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Mobile phone involvement, beliefs, and texting while driving in Ukraine

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ABSTRACT

There is extensive evidence that using a mobile phone whilst driving is one of the biggest contributors to driver distraction, which in turn increases the risk of motor vehicle collisions. Whilst most of the developed countries have been trying to deter this behaviour through legislation, enforcement and educational campaigns, in Ukraine, where the road fatality rate is the highest in Europe, this issue has only recently become publicised. The present study examined psychological factors that are associated with hand-held mobile phone use while driving among a sample of Ukrainian drivers, in particular writing or reading a text message while driving. This included drivers' behavioural, normative, and control beliefs relating to mobile phone use while driving, as well as the degree to which using a mobile phone is integral to one's everyday life (measured using the Mobile Phone Involvement Questionnaire; MPIQ). Almost one quarter to one third of the sample reported using their phone on a daily basis to write (22.2%) or read (38.2%) text messages while driving. A binary logistic regression showed that gender, higher MPIQ scores, perceived approval from family members, lower perceived likelihood of receiving traffic fines and less demanding traffic conditions were all significantly associated with mobile phone use while driving. These results suggest that dependence upon a mobile phone in everyday life may be an important factor to consider when developing interventions to reduce hand-held mobile phone use while driving.

1. Introduction

The use of a mobile phone whilst driving is one of the most common types of driver distractions that increases the risk of motor vehicle crashes (e.g., Sullman and Baas, 2004; Bianchi and Phillips, 2005; Caird et al., 2014). Whilst many developed countries have tried to deter this behaviour through legislation, enforcement and educational campaigns (e.g., Walsh et al., 2008; Shi et al., 2016), this issue has only recently become publicised in Ukraine, which has the highest road fatality rate in Europe. Data obtained in 2015 from the State Statistics Service of Ukraine showed that in a country with a total population of 42,541,633, there were 61,740,836 active mobile phone connections. Additionally, the results of a recent survey by the Kiev International Institute of Sociology (KIIS) found that almost one in three Ukrainians now have a touch-screen smartphone that can provide advanced functionality in terms of easy access to the Internet and social media, as well as offering a range of other applications. These additional features, beyond talking and text messaging, can drastically increase drivers' levels of engagement with the mobile phone and also encourage hand-held mobile phone use whilst driving (Rudin-Brown et al., 2013).

2. Literature review

A number of studies have explored how interacting with a mobile phone while driving leads to the tactical and operational impairment of the driver (e.g., Haigney et al., 2000; Jenness et al., 2002; Nunes and Recarte, 2002; Rudin-Brown et al., 2013). More specifically, using a mobile phone while driving can lead to a loss of attention (McKnight and McKnight, 1993; Alm and Nilsson, 1995), cause inattention blindness (Strayer et al., 2003), increase mental workload (Alm and Nilsson, 1995; Patten et al., 2004) and decrease vehicle control (Brookhuis et al.,1991). Using a mobile phone while driving has also been shown to result in a deterioration of lane-keeping performance (De Waard et al., 2001; Harrison, 2011), as well as impairments in steering and accelerator control (Hosking et al., 2009). Previous driving simulator research has also shown that active engagement in this unsafe behaviour can negatively impact traffic stability and flow by increasing reaction and brake response times in unforeseen circumstances (Lamble et al., 1999; Haque and Washington, 2015), as well as prompting inappropriate variability in vehicle following distance (Drews et al., 2009) and increased fluctuations in driving speed (Saifuzzaman et al., 2015). It has also been found that at the operational level, drivers tend

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to pay less attention to the vehicle controls and spend less time checking their mirrors when using a mobile phone (Harbluk et al., 2002; Nunes and Recarte, 2002). As a result, the use of mobile phones while driving is strictly prohibited in many countries, if used without a hands-free unit. This is despite the fact that research has found no significant safety advantages for using a hands-free device while driving (e.g., Lamble et al., 1999; Nunes and Recarte, 2002; Patten et al., 2004). Interestingly, most of the experimental studies aimed at exploring the effects of mobile phone use on driving were conducted more than 10 years ago, when mobile phones were only able to provide a limited suite of functions, in comparison to the smartphones in use today. This may mean that we are significantly underestimating the degree to which mobile phone use disrupts driving performance.

Despite the recognised risks, drivers continue to use mobile phones while driving, which suggests there are other factors contributing to this unsafe behaviour. Although one possible explanation could be that some of the Ukrainian drivers are still unaware of the risks related to mobile phone use, another way to investigate this issue would be to explore the personal and social factors influencing a driver's decision to use hand-held mobile phones.

Compared to the number of studies that have explored the effects of mobile phone use on visual and driving performance, only a small body of research has investigated the psychosocial factors associated with driver mobile phone use (e.g., Waddell, and Wiener, 2014; Struckman-Johnson et al., 2015), and none have been conducted in Ukraine.

2.1. Mobile phone behaviour

Mobile phone use while driving is common for many drivers. Mobile phones can provide instant information related to driving and a sense of connectedness for drivers. While some of the mobile phone functions are useful while driving (e.g., real-time traffic updates, navigation), other applications (e.g., social networks) are unnecessary and problematic. Although the risks have been widely acknowledged, there is little understanding of why drivers continue to interact with mobile phones. Previous research has predominantly tried to explore these interactions by assessing how frequently drivers use their mobile phones (e.g., Cohen and Lemish, 2003; Özcan and Koçak, 2003; Walsh and White, 2006) and by measuring this behaviour using methods drawn from addiction theories (e.g., Bianchi and Phillips, 2005; Jenaro et al., 2007; Beranuy et al., 2009). However, most of these studies do not take into consideration the fact that drivers may also become distracted simply by thinking about their phones without directly interacting with them (Walsh et al., 2011; White et al., 2012). To address this issue, Walsh et al. (2011) proposed that both the cognitive (thoughts about the mobile phone without using it) and behavioural (frequency of using the phone for no reason) aspects of mobile phone interactions needed to be considered. They conceptualised this as "mobile phone involvement" and developed a measurement tool to assess this, which was used in the present research. The construct of mobile phone involvement is conceptualised as a form of behavioural addiction, incorporating symptoms of behavioural salience, withdrawal, and loss of control. This draws on the framework proposed by Brown (1993, 1997).

2.2. Beliefs about mobile phone use

People tend to engage in risky behaviours when they believe that the benefits outweigh the potential costs, which in the driving context may be the perceived chances of having a motor vehicle collision (e.g., Walsh and White, 2006; White et al., 2012; Nelson et al., 2009). A number of studies have used the Theory of Planned Behaviour (TPB; Ajzen, 1991) to understand the determinants and decision-making processes that underpin risky driving practices. Primarily, most of the studies have used an intention-based TPB approach to explore why drivers use their mobile phones while driving (e.g., Nemme and White, 2010; Sullman et al., 2018). However, some of the recent studies on various road violations, such as speeding, have adopted a beliefs-based approach to investigate the direct determinants of intentions to engage in these risky behaviours (e.g., Forward, 2009; Warner and Åberg, 2008). According to this approach, behaviour is formed by three considerations: beliefs regarding the costs and benefits of performing the behaviour (behavioural beliefs), beliefs about social acceptability and normative expectations of others (normative beliefs), and beliefs about the factors that can prevent or facilitate performance of the behaviour (control beliefs). Although results are based on a small number of studies (e.g., White et al., 2010), these findings suggest that this framework could explain some of the psychosocial factors that underlie mobile phone use while driving and help to differentiate between drivers who may or may not use their mobile phones while driving.

2.3. The current study

The data for the present study were collected in Ukraine from March until October 2014. The main aim was to explore the psychosocial factors that influence a driver's decision to use a mobile phone while driving. The beliefs held by Ukrainian drivers regarding mobile phone use were investigated, as well as their level of mobile phone involvement and the reported frequency of mobile phone use. More specifically, mobile phone use included sending and/or receiving a text message, making and/or receiving a call with a hand-held phone and general mobile phone use.

3. Method

3.1. Participants and procedure

In total 220 licensed drivers from several regions of Ukraine completed an online questionnaire about mobile phone use while driving. Participants (males = 81.8%) were aged from 19 to 70 years old, with an average age of 35.5 (SD = 10.54). Most participants had held a driving licence for more than 10 years (46.8%) and the majority were fully licensed drivers (97.7%), with a small proportion holding a temporary licence (2.3%). Participants reported driving an average of 17.2 h per week (SD = 18.03).

Potential participants were emailed a link to the online survey, which was hosted by Qualtrics. The sample was comprised of staff and students from the National Aviation University and members of the Ukrainian forum for motorists. In order to participate, drivers had to hold a valid licence to drive in Ukraine and had driven at least once in the last six months. Drivers were informed that participation in this study was voluntary with no reward and that their responses were confidential and anonymous. The University Ethics Committee approved the research.

3.2. Measures

The survey measured a set of demographic variables (gender, age, marital and work status), variables related to driving (type of driving licence, licence tenure, hours spent driving each week, driving purpose), and variables related to hands-free device use (hands-free policy at work, frequency of hands-free use).

3.2.1. General frequency of mobile phone use

General mobile phone use was assessed using four questions that asked "On average, how many calls would you make [receive] on your mobile phone each week?" and "On average, how many texts would you make [receive] on your mobile phone each week?' These responses were summed to form a general frequency of mobile phone use. Additionally, the ratio of mobile phone use for personal/ business purposes were assessed using a scale which ranged from 1 [all business] to 7 [all personal], where the respondents had to choose one option. This was subsequently recoded into: mostly business (representing

responses from 1, 2 and 3), approximately equal (response 4) and mostly personal (responses 5, 6 and 7).

3.2.2. The frequency of mobile phone use while driving

The frequency of mobile phone use was measured using five questions, which asked "How often do you": "Use your phone in general while driving"; "Make a mobile phone call"; "Answer a mobile phone call"; "Send a text" and "Read a text". Responses were made on a 7-point Likert scale (1 = more than once a day; 4 = one or two times a month; 7 = never).

3.2.3. Mobile phone involvement questionnaire (MPIQ)

The MPIQ is an eight item questionnaire, which was originally based on the behavioural addiction components presented by Brown (1993, 1997) and developed further by Walsh et al. (2008). Each item represents the degree to which interacting with a mobile phone is perceived as integral to everyday life. For example, "I often think about my mobile phone when I am not using it". Responses were made on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree) and were then summed to produce a composite score, with higher scores indicting a greater reliance on the mobile phone. The MPIQ has acceptable internal consistency, with a Cronbach alpha of 0.78 (Walsh et al., 2011).

3.2.4. Beliefs about mobile phone use

Four items were included to measure beliefs about the ability to safely use a mobile phone while driving (e.g., "I am able to drive safely and read a text at the same time"). Responses were made on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree).

The perceived costs and rewards of using a mobile phone (behavioural beliefs) while driving were measured using six items: e.g., "How likely is it that using a mobile phone while driving in the next week would result in": "Using time effectively", "Being involved in a crash", etc. Responses were made on a 7-point Likert scale (1 = extremely unlikely; 4 = neither; 7 = extremely likely).

Social acceptability of the behaviour (normative beliefs) was measured using the item "How likely is it that the following people or groups of people would approve of you using a mobile phone while driving in the next week", with five options [friends/family; members/partners/work colleagues/other; drivers/police]. Responses were made on a 7-point Likert scale (1 = extremely unlikely; 4 = neither; 7 = extremely likely).

Protective factors for mobile phone use (control beliefs) were measured using the question stem: "How likely are the following to prevent you from using your mobile phone while driving in the next week", with six protective factors being explored (i.e., fines, demanding conditions, risk of a crash, police presence, lack of hand-free device, heavy traffic). Answers were reported, for each of the six protective factors, on a 7-point Likert scale (1 = extremely unlikely; 4 = neither; 7 = extremely likely).

3.3. Data handling

There were no missing data and all analyses were undertaken using SPSS for Windows and STATA 14. All 7-point Likert scale responses were recoded into three variables to avoid low numbers in subsequent analyses. Therefore, the responses to the Likert scales measuring agreement became 1 = disagree, 2 = neither, 3 = agree, with the 'strongly' and 'somewhat' responses being merged with their respective agree or disagree responses. The responses to the Likert scales measuring likelihood were also recoded (1 = unlikely; 2 = neither; 3 = likely), again by merging their respective 'extremely' and 'somewhat' responses. Frequencies for texting (reading or writing combined) while driving, talking while driving (making or receiving a mobile phone call combined) and general mobile phone usage while driving were dichotomised into yes / no responses to enable subsequent analyses.

A binary logistic regression was used to explore the associations that age, gender, purpose for mobile phone use, general frequency of mobile phone use, MPIQ scores and beliefs toward mobile phone use while driving had with the outcome variables of sending or reading a text while driving. A subsequent model examining associations with making or receiving a phone call while driving could not be undertaken, as only 19 respondents (9%) reported having never made or answered a phone call while driving.

Ten participants reported always using a hands-free device in the car and were therefore excluded from the regression analysis, which will be reflected in the reported sample sizes. Initial univariate models were conducted regressing texting based phone usage separately on each independent variable. Any factor with significance of $p \leq 0.25$ was included in the initial multivariate model. Multivariable models were then conducted, with exclusion set at $p \leq 0.05$, removing one item at a time until all items in the model were significant at the 5% level. Both the main and interaction effects were tested and model evaluation was performed using the Hosmer-Lemeshow test, with non-significant p values demonstrating good model fit. Collinearity was not a problem and the area under the curve was also examined, with values above 0.70 showing acceptable discrimination (Hosmer et al., 2013). Odds ratios and adjusted odd ratios with 95% confidence intervals were also calculated and reported.

4. Results

4.1. Frequency of mobile phone usage

In general, participants reported using their mobile phones from 15 to 2260 times per week ($M = 380$, $SD = 399$) to make or receive calls and to read or write text messages. Considering each behaviour individually, participants reported making between 0 and 500 calls per week ($M = 82$, $SD = 77$), receiving between 0 and 800 calls ($M = 91$, $SD = 100$), writing between 0 and 1000 text messages ($M = 92$, $SD = 171$) and reading between 0 and 1000 text messages per week ($M = 113$, $SD = 192$). There was a relatively even distribution of responses relating to the purpose for using the phone, with 28% of the sample using it mostly for business, 38% reporting equal amounts of business and personal calls and 34% using it only for personal communications.

Table 1 shows the frequency of using a mobile phone while driving. As can be seen, only 10% of drivers reported never using their phone while driving. The least frequent behaviour was writing texts, with the majority of participants (51%) reporting never engaging in this behaviour and 35% of participants reporting never reading texts while driving. Making and receiving calls while driving, however, was

Table 1
Frequency of Mobile Phone Use While Driving ($N = 220$).

	More than once a day (%)	Daily (%)	1-2 times per week (%)	1-2 times per month (%)	1-2 times per six months (%)	Once a year	Never
Overall usage	28.2	34.5	14.5	6.8	4.1	1.8	10
For making calls	24.1	25.9	18.6	7.7	5.9	6.4	11.4
For receiving calls	32.3	20	18.6	6.8	8.2	4.5	9.5
For writing texts	7.7	14.5	13.6	7.3	4.1	1.8	50.9
For reading texts	15.9	12.3	25	5.5	2.7	3.6	35

Table 2
Specific Beliefs about the Safety of Using Mobile Phone While Driving (N = 220).

Safely drive and….	Strongly disagree (%)	Disagree (%)	Somewhat disagree (%)	Neither (%)	Somewhat agree (%)	Agree (%)	Strongly Agree (%)
Talk on a hand-held mobile phone	31.8	12.7	14.5	10.5	12.7	7.7	10
Talk on a hands-free kit	20.5	5.9	5.0	15.9	13.6	11.4	27.7
Read a text message	53.6	17.3	13.6	7.3	1.8	3.2	3.2
Write a text message	60.9	15.9	10	5.5	2.7	1.8	3.2

frequent with approximately a quarter of the sample (24%) making calls and a third of the sample (32%) receiving calls while driving.

4.2. Mobile phone involvement questionnaire

The average composite score for the MPIQ ranged from 8 to 55 (out of a possible 8 to 64; M = 22, SD = 10) indicating that participants had moderate levels of involvement with their mobile phones. The internal consistency of the MPIQ scale was acceptable (α = 0.81).

4.3. Beliefs about mobile phone use

Table 2 shows the participants' beliefs regarding using a mobile phone and driving safely. A larger proportion of participants believed that they could talk and drive safely using a hands-free unit (27.7%) than was the case for a hand-held mobile phone (10%). Furthermore, the majority of participants strongly disagreed that they could drive safely while writing (61%) or reading (54%) text messages.

Table 3 shows the reported beliefs regarding the potential repercussions of phone use while driving, including the benefits and social acceptability of the behaviours. Interestingly, 22% of the sample reported that using a mobile phone while driving would not help them to use time effectively. The majority of respondents reported that using a mobile phone while driving would lead to them being distracted (40% saying extremely likely; 28% saying quite likely) and involved in a crash (39% saying extremely likely, 26% saying quite likely). Many participants also reported that using a hand-held phone while driving would lead to them being caught and fined by the police (28% saying extremely and 21% saying quite likely). The majority of the sample reported that it was extremely (46%) or quite (15%) likely that a mobile phone would help them receive assistance in an emergency.

As can be seen in the social acceptability section of Table 3, there was general agreement that using a mobile phone while driving was socially unacceptable. This belief held for friends, family, partner, work colleagues, other drivers and the police. Only a small percentage of drivers reported that it was extremely or quite likely that people in these groups would approve of them using a mobile phone while driving (ranging from 0.5% to 18%). Perceived approval was higher for friends (22% saying it was likely, 18% quite likely and 8.2% extremely likely) than for family (10.9% saying it was likely, 9.5% quite likely and6.4% extremely likely) or other drivers (15.9% saying it was likely, 3.2% quite likely and 3.2% extremely likely). The protective factors with the largest proportion of agreement were the perceived risk of having a crash and the demands of the driving conditions (e.g., increased demands due to weather or changing lanes), with 59% and 55% of the sample, respectively, saying it was extremely likely that these situations would deter them from using a phone while driving. The least protective factors were the lack of a hands-free device (14%) and heavy traffic (8%).

4.4. Associations with writing or reading a text message while driving

Table 4 shows the unadjusted odds ratios for the associations with reading and writing a text message while driving. Age and hours spent driving were not found to be significantly associated with texting while driving and neither were these found to be confounding factors in the final model. MPIQ and traffic conditions, as protective factors, were significant at the 0.06 level and, given the number of variables in the model, it was decided to retain these in the final model. The final model included: gender, MPIQ scores, perceived approval from friends, family and others, as well as perceptions about receiving police fines and demanding traffic conditions.

Table 3
Behavioural, Normative and Control Beliefs about Using a Mobile Phone While Driving (N = 220).

	Extremely unlikely (%)	Quite unlikely (%)	Unlikely (%)	Neither (%)	Likely (%)	Quite likely (%)	Extremely likely(%)
Behavioural beliefs (costs and benefits): How likely is it that using your mobile phone while driving in the next week would result in the following:							
Using time effectively	21.8	6.4	7.7	30.9	2.3	15.5	15.5
Being distracted from driving	4.5	1.4	2.3	20.0	4.1	28.2	39.5
Being involved in a crash	3.2	2.3	2.7	20.0	6.8	25.9	39.1
Receive information (e.g. navigation)	1.4	3.6	17.3	23.2	11.8	18.2	24.5
Receiving assistance in an emergency	7.7	3.2	1.4	12.7	13.6	15.0	46.4
Being caught and fined by the police	9.5	8.2	8.2	19.5	5.9	20.5	28.2
Normative beliefs (social acceptability): How likely is it that the following people or groups of people would approve of you using a mobile phone while driving in the next week:							
Friends	16.8	5.9	8.2	20.9	21.8	18.2	8.2
Family members	21.4	16.8	10.9	24.1	10.9	9.5	6.4
Partner/Spouse	16.8	19.1	5.5	25.0	20.5	4.5	8.6
Work colleagues	12.7	10.0	7.3	30.0	24.5	8.2	7.3
Other drivers	25.5	11.8	11.4	29.1	15.9	3.2	3.2
Police	55.5	16.8	4.5	8.2	10.0	0.5	4.5
Control beliefs (preventative factors): How likely are the following to prevent you from using a mobile phone while driving in the next week:							
Risk of fines	11.8	12.3	12.3	9.1	10.9	13.6	30.0
Demanding driving conditions (e.g., weather, changing lanes)	3.2	3.2	4.1	7.7	9.5	16.8	55.5
Risk of a crash	5.9	1.4	2.7	3.2	6.4	21.8	58.6
Police presence	20.0	7.3	3.6	12.7	10.0	10.9	35.5
Lack of hands-free device	17.7	5.5	6.8	23.2	11.4	21.4	14.1
Heavy traffic	24.0	15.5	14.5	20.5	4.5	12.3	8.6

Table 4
Adjusted and Unadjusted Odds Ratios for the Associations between the Independent Variables and Texting While Driving (N = 220).

	Self-reported texting while driving		OR	95% CI	*p*-value	Adjusted OR	95% CI	*p*-value
	No	Yes						
Age			0.99	0.96,1.01	0.29	Removed from the model		
Hours driving per week			0.98	0.98,1.01	0.97	Removed from the model		
Gender								
Males	31%	69%	Referent (1.0)			Referent (1.0)		
Females	46%	54%	0.52	0.25,1.06	**0.07**	0.37	0.15,0.82	0.02
Purpose of phone use								
Mostly business	39%	61%	Referent (1.0)			Removed from the model		
Equal business/personal	31%	69%	1.38	0.68,2.82	0.38			
Mostly personal	33%	67%	1.28	0.62,2.64	0.50			
Frequency of mobile phone use			1.00	0.99,1.00	0.89	Removed from the model		
MPIQ scores			1.02	0.99,1.05	**0.14**	1.03	1.00,1.06	0.06
"Safely drive and talk on a hand-held phone"								
Disagree	36%	64%	Referent (1.0)			Removed from the model		
Neither agree nor disagree	17%	83%	1.75	0.65,4.76	0.27			
Agree	19%	81%	1.58	0.82,3.04	**0.17**			
"Safely drive and talk on a hands-free phone"								
Disagree	38%	62%	Referent (1.0)					
Neither agree nor disagree	35%	65%	1.13	0.48,2.68	0.77	Removed from the model		
Agree	31%	69%	1.41	0.74,2.66	0.29			
"Safely drive and read a text"								
Disagree	37%	63%	Referent (1.0)			Removed from the model		
Neither agree nor disagree	19%	81%	2.51	0.69,9.15	**0.16**			
Agree	18%	88%	2.70	0.75,9.78	**0.13**			
"Safely drive and write a text"								
Disagree	38%	62%	Referent (1.0)			Removed from the model		
Neither agree nor disagree	26%	74%	2.84	0.60,13.37	**0.19**			
Agree	28%	72%	2.46	0.68,8.97	**0.17**			
Using a phone leads to effective use of time								
Unlikely	37%	63%	Referent (1.0)			Removed from the model		
Neither unlikely nor likely	34%	66%	1.16	0.58,2.33	0.67			
Likely	30%	70%	1.39	0.70,2.78	0.35			
Using a phone leads to distraction								
Unlikely	47%	53%	Referent(1.0)			Removed from the model		
Neither unlikely nor likely	36%	54%	1.60	0.51,5.01	0.42			
Likely	32%	68%	1.91	0.69,5.25	**0.21**			
Using a phone leads to crash involvement								
Unlikely	33%	67%	Referent (1.0)			Removed from the model		
Neither unlikely nor likely	33%	67%	1.04	0.32,3.33	0.95			
Likely	34%	66%	0.96	0.34,2.71	0.94			
Using a phone can help receive information								
Unlikely	38%	62%	Referent (1.0)			Removed from the model		
Neither unlikely nor likely	38%	62%	1.00	0.43,2.30	1.00			
Likely	30%	70%	1.43	0.71,2.91	0.32			
Using a phone can assist in an emergency								
Unlikely	35%	65%	Referent (1.0)			Removed from the model		
Neither unlikely nor likely	35%	65%	1.00	0.31,3.13	1.00			
Likely	34%	64%	1.04	0.44,2.51	0.92			
Using a phone can lead to being caught and fined by police								
Unlikely	32%	68%	Referent (1.0)			Removed from the model		
Neither unlikely nor likely	37%	63%	0.80	0.33,1.88	0.60			
Likely	34%	66%	0.90	0.45,1.79	0.75			
Friends would approve								
Unlikely	39%	61%	Referent (1.0)			Referent (1.0)		
Neither unlikely nor likely	37%	63%	1.05	0.48,2.34	0.90	0.30	0.10,0.91	0.03
Likely	29%	71%	1.50	0.78,2.89	**0.23**	0.25	0.07,0.88	0.03
Family would approve								
Unlikely	41%	59%	Referent (1.0)			Referent (1.0)		
Neither unlikely nor likely	32%	68%	1.49	0.73,1.03	0.28	2.20	0.71,6.87	0.17
Likely	22%	78%	2.42	1.16,5.04	**0.02**	6.58	1.80,23.88	0.004
Partner would approve								
Unlikely	39%	61%	Referent (1.0)			Removed from the model		
Neither unlikely nor likely	37%	63%	1.12	0.55,2.30	0.58			
Likely	26%	74%	1.87	0.95,3.70	**0.07**			
Work colleagues would approve								
Unlikely	38%	62%	Referent (1.0)			Removed from the model		
Neither unlikely nor likely	36%	64%	1.09	0.53,2.56	0.82			
Likely	29%	71%	1.50	0.75,2.99	0.85			
Other drivers would approve								
Unlikely	42%	58%	Referent (1.0)			Removed from the model		
Neither unlikely nor likely	22%	78%	2.48	1.19,5.15	**0.02**			
Likely	31%	69%	1.62	0.79,3.34	**0.19**			
Police would approve								

(*continued on next page*)

Table 4 (*continued*)

	Self-reported texting while driving		OR	95% CI	*p*-value	Adjusted OR	95% CI	*p*-value
	No	Yes						
Unlikely	35%	65%	Referent (1.0)			Removed from the model		
Neither unlikely nor likely	35%	65%	1.00	0.35,2.83	0.99			
Likely	26%	74%	1.56	0.66,3.71				
Risk of fines would prevent behaviour								
Unlikely	29%	71%	Referent (1.0)			Referent (1.0)		
Neither unlikely nor likely	21%	79%	0.93	0.75,1.19	0.51	3.28	0.68,15.85	0.14
Likely	83%	17%	0.54	0.44,0.67	**0.13**	0.43	0.20,0.94	0.03
Risk of crash would prevent behaviour								
Unlikely	29%	71%	Referent (1.0)			Removed from the model		
Neither unlikely nor likely	17%	83%	2.00	0.19,20.19	0.56			
Likely	35%	65%	0.74	0.28,2.01	0.56			
Police presence would prevent behaviour								
Unlikely	30%	70%	Referent (1.0)			Removed from the model		
Neither unlikely nor likely	20%	80%	1.74	0.57,5.29	0.33			
Likely	39%	61%	0.69	0.36,1.31	**0.26**			
Lack of a hands-free device would prevent behaviour								
Unlikely	31%	69%	Referent (1.0)			Removed from the model		
Neither unlikely nor likely	29%	71%	1.14	0.50,2.57	0.76			
Likely	38%	62%	0.74	0.38,2.43	0.37			
Heavy traffic conditions would prevent behaviour								
Unlikely	37%	63%	Referent (1.0)			Removed from the model		
Neither unlikely nor likely	26%	74%	1.62	0.74,3.55	**0.23**			
Likely	34%	66%	1.12	0.57,2.52	0.75			
Demanding traffic conditions would prevent behaviour								
Unlikely	45%	55%	Referent (1.0)			Referent (1.0)		
Neither unlikely nor likely	20%	80%	3.33	0.73,15.21	**0.12**	3.01	0.49,18.47	0.23
Likely	34%	66%	1.65	0.67,4.05	0.27	2.98	0.96,9.93	0.06

As can been seen in Table 4, increases in phone involvement were associated with increased odds of texting while driving. In comparison to males, females had 73% lower odds of texting while driving (Adjusted OR = 0.37, 95% CI = 0.15, 0.82). The odds of texting and driving were also 57% lower for those who perceived fines as a likely deterrent (Adjusted OR = 0.43, 95% CI = 0.20, 0.94), in comparison to those who reported it unlikely that receiving a fine would deter them from using their mobile phone and driving. Interestingly, drivers who reported their friends were likely to approve of their use of a phone while driving had lower odds of (75%) of texting while driving than those who reported that their friends were unlikely to approve (Adjusted OR = 0.25, 95% CI = 0.07, 0.88). In contrast, the odds of texting while driving were six-fold higher (Adjusted OR = 6.58, 95% CI = 1.80, 23.88) for drivers who believed their family would approve of using a phone while driving, in comparison to those who thought approval was unlikely.

Drivers who reported that demanding traffic conditions would prevent them from using their phone in the next week had higher odds of texting and driving compared to drivers who said it was unlikely that these conditions would prevent them from doing so (Adjusted OR = 2.98, 95% CI = 0.96, 9.93). This finding suggests that drivers who text and drive might make incorrect assessments about the demands of the driving conditions. Overall, the model showed good fit, with the Hosmer -Lemeshow test being non-significant ($\chi^2(8) = 4.98$, $p = 0.76$) and the area under the curve was 0.73, showing good discrimination.

5. Discussion

This study explored the psychosocial factors associated with mobile phone use while driving among a sample of Ukrainian drivers. A lower proportion of Ukrainian drivers (34%) reported using a mobile phone while driving on a daily basis, than were found in self-report studies in Spain (60%; Gras et al., 2007), Finland (80%; Pöysti et al., 2005) and Australia (43%; White et al., 2010). Considering that the data were collected using self-report, the frequency of mobile phone use could be under-reported due to social desirability bias, as this behaviour may be perceived by Ukrainian drivers as undesirable (Lindeman and Verkasalo, 1995).

Approximately even proportions of drivers reported using a mobile phone while driving for mostly business purposes and for personal purposes. This finding is somewhat different to the findings of previous studies (e.g., Eost and Flyte, 1998; Walsh et al., 2008), which have found that drivers tend to use mobile phones more for business than for personal reasons. Perhaps the reason for this finding is the nature of the sample, who were mostly from a university, where using a mobile phone for work is less likely than for many other occupations.

Among all of the self-reported interactions with the phone while driving, the least frequent behaviour was writing text messages, followed by reading text messages. This finding is consistent with previous studies (e.g., Drews et al., 2009; Gras et al., 2007; Nemme and White, 2010) and suggests that drivers may be deterred by the level of distraction this task imposes. Compared to making or receiving a call, writing a text message leads to higher levels of cognitive, physical and visual distraction. In addition, the increased functionality of mobile phones makes writing a text message more demanding for drivers. This has led to an increase in the number of applications used for exchanging text messages, which vary in terms of complexity, and an increase in the number and diversity of characters that can be used for writing messages (e.g., emojis). The type of message application is a topic that should be investigated in future distraction research.

The present study found that there was a relatively low level of mobile phone involvement among this sample of Ukrainian drivers. This finding is somewhat inconsistent with the comparatively frequent mobile use while driving that participants' reported. This may indicate that drivers use their mobile phones out of habit and automatically, which means that although they may not think about mobile phones when not using them, drivers remain unaware of how often they use their phones without necessity. Secondly, the low mobile phone involvement reported may also be due to social desirability bias. As high mobile phone involvement may be considered to be a form of addiction, those drivers who had problematic levels of mobile phone use may deny this fact and be resistant to reporting their mobile phone involvement truthfully (e.g., West and Brown, 2013). This finding may potentially

contribute to a broader understanding of the theory, as it indicates that the use of self-assessment tools to evaluate addictive behaviours or behaviours performed out of habit, can return misleading results. Therefore, mobile phone involvement should be further explored with the addition of observational assessments and / or corresponding measures for controlling social desirability bias.

Interestingly, Ukrainian drivers reported that answering or making a call via a hands-free device was safer than using a hand-held phone. This finding is concerning as a number of studies have found that, due to the distracting nature of the conversation (Amado and Ulupınar, 2005; Törnros and Bolling, 2006), there is little difference in the risks associated with using a hands-free mobile phone or using a hand-held mobile phone (e.g., Matthews et al., 2003; McEvoy et al., 2005). At the same time, most of the drivers considered that using a mobile phone for texting and reading messages while driving was a risky task, which may explain why this was a relatively infrequently reported behaviour.

In terms of time management, surprisingly, nearly one fifth of the drivers reported that using a mobile phone while driving would not save time, which contrasts with previous research (Lissy et al., 2000; White et al., 2010). It may be that drivers perceive that the distraction associated with using a mobile phone will lead to increased journey times. This explanation is supported, to some extent, by the large degree of agreement from drivers in this Ukrainian sample that mobile phone use leads to distraction and crashes. A large proportion of drivers reported that a mobile phone could be used to provide assistance in an emergency, as found in previous research. This could possibly indicate that the perceived benefits of using a mobile phone while driving outweigh the risks of this behaviour, as has been suggested by other scholars (e.g., Nelson et al., 2009; White et al., 2007).

A substantial proportion of drivers stated that their important others (e.g., friends, family, colleagues etc.) would disapprove of them using a mobile phone while driving, which is somewhat different to the results of previous studies that have highlighted the role of social pressure in using a mobile phone while driving (e.g., Atchley et al., 2011; Lindqvist and Hong, 2011). Nevertheless, friends were reported to be the important others that would most likely approve of the drivers using a mobile phone while driving, which suggests that social influence can still affect drivers' decisions.

The perceived risk of crash involvement and demanding driving conditions were the most commonly reported protective factors in deterring mobile phone use while driving. In contrast, the absence of a hands-free device and heavy traffic were the protective factors least likely to deter this type of risky behaviour. Perhaps the reason for this is that there is no legal requirement for drivers in Ukraine to have a hands-free unit fitted in their vehicles and consequently most drivers do not possess one. Secondly, as participants were mainly from big cities, heavy traffic may be perceived to be normal driving conditions.

In contrast to previous research (e.g., Pöysti et al., 2005; White et al., 2010), there were no significant associations found between age and reading/sending text messages. Hours spent driving was also found to be unrelated to texting, although it is expected that drivers who spent more hours driving would be more likely to multitask than those who spent less time driving (Hill et al., 2015).

The results of the logistic regression analysis, used to explore the associations with writing or reading a text message while driving, revealed that mobile phone involvement and demanding traffic conditions were the main protective factors. As expected, the results showed that higher mobile phone involvement led to more frequent texting while driving. Considering that higher mobile involvement is often associated with addiction (Walsh et al., 2011; Nehra et al., 2012; Rupani et al., 2016), this finding may be because the perceived benefits of an addictive behaviour outweigh the perceived risks. Lastly, the perceived risk of being fined was also found to be a protective factor in texting, suggesting that drivers who perceived fines to be a deterrent would be less likely to send messages while driving than those who would not be discouraged by fines. The results also showed that approval from a family member significantly increased the odds of texting while driving. This finding is in line with previous research (e.g., Atchley et al., 2011; Lindqvist and Hong, 2011; Nemme and White, 2010) and suggests that drivers tend to experience greater social pressure from their significant others to reply to text messages than from other relationship types. These findings may indicate that there might be a more complex relationship between social approval and text messaging behaviour. For instance, it might be that social approval varies according to the purpose and target of the text message. In other words, family members may be more likely to approve when they are the target and the message is something they view as important. This suggests that text messaging behaviour may itself be context specific. Therefore, the current study provides some empirical evidence that broadens a beliefs-based TPB approach, as it appears to indicate that beliefs, as determinants of intentions to use a mobile phone while driving, may be influenced by context. The relationships between the target, text messaging purpose and its frequency of use would be an interesting and fruitful topic for future research.

5.1. Limitations

Firstly, this study used self-report data, which may have been affected by social desirability bias. However, participants were assured of anonymity and confidentiality, suggesting that the impact of social desirability bias is not likely to be significant (e.g., Lajunen and Summala, 2003: Sullman and Taylor, 2010). Secondly, Ukraine has been recently classified as a "lower middle income" country, according to the World Bank (2016), suggesting that a comparatively large proportion of the population might not be actively using mobile phones due to its high monthly costs. Furthermore, some groups of people, especially the older generation, might not have been able to use the Internet, or had access to it, and would thus have been unable to take part in the survey. Unfortunately, the present study did not have the resources to fund an alternative method of data collection. In addition, the sample was comprised mainly of male drivers, which may reduce the ability to generalise these findings to the driving population of Ukraine. However, statistical data indicate that only 22% of Ukrainian drivers are females (Marketing Index TNS Global, 2016), which appears to indicate that the study sample was reasonably representative of the driving population, at least in terms of the sex ratio. Furthermore, a large proportion of participants were students/staff from the National Aviation University and members of the Ukrainian motorists' forum, who are likely to differ substantially from the general population. Presumably, these participants belong to higher socio-economic groups, than the general population, and may also possess wider knowledge and access to technology, which could affect their awareness of road safety and the use of mobile phones when driving. Considering these points, it is likely that this sample of Ukrainian drivers was not completely representative of the Ukrainian population of drivers. Therefore, future research should aim to explore the psychosocial factors relating to mobile phone while driving among a more representative sample.

5.2. Summary and practical implications

This study has shown the associations between mobile phone use while driving and several psychological factors that increase or deter the behaviour in a sample of the Ukrainian drivers. Drivers in the sample had comparatively low levels of mobile phone involvement, although only a small proportion of them reported "never" using a mobile phone while driving. Drivers also reported that they were unable to drive and simultaneously read or write a text message. Furthermore, the majority of drivers did not perceive using a phone while driving as a way to use time effectively, possibly indicating their awareness of its distractive nature and the increased chances of crash involvement. There was also general agreement among drivers that using a mobile phone was considered to be unacceptable behaviour by

their important others. The most protective factors against this risky behaviour were perceived crash risk and demanding driving situations. Logistic regression revealed several protective factors were associated with writing or reading a text message while driving, including gender (male drivers were more likely to text than females), perceived fines (the chances of texting were lower for those drivers who perceived fines to be a deterrent), and demanding traffic conditions (demanding traffic conditions lead to decreased texting). Furthermore, social approval lead to a twofold increase in mobile phone use. Surprisingly, approval from friends decreased the chances of texting, whilst approval from family encouraged this behaviour. Future studies should be undertaken to identify the effect of the target and message purpose on texting behaviour, as well as further exploring the effect of social approval on mobile phone use. Lastly, future studies should also investigate specific types of mobile phone interactions and the perceived risks related to these interactions.

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