Norton, 2009; Olatunji, Cisler, & Tolin, 2007) have been thoroughly explored, relatively few studies have explored the relationship between anxiety and driving (e.g., Clapp et al., 2011; Dula, Adams, Miesner, & Leonard, 2010; Taylor, Deane, & Podd, 2007a;). Previous research has established that anxiety can negatively affect a driver's adjustment to changes in the driving environment, which can lead to a deterioration in driving performance and an increased risk of collision (e.g., Kontogiannis, 2006; Mesken, Hagenzieker, Rothergatter, & de Waard, 2007). The results of on-road and simulator studies suggest that anxious drivers tend to make more driving errors (e.g., Taylor et al., 2007), have increased reaction times in braking tasks (e.g., Morton & White, 2013), greater likelihood of speeding (e.g., Roidl, Frehse, & Hoeger, 2014), as well as lower overall driving performance (Matthews et al., 1998). On the other hand, several studies have provided evidence that anxiety can result in more cautious behaviours, such as increased speed compliance (Stephens & Groeger, 2009).

Several studies have examined the relationship between anxiety and unsafe driving behaviours using self-report questionnaires (e.g., Dula & Geller, 2004; Ehring, Ehlers, &

Glucksman, 2006). For example, the Travel Phobia Questionnaire measures the degree of travel fear among motor vehicle crash (MVC) survivors (TPQ; Ehring, Ehlers, & Glucksman, 2006), the Driving Cognitions Questionnaire measures the degree to which negative thoughts occur whilst driving (DCQ; Ehlers et al., 2007), and the Driving and Riding Avoidance Scale measures the degree of travel avoidance independent of prior MVC involvement (DRAS; Stewart & Peter, 2004). The findings of these studies suggest that self-report tools investigating the relationship between anxiety and unsafe driving have a methodological advantage, in that data can be collected from a much larger sample than using other approaches, such as in person assessments.

However, the majority of these studies have examined specific types of anxiety, such as anxiety and fear *about* driving and vehicle crashes (e.g., driving phobia, travel phobia), rather than more general and non-clinical experiences of anxiety as they might occur in the driving context. Recent research suggests that a broader perspective is needed (e.g., Clapp et al., 2011). Firstly, an understanding of the negative repercussions of driving-related anxiety should not be limited to subjective fear of driving and travel avoidance (Clapp et al., 2011). This is also supported by the findings suggesting that those individuals, who continue to drive despite feeling anxious, tend to engage in various problematic behaviours like slowing for green lights and driving far below the speed limits (e.g., Koch & Taylor, 1995; Taylor & Koch, 1995) or committing more driving violations (e.g., Shahar, 2009; Shoham, Rahav, Markovski, Chard & Baruch, 1984). Secondly, apart from exploring the prevalence of anxiety among MVC survivors (e.g., Blanchard & Hickling, 2004; Taylor & Koch, 1995), most previous research has concentrated on the relationships of driving behaviours with clinical problems such as post-traumatic stress disorder (PTSD), generalised anxiety disorder, panic disorder and social phobia (e.g., Blanchard & Hickling, 2004; Taylor, Deane, & Podd, 2002; Taylor et al., 2007a). However, non-clinical individuals and those with no MVC history can

also exhibit anxiety-related behaviours, such as high levels of fear, functional interference, and general help-seeking behaviour (e.g., Taylor & Deane 1999, 2000). In order to measure a range of anxious driving behaviours that are not limited to accident history and clinical anxiety, the Driving Behaviour Survey (DBS; Clapp et al., 2011) was developed.

The DBS is a 21-item scale that measures the frequency of anxious driving behaviours, defined as changes in performance due to anxiety whilst driving a car (Clapp et al., 2011). The DBS has three subscales that include behaviours characterised by anxiety-based performance deficits, exaggerated safety/cautious behaviours, or hostile or aggressive responses when anxious. This three-factor model has been supported (Clapp et al., 2011). The DBS subscales are negatively correlated with perceived driving skill, and positively correlated with other measures of driving anxiety, including the DRAS and DCQ (Clapp et al., 2011; (OliSan, Cantini, de Carvalho, & Cardoso, 2015), and with stress history (Clapp et al., 2011) and MVC-related PTSD (Baker, Litwack, Clapp, Beck, & Sloan, 2014). Therefore, as a broader measure of anxious driving behaviour, the DBS warrants further study.

The aim of the present study was to validate the DBS in a sample of Polish drivers. This study is the first to use the DBS in a non-clinical population in a non-English speaking country. These findings will add to the growing body of research on the psychometric properties of the DBS and may also provide further support for its use as a measure of anxiety-induced driving behaviours in a non-clinical sample. We also examined the relationships between the DBS and trait anxiety and self-esteem. These two constructs were selected to explore whether and to what extent the self-reported driving behaviours are a function of trait anxiety (e.g., Shahar, 2009) and to investigate if self-esteem is as strongly associated with driving anxiety as it is with trait and social anxiety (e.g., Iancu, Bodner, & Ben-Zion, 2015; Rector, & Roger, 1997). In addition, driving-related demographic and

descriptive variables were also collected. Lastly, concurrent validity was examined by investigating the relationships between the DBS and DCQ and DRAS subscales.

Method

Participants

In total, 310 participants (158 women, 152 men) completed the paper-based survey. The mean age of the participants was 24.4 years (*SD* = 6.13, range 18–51 years).The sample was predominantly comprised of students studying marketing, management,economics, computer science and medicine. They had held their driver's licence for an average of 5.4 years (*SD* = 5.4) and had driven an average mileage of 14,585 km (*SD* = 16,962) over the last year. Most (91.3%) of the sample held a full driver's licence, while 5.1% had a restricted and 2.6% a learner's licence. The vast majority of the participants reported driving a car (95.5%) on a daily basis, with a small number driving a motorcycle (1%) or van (0.6%).

In terms of the frequency of driving, 43.7% indicated that they drove every day, 31.8% reported driving several times a week, 10.9% drove once a week, 6.4% drove once a month, 4.8% drove once in a couple of months, and 1.9% reported never driving. Most of the participants had not crashed within the past three months, with only four people reporting having had a crash during this period of time.

Procedure

Part-time students were approached in class and were provided with an information sheet outlining the study aims. They were informed that the study was voluntary, that their responses were anonymous and confidential, and that no reward would be received for completing the survey. Once informed consent had been obtained, participants were asked to complete the questionnaires in class.

Measures

In addition to demographic and descriptive variables (i.e., age, gender, kilometres driven in the last year, status of current car driver's licence, licence tenure), the questionnaire included several other measures, as described below. The participants were also asked to report their perceived driving skill "How do you assess your driving skill?" on a 5-point Likert scale, which ranged from 1 = very poor to 5 = excellent.

The Driving Behaviour Survey. The DBS (Clapp et al., 2011) consists of 21-items that assess the occurrence of anxious driving behaviour across the three dimensions of performance deficits, exaggerated safety/caution behaviour, and hostile/aggressive behaviour (7 items in each dimension). Participants were asked to rate items using a 7-point Likert scale, with higher scores indicating greater frequency of anxious behaviour. The average scores on each of the DBS subscales were calculated. Previous studies (Clapp et al., 2011a, 2011b) have found that the subscales have good internal validity with α = 0.78 - 0.90 for exaggerated safety/caution, α = 0.75 - 0.85 for performance deficits, and α = 0.86 - 0.91 for hostile / aggressive behaviours. Test-retest reliabilities in the original study were 0.68 for exaggerated safety / caution, 0.61 for performance deficit, and 0.89 for hostile / aggressive behaviours (Clapp et al., 2011a).

The measure was firstly translated from English to Polish by Blachnio, Przepiorka, Sullman, and Taylor (2013) and then back-translated by a professional English translator to ensure no mistakes were made. The translator also proofread and approved the final version of the measure to ensure that the items were grammatically correct and contained no ambiguity or errors.

The Driving and Riding Avoidance Scale. The Polish adaptation of the DRAS (Blachnio, Przepiorka, Sullman & Taylor, 2013) was used to measure the frequency of overt travel avoidance over the previous week (Stewart & St. Peter, 2004; Taylor, Sullman & Stephens, 2018). The participants were asked to rate, on a 4-point Likert scale (0 = rarely to 3

= most of the time), the tendency to avoid 20 driving scenarios (e.g., “I put off a brief trip or errand that required driving the car”, “I avoided driving on busy city streets”). Items were then summed to provide a total score (range 0 - 60) with higher scores indicating more frequent avoidance behaviour. The DRAS also has subscales, which measure general avoidance, traffic avoidance, riding avoidance, and weather avoidance. The scale demonstrated good internal consistency (α = 0.91) for the total score and α = 0.77 - 0.85 for each of the subscales (Blachnio et al., 2013).

The Driving Cognitions Questionnaire. The DCQ was used to assess driving-related fear based on three domains: panic-related concerns, accident-related concerns and social fears (Ehlers et al., 2007). The scale contains 20 items, 7-items to evaluate accident- and panic-related concerns, and 6-items for social fears. The participants were asked to rate each of the statements using a 5-point Likert scale (0 = never to 4 = always). The total and subscales’ scores were calculated by summing the items. The higher the summed score for all items, the greater the frequency of specific driving-related fear cognitions. The DCQ has been shown to have good internal consistency, with a Cronbach alpha of 0.95 for the total score and 0.86 - 0.91 for the subscales, which also showed high inter-correlations (Ehlers et al., 2007).

Rosenberg’s Self-Esteem Scale. The Polish adaptation (Łaguna, Lachowicz-Tabaczek, & Dzwonkowska, 2007) of Rosenberg’s Self-Esteem Scale (1965) was used to measure the overall level of self-esteem representing a positive or negative attitude towards self. This scale consists of 10 items, which the participants were asked to rate using a 4-point Likert scale (1 = strongly agree to 4 = strongly disagree).

State-Trait Anxiety Inventory. The Polish adaptation (Wrześniewski, Sosnowski, & Matusik, 2002) of the 20-item State-Trait Anxiety Inventory (STAI-T; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) was used to measure trait anxiety. The participants were

asked to rate how they feel using a 4-point Likert scale (0 = not at all to 4 = very much). The total STAI-T score ranges from 20 to 80,where a high rating indicates the absence of anxiety.

Results

Descriptive Variables and Internal Consistency

Table 1 shows the mean scores for each item of the Driving Behaviour Survey (DBS). Item-total correlations ranged from 0.14 (for Items 3 and 15) to 0.49 (for Item 7). For the DBS, the overall scale had an acceptable internal consistency (Cronbach's $\alpha = 0.76$), with the safety/cautious ($\alpha = 0.75$) and hostile/aggressive behaviours ($\alpha = 0.85$) subscales also demonstrating acceptable levels of internal consistency. However, the performance deficits subscale had a lower level of internal consistency ($\alpha = 0.65$).

Correlational Analysis

Table 2 provides correlations between the overall DBS scores and subscales as well as the validity measures. The total score correlated significantly with each subscale score. A small correlation was found between the anxiety-based performance deficits and the other two subscales of exaggerated safety/caution behaviours and hostile/aggressive behaviours. No correlations were found between the exaggerated safety/caution behaviour and hostile/aggressive behaviours subscales. With the exception of the hostile/aggressive behaviours subscale, all DBS scores and subscale scores positively correlated with scores on the Driving Cognitions Questionnaire. The total score and subscale scores of the Driving and Riding Avoidance Scales had small correlations with the total DBS score and two of the three subscales (not the hostile/aggressive behaviours subscale).

Statistically significant negative correlations were found between the DBS total score and subscale score and driving frequency, in that more frequent driving was associated with a lower level of anxious driving behaviour. A negative correlation was also found between the exaggerated safety/caution subscale and annual mileage, meaning that a greater annual

mileage was associated with lower levels of safety cautious behaviours. Interestingly, however, a positive correlation was found between the hostile/aggressive behaviours subscale and annual mileage, suggesting that greater levels of hostile/aggressive behaviours were associated with a higher annual mileage. A small negative correlation was also found between the exaggerated safety/caution behaviours subscale and gender, meaning that female drivers had higher levels of safety cautious behaviours.

Trait anxiety scores were also positively correlated with the total DBS score, as well as the anxiety-based performance deficits and exaggerated safety/caution behaviours subscales. No correlations were found between self-esteem scores and the DBS. In addition, the level of perceived driving skill had no significant associations with the DBS total and subscale scores.

Table 1

DBS Mean Scores and Item-Total Correlations

Item		Mean	*SD*	Item-total correlations
1	I lose track of where I am going.	1.88	1.07	0.30
2	I yell at the driver/drivers who make me nervous.	3.14	1.72	0.43
3	I slow down when approaching intersections, even when the light is green.	3.56	1.78	0.14
4	I have trouble staying in the correct lane.	1.84	1.01	0.41
5	I drift into other lanes.	2.51	1.67	0.23
6	I forget to make appropriate adjustments to speed.	2.91	1.43	0.20
7	I let the driver who has made me nervous know that I am upset.	2.65	1.47	0.49
8	I maintain a large distance between myself and the driver in front of me.	4.21	1.54	0.37
9	I forget where I am driving to.	1.43	1.70	0.17
10	I make gestures at the driver/drivers who made me nervous.	2.27	1.55	0.38
11	I try to put distance between myself and other cars.	5.24	1.70	0.23
12	I maintain my speed in order to calm myself down.	2.98	1.75	0.40
13	I try to stay away from other cars.	3.06	1.70	0.40
14	I have trouble finding the correct lane.	1.64	0.88	0.35
15	I pound on the steering wheel when I'm nervous.	1.65	1.21	0.14

16	I decrease my speed until I feel comfortable.	2.52	1.61	0.41
17	I honk my horn at the driver who made me nervous.	2.53	1.73	0.32
18	I try to find ways to let other drivers know that they are making me nervous.	2.07	1.42	0.40
19	During bad weather, I drive more cautiously than other vehicles on the road.	4.44	1.90	0.24
20	I swear/use profanity when I am driving.	3.21	1.87	0.35
21	I have difficulty merging into traffic.	1.80	1.04	0.31

Table 2

Correlations between the DBS, DBS Subscales and Validity Measures

Scale	Total DBS Score	Anxiety-based performance deficits	Exaggerated safety/caution behaviours	Hostile/aggressive behaviours
Total DBS Score		0.61**	0.66**	0.65**
Anxiety-based performance deficits	0.61**		0.29**	0.15*
Exaggerated safety/caution behaviours	0.66**	0.29**		-0.03
Hostile/aggressive behaviours	0.65**	0.15**	-0.03	
Total DCQ Score	0.44**	0.44**	0.38**	0.09
Panic-related concerns	0.44**	0.44**	0.38**	0.09
Accident-related concerns	0.4**	0.37**	0.36**	0.08
Social concerns	0.38**	0.44**	0.37**	0.01
Total DRAS Score	0.19**	0.23**	0.24**	0.05
General Avoidance	0.14*	0.18**	0.21**	-0.07
Traffic avoidance	0.23**	0.28**	0.27**	-0.06
Weather avoidance	0.2**	0.22**	0.24**	-0.03
Riding avoidance	0.09	0.1	0.12*	-0.04
Age	-0.07	-0.12	0.01	-0.03

Gender	-0.13	-0.04	-0.13*	-0.04
km travelled per year	0,01	-0.07	-0.13*	0.17**
Driving Assessment Scores	0.06	0.09	0.1	-0.07
Driving frequency	-0.14*	-0.16**	-0.29**	0.12*
Years with Licence	-0.72	-0.05	-0.04	-0.06
Trait Anxiety Scores	0.15**	0.15**	0.2**	-0.03
Self-Esteem Scores	-0.27	0.02	0.01	-0.1

Notes: ** Significant at $p < 0.01$; * Significant at $p < 0.05$. For gender, 1 = female, 2 = male.

Factor Analysis

To determine the questionnaire's factor structure using the Polish data, all items were entered into a Principal Components Analysis (PCA) and oblimin rotations was used, as the subscales of the DBS were correlated. The Kaiser-Meyer-Olkin value was 0.8 and Bartlett's test of sphericity was significant ($p < 0.001$), which demonstrated the suitability of the data for PCA.

The initial analysis indicated five components with eigenvalues greater than 1. These components explained 18.94%, 16.84%, 8.76%, 6.11% and 5.83% of the variance respectively. However, parallel analysis suggested that only three of these components had eigenvalues which exceeded criterion values produced by randomly generated data matrices. Cattell's (1966) scree test supported this notion and therefore three components were retained for further analysis. Component 1 explained 18.94% variance, Component 2 explained 16.84% of the variance and Component 3 explained 8.76% of the variance.

Table 2 shows the pattern and structure matrices for the DBS. Stevens (1992) criterion was used in order to assist interpretation of factor loadings and, due to the sample size, the

minimum value required to interpret a factor loading as significant was 0.4. Any items that significantly loaded onto one component are highlighted in bold in Table 2. The pattern matrix suggested a clear three factor solution, with no shared variance between components. The overall structure supported the one initially proposed for the DBS. Component 1 consisted of aggressive/hostile behaviours, Component 2 consisted of exaggerated safety/caution behaviours, and Component 3 contained anxiety-based performance deficit items. Items 3 and 5 did not load on to any of the three components, however, it is worth noting that item 3 was close to loading onto the exaggerated safety/caution component (0.365), and item 5 was somewhat close to loading onto the hostile/aggressive behaviours component (-0.295).

The structure matrix shows a similar discrimination between the components. Items 13 and 16 loaded on both Component 3 and Component 2, but the cross-loadings on Component 3 were barely significant (-0.406 and -0.425 respectively). Items 3 and 5 once again did not load onto any of the three components. They also had communalities of 0.14 and 0.12, respectively. This suggests that they do not share a lot of variance with other items in the analysis and thus these two items may need to be removed from the DBS.

Overall, the PCA generally supported the original factor structure using the Polish data, with the exception of a small number of items.

Table 2

Pattern and Structure Matrices for the DBS

Item		Pattern Matrix			Structure Matrix			Communalities
		Component 1	Component 2	Component 3	Component 1	Component 2	Component 3	
7	I let the driver who has made me nervous know that I am upset.	**0.85**	0.01	-0.06	**0.86**	-0.04	-0.20	0.74
10	I make gestures at the driver/drivers who made me nervous.	**0.81**	0.01	0.07	**0.81**	-0.06	-0.16	0.65
17	I honk my horn at the driver who made me nervous.	**0.80**	0.02	0.15	**0.80**	-0.06	-0.06	0.62
2	I yell at the driver/drivers who make me nervous.	**0.80**	-0.01	-0.03	**0.77**	-0.06	0.01	0.65
18	I try to find ways to let other drivers know that they are making me nervous.	**0.72**	0.07	0.01	**0.71**	0.01	-0.13	0.51
20	I swear/use profanity when I am driving.	**0.63**	0.05	-0.01	**0.62**	0.01	-0.12	0.39
15	I pound on the steering wheel when I'm nervous.	**0.40**	-0.29	-0.18	**0.45**	-0.28	-0.19	0.30
11	I try to put distance between myself and other cars.	0.01	**0.78**	0.23	-0.03	**0.76**	-0.14	0.58
8	I maintain a large distance between myself and the driver in front of me.	0.02	**0.77**	0.22	-0.08	**0.73**	0.07	0.59
19	During bad weather, I drive more cautiously than other vehicles on the road.	-0.02	**0.68**	0.08	-0.07	**0.66**	-0.05	0.45
13	I try to stay away from other cars.	-0.02	**0.60**	-0.29	-0.01	**0.66**	**-0.41**	0.51
12	I maintain my speed in order to calm myself down.	0.11	**0.57**	-0.20	0.10	**0.60**	-0.33	0.42
16	I decrease my speed until I feel comfortable.	0.04	**0.51**	-0.31	0.06	**0.57**	**-0.43**	0.42

3	I slow down when approaching intersections, even when the light is green.	-0.03	0.37	-0.04	-0.05	0.38	-0.11	0.14
14	I have trouble finding the correct lane.	-0.02	-0.01	**-0.75**	0.11	0.15	**-0.74**	0.55
4	I have trouble staying in the correct lane.	0.01	0.12	**-0.70**	0.06	0.19	**-0.67**	0.53
21	I have difficulty merging into traffic.	-0.05	0.05	**-0.67**	0.12	0.27	**-0.72**	0.46
1	I lose track of where I am going.	-0.01	0.11	**-0.51**	0.06	0.19	**-0.67**	0.30
9	I forget where I am driving to.	-0.06	-0.10	**-0.51**	0.03	0.20	**-0.53**	0.25
6	I forget to make appropriate adjustments to speed.	0.08	-0.10	**-0.42**	0.15	-0.02	**-0.48**	0.18
5	I drift into other lanes.	0.05	0.14	-0.30	0.09	0.20	-0.33	0.12

Discussion

The present study aimed to investigate the psychometric properties of the DBS in a sample of Polish students. The internal consistency of the overall DBS score was acceptable (0.76), as were the two subscales (safety/cautious = 0.75 and hostile/aggressive = 0.85), respectively, which is consistent with the estimates obtained in previous studies (Clapp et al., 2011a; Clapp et al., 2011b). However, the reliability estimate for performance deficit produced a lower coefficient than found in previous research using university students (Clapp et al., 2011a; Clapp et al., 2011b) and individuals with PTSD (Clapp, Baker, Litwack, Sloan, & Beck, 2014), which may be due to several factors. Firstly, drivers routinely commit many errors leading to various extends of performance deterioration, which in most cases do not produce any serious consequences (e.g., Allahyari et al., 2008; Wallace & Vodanovich, 2003). This means that drivers may report less violations and errors, as they do not always make a mental note of the minor cases and / or they are simply unaware of committing a driving error in the first place. Chapman and Underwood (2000) found that drivers do not report nearly 80% of incidents after a delay of up to two weeks. Secondly, when reporting any forms of violations, drivers tend to be affected by social desirability bias, which makes some of them resistant to report truthfully (Sullman & Taylor, 2010). Lastly, this difference may indicate that anxiety, to some extent, may enhance control of driving (Gwyther & Holland, 2012) due to being an increment in on-task efforts, as explained by the processing efficiency theory (Eysenck & Calvo, 1992).

Factor analyses of the DBS data produced a clear three-factor solution, with minor overlaps observed across the pattern and structure matrices of the survey items. The factors that emerged in the current study were exaggerated safety/caution behaviours, aggressive/hostile behaviours, and anxiety-based performance deficit, which suggests that the original DBS factor

structure developed in the U.S. is applicable to the present sample of Polish drivers. It should be noted, however, that conclusions about the similarity of these studies are tentative and it is questionable whether they can be compared overall. This is due to the fact that the developmental studies conducted by Clapp et al. (2011a,b) focused on university students who had a history of traffic collisions, which is considered to be one of the key factors contributing to driving anxiety, and the other study was conducted with a clinical sample of individuals with PTSD (Clapp et al., 2013).

The reliability of the DBS items was also confirmed by the strong positive correlation between the total score and each of the subscales. Inter-item correlations were positive between the anxiety-based performance deficits and the other two subscales of exaggerated safety/caution behaviours and hostile/aggressive behaviours, although only a small correlation was found with the latter. In addition, no correlations were found between the exaggerated safety/caution behaviours and hostile/aggressive behaviours subscales. This may indicate that anxiety-related aggressive behaviours may be a byproduct of trait anger, meaning that drivers who tend to exhibit hostile/aggressive behaviours continue to engage in these behaviours because of elevated trait anger, rather than driving anxiety. Additionally, it should be noted that, although trait anger and anxiety generally reflect negative affectivity (Watson & Clark, 1984), angry individuals are more likely to express greater emotionality of various types (Deffenbacher, 1992), meaning that the intensity of anger expression is not entirely related to anxiety levels. Lastly, both the performance deficit and exaggerated safety/caution subscales positively correlated with the DCQ and DRAS scores, which provides some evidence regarding the concurrent validity of the DBS in a non-clinical sample. The results of the current research indicate that an increase in problematic, anxiety-based driving behaviours are associated with increases in concerns whilst

driving as well as greater levels of driving and riding avoidance. Interestingly, however, the hostile/aggressive behaviours subscale did not correlate with these measures, which may suggest that aggressive behaviour and driving anxiety have different underpinnings (Deffenbacher et al., 2000; Deffenbacher et al., 2003).

The total DBS score was negatively correlated with the frequency of driving, meaning that the lack of driving exposure may affect drivers' confidence, the sense of security and, as a consequence, increase driving anxiety (Blachnio et al., 2013). In addition, annual mileage was weakly but negatively correlated with the exaggerated safety/caution behaviours subscale, which suggests that the more drivers are exposed to driving, the less they may exhibit behaviour contributing to the maintenance of anxiety reactions. However, a positive correlation was found between annual mileage and the hostile/aggressive behaviours subscale. This may indicate that driving exposure might also influence the likelihood of aggressive behaviour (Lajunen & Parker, 2001). A small negative correlation was also found between the exaggerated safety/caution behaviours subscale and female gender. This could be related to the fact that females especially in their younger years, tend to have high self-regulation mechanisms when feeling vulnerable, either because they are less experienced or from a lack of confidence about their driving (e.g., Siren & Hakamies-Blomqvist, 2004; Kostyniuk & Molnar, 2008; Gwyther & Holland, 2012).

The total DBS score, as well as the anxiety-based performance deficit and exaggerated safety/caution behaviours subscales, were positively correlated with trait anxiety. This could be due to the fact that anxious individuals tend to have high levels of fearfulness and nervousness in regard to most aspects of their lives (Reiss, Peterson, Gursky, & McNally, 1986; Ulleberg & Rundmo, 2003). When applied to the driving context, anxious drivers may become more alert

and aware of the risk of accident involvement, which may lead to the exhibition of defensive and precautious driving behaviours (Ulleberg & Rundmo, 2003). Interestingly, however, there was no relationship between hostile/aggressive behaviours and trait anxiety.

No correlations were found between perceived driving skill and the DBS scores. This may indicate that driving anxiety is more strongly related to other cognitions, rather than low perceived levels of driving skills, including fear of accidents and embarrassment (Ehlers et al., 1994; Taylor, Deane, & Podd, 2002) as well as fear of one's driving performance being criticised or negatively evaluated by others (Taylor, Deane, & Podd, 2007). This explanation is also supported by that fact that anxious drivers make the same types of errors as those who are not anxious about driving; the only difference is that anxious drivers tend to make these errors more frequently (Taylor, Deane, & Podd, 2007). More research is needed to replicate the findings in more diverse samples.

Lastly, no correlations could be found between self-esteem and the DBS, which is in contrast to previous studies that have described the role of self-esteem as a buffer against anxiety (e.g., Crocker & Park, 2004; Greenberg, Pyszczynski, & Solomon, 1986; Pyszczynski et al., 2004). Considering self-esteem has many determinants, such as age (Rosenfield, 1999) and social class (McMullin & Cairney, 2004), the generalisability of the current findings may be somewhat questionable given the sample in this study was predominantly university students. Future research should further explore the links between driving anxiety and self-esteem among drivers with more varied backgrounds.

The current study has a number of limitations. Firstly, the sample of drivers was predominantly comprised of university students, which does not represent the general population

of Poland. However, as previous research has predominantly explored the psychometric properties of the DBS among university students (Clapp et al., 2011a; Clapp et al., 2011b), our findings are likely to be no less representative than previous research. Nevertheless, further research should explore driving anxiety with a more representative sample of drivers. Secondly, the present study relied on self-report data that can potentially be vulnerable to social desirability bias. It should be noted that an attempt to mitigate the impact of social desirability bias was made by reassuring the participants that all data will be anonymised and treated confidentially, which is a proven method of reducing social desirability bias (e.g., Lajunen & Summala, 2003, Sullman & Taylor, 2010). Notwithstanding the above, the fact that the hostile/aggressive behaviours subscale was the only subscale that did not correlate with most of the constructs may indicate an attempt at favourable self-description, as previously suggested by Clapp et al. (2011).

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