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Mobile phone use while driving in Finland

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ABSTRACT

Mobile phones represent one of the most common distractions for drivers and phone use while driving is particularly problematic in Finland. The aim of this research was to explore the Finnish sample of responses from ESRA2 (E-Survey of Road users' Attitudes) with a specific focus on the distracting behaviours related to mobile phone usage while driving. ESRA2 data is derived from online surveys amongst a representative sample of the adult populations in each participating country. In total a sample of 994 responses were collected in Finland for ESRA2, which included 703 responses from participants who held a driver's licence and reported driving a car in the 30 days prior to the survey.

The results provide evidence of the problematic usage of mobile phones while driving in Finland. Mobile phone use was considered across three specific types of usage: (1) handheld phone calls while driving; (2) handsfree phone calls while driving; (3) texting, emailing or social media use while driving. Almost half (49.4 %) of the sample reported using a handheld mobile phone to make a call while driving at least once in the 30 days prior to the survey. A similar percentage (41.4 %) of the sample had used a phone hands-free and 35.6 % had texted, emailed, or used social media.

The study highlights how mobile phone usage is a complex and multifaceted issue and that there are a broad range of underlying factors that influence mobile phone usage depending on the way in which people engage with their mobile phone while driving. The findings suggest that a systematic approach to reducing mobile phone distraction is needed that addresses the issue through a combination of legislation, enforcement, and education.

1. Introduction

Globally, 1.35 million lives are lost each year due to road trauma and 50 million people suffer non-fatal injuries (WHO, 2019). The United Nations (UN) proclaimed 2021–2030 as the Decade of Action for Road Safety, with the target of reducing road traffic deaths and injuries by 50 percent by 2030 (United Nations, 2018). This coincides with UN Sustainable Development Goal 3.6 which aims to significantly reduce road trauma, ultimately meeting the objectives of Vision Zero – the elimination of all fatal and serious injury crashes (United Nations, 2018). To achieve these targets and create a safe transport system for all road users, the UN advocates for the use of a Safe Systems approach to road safety (United Nations, 2018). The Safe System approach recognises that the transport system should be designed to be forgiving of human error while considering people's vulnerability to injury in road traffic crashes (WHO, 2019). The cornerstones of this approach are creating safe roads and roadsides, safe speeds, safe vehicles, and safe road users, all of

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which must be addressed in unison to eliminate fatal crashes and reduce serious injuries.

Driver distraction is recognised internationally as a significant road safety concern that leads to unsafe drivers (Regan et al., 2008). Driver distraction is defined as diversion of attention away from activities critical for safe driving towards a competing activity (Lee et al., 2008). There are three recognised categories of distraction, namely, visual, cognitive, and manual distraction, which have all been shown to effect driving performance (Young & Salmon, 2012). Distractions may come from inside the vehicle (e.g. using a mobile phone, or tuning a radio) or due to events occurring in the road environment (e.g. dynamic billboards, or pedestrian activities) (Beanland et al., 2013; Young & Salmon, 2012). Distractions may also be internally driven (e.g., a thirsty driver reaches for a water bottle) or externally driven (e.g., child passengers demanding attention). Research has shown that drivers regularly engage in various distractions while operating a vehicle (Young & Salmon, 2012) which can degrade driving performance if sufficient attention is not given to the driving task, particularly at critical moments (O'Hern et al., 2019; Young & Salmon, 2012). Thus, distraction presents a unique road safety challenge, given the range of non-driving tasks available to a driver at any one time.

The safety impacts of engaging in distracting activities while driving have been well evidenced (Dingus et al., 2016; Young et al., 2020; Young & Salmon, 2012). Dingus et al., (2016) found that when distracted, drivers have increased odds of crashing, compared to when they are fully attentive to the driving task. Lee et al. (2007) found that secondary task distraction, including mobile phone usage, is a contributing factor in approximately-one quarter of crashes and near-crashes.

In addition, distracted drivers have poorer driving performance, including reduced lateral and longitudinal control of the vehicle (de Waard et al., 2001; Young & Salmon, 2012), reduced situational awareness (Young et al., 2013; Young & Salmon, 2012), impaired reaction times (Young & Salmon, 2012) and increased driver errors (Young et al., 2020). These studies provide clear evidence that reductions in serious and fatal injuries can be achieved by targeting driver distraction. One way to do this is to understand what types of distractions driver are engaging in and why.

Mobile phone use is the most wide-spread and common form of driver distraction (Dingus et al., 2016; Young et al., 2007). This may be because of the connectivity mobile phones afford. However, interacting with a mobile phone can involve all categories of distraction. For example, manual distraction through reaching for, texting or dialling, visual distraction when looking at the phone, and cognitive distraction when engaged in the phone call. These can happen independently or in conjunction (i.e., remembering the number to dial while holding and looking at the phone). Visual-manual distractions from mobile phones increases odds of crash and serious crash involvement between 2 and 4-fold (Kidd & McCartt, 2015; Victor et al., 2015). Studies have suggested that mobile phone use is a contributing factor in 4 % of fatal or serious injury cDingus et al., 2016rashes (Sundfør et al., 2019). Moreover, mobile phone use is found in approximately 7 % of driving trips ().

One reason for the use of mobile phones while driving, is the attitudes drivers have towards mobile phone use and road safety and the road safety culture in general. For example, some researchers have linked mobile phone use while driving to the Theory of Planned behaviour (Ajzen, 1991; Sullman et al., 2018). This theory suggests that positive attitudes about mobile phone use (attitudes) and towards the ability to make a call while driving (perceived behavioural control), coupled with higher levels of acceptance from family and friends for the behaviour (subjective norms) leads to intention for the behaviour, and ultimately more engagement in mobile phones use and driving (Sullman et al., 2018). However, while these studies demonstrate areas to target to reduce mobile phone use while driving, they are focussed on small convenience samples. There is less research comparing the problem across countries and none focussed on the problem in Finland.

However, in 2015, Vias Institute (the Belgian Road Safety Institute) launched the ESRA survey (E-Survey of Road users' Attitudes) as a joint initiative between international road safety institutes and research centres (Meesmann et al., 2019). The aim of ESRA is to collect an internationally comparable set of road safety performance indicators with a particular focus on road safety culture and the behaviours of road users (Meesmann et al., 2019). Findings from the ESRA survey have been used to investigate a range of road safety issues including, driving under the influence of alcohol, drugs and medication (Meesmann et al., 2020), driver's attitudes towards vehicle automation (Woods-Fry et al., 2021) and the self-reported perspectives of traffic rules of powered-two-wheeler users (Ziakopoulos et al., 2021). Within ESRA, there are a subset of questions on distraction that specifically focus on mobile phone use either to talk (hand-held and hands-free) or text (read a text message/email or check social media) while driving. Since its launch, the ESRA has been administered twice, once in 2015 and a follow up survey on an independent sample of participants in 2018 (ESRA2).

Results from the ESRA study in 2015 found that Finnish drivers had the highest rates of hand-held mobile phone usage while driving amongst the adult population of the 17 European nations included in the study. Finnish respondents also had the lowest rate of support for road safety policies to address distraction (Torfs et al., 2016). Similarly, in the follow up survey in 2018 (ESRA2), Finnish respondents self-reported the highest rate of hand-held mobile phone use while driving and the third highest rate of texting (Ross et al., 2018). Naturalistic research in Finland found that drivers most frequently use messaging applications such as WhatsApp when engaging with their mobile phone while driving, despite Finnish traffic laws forbidding the use of hand-held devices while driving (Kujala & Mäkelä, 2018). These findings align with research conducted in Finland in 2003 which demonstrated that up to half of Finnish drivers use a mobile phone while driving (Rajalin et al., 2005). Crash statistics from Finland reveal that distraction due to mobile phone use is a contributing factor in between 3 and 5 fatal traffic crashes each year, however the contribution to personal injury and damage only crashes are unknown (Jääskeläinen, 2014).

Clearly, mobile phone distraction is a major road safety issue that must be addressed, and within the Finnish context there is a need to understand the factors that influence phone usage and distraction while driving. As such the aim of this research was to explore the Finnish sample of responses from ESRA2 with a specific focus on the three distracting behaviours related to mobile phone usage while driving that were reported in the questionnaire: talking on a hand-held mobile phone, talking on a hands-free mobile phone, and reading a text message/email or checking social media.

2. Method

2.1. Procedure

In 2018 the second iteration of the ESRA survey, ESRA2, was undertaken in 32 countries. The ESRA2 questionnaire is based on the Theory of Planned Behaviour (TPB) (Ajzen, 1991), which describes the relationship between socio-cognitive factors and self-reported behaviour. ESRA2 addresses these issues across road users including car drivers, powered-two-wheelers, cyclists, and pedestrians (Meesmann et al., 2019). Included in the questions are aspects related to self-declared unsafe behaviours in traffic, acceptability of unsafe traffic behaviours (both from a personal and social perspective), attitudes towards the use of a mobile phone while driving, risk perception of using a mobile phone while driving, support for policy measures, opinions of traffic rules and penalties, and perception of enforcement.

ESRA2 data is derived from online surveys amongst a representative sample (approximately 1,000 responses) of the adult populations in each participating country (Meesmann et al., 2019). Quotas were set for the age and gender distributions of the sample for each country, based on data from the UN statistical division. The geographic spread of the population was also monitored, however quotas were not set (Meesmann et al., 2019).

The analysis in this manuscript is focused on the subset of data collected in Finland as part of ESRA2. Specifically, questions related to car drivers self-reported engagement and attitudes towards mobile phone use while driving. Data collection, cleaning and processing were undertaken following the protocol specified by Vias Institute (Meesmann et al., 2019). Recruitment of participants in Finland was undertaken by a market research company using existing online panels. Translations of the survey were performed by the Finnish Road Safety Council (Liikenneturva) with responses collected throughout December in 2018 (Meesmann et al., 2019). Data cleaning involved removal of many duplicate entries based on age, gender, country, and IP address. Response time was monitored, any participants who completed the survey in under 8 min were removed and any participants who provided the same response to each scale item question "straightliners" were excluded. In total a sample of 994 responses were collected in Finland for ESRA2. To be eligible to participate in the survey, respondents were required to be aged 18 or older. The questionnaire took approximately 20 min to complete.

Only deidentified data was provided for the analysis undertaken for this manuscript, that is no identifiable or re-identifiable data was available to researchers. In Finland, the Finnish National Board on Research Integrity does not require ethical review by an ethics committee for research based purely on public and published data, registry and documentary data or archive data. However, institutional ethics and data protection procedures were followed when handling, storing, and processing the data. A comprehensive overview of the ESRA2 data collection procedure and questionnaire design is provided in the methodology report (Meesmann et al., 2019) which is available on the ESRA website (https://www.esranet.eu/).

2.2. Analysis

Descriptive statistics for demographic variables are first presented for the Finnish sample who identified as car drivers. Summary statistics are presented for the three self-reported behaviours related to mobile phone use while driving, with comparisons made to the European sample of the ESRA2 survey.

Item scores are reported for each TPB factor related to mobile phone use while driving as well as factors related to habits, risk perception, social desirability, enforcement perception, and support for policy measures. Each item was measured using an anchored Likert scale, ranges and anchor values are shown in Table 3. When completing questions participants were shown text stating "You can indicate your answer on a scale from 1 to 5, where 1 is "never" and 5 is "almost always". The numbers in between can be used to refine your response". Finally, binary logistic regression was performed to assess the factors that influence self-reported mobile phone use while driving with odds ratios (OR) and 95 % confidence intervals reported. Binary logistic regressions were performed using the three distracting behaviours for drivers as dependant variables. Each variable was dichotomised indicating participants who reported that they never engaged in the behaviour (i.e., responded 1 to the question) and those that had engaged in the behaviour at least once in the

Table 1
ESRA2 Finland: Car driver characteristics.

Variable		n (%)
Gender	Female	329 (46.8)
	Male	374 (53.2)
Age group	18–24	67 (9.5)
	25–34	97 (13.8)
	35–44	106 (15.1)
	45–54	126 (17.9)
	55–64	114 (16.2)
	65+	193 (27.5)
Education level	None/primary education	78 (11.1)
	Secondary education	377 (53.6)
	Bachelor's degree	144 (20.5)
	Master's degree or higher	104 (14.8)
Urbanisation	Urban	236 (33.6)
	Semi-urban or Rural	467 (66.4)

past 30 days (i.e., responded 2–5 to the question). Analysis was undertaken using IBM SPSS version 28.

3. Results

In total a sample of 994 responses were collected in Finland for ESRA2. As the focus of this research is on driver distraction, only respondents who held a driver's licence and reported driving a car in the 30 days prior to the survey were included in the analysis. This reduced the sample to 703 responses. A summary of the demographics of the included respondents are presented in (Table 1).

To assess self-declared distraction from mobile phone use while driving, car drivers were asked 'Over the last 30 days, how often did you as a car driver …?; talk on a hand-held mobile phone while driving; talk on a hands-free mobile phone while driving; and read a text message/email or check social media (e.g. Facebook, twitter, etc.) while driving (texting)'. Comparison between the Finnish and European24 results are presented in Table 2 for those who had performed the behaviour at least once in the last 30 days (responses from 2 to 5).

The self-reported rate of mobile phone usage was higher in Finland than the European average for talking on a hand-held device and texting while driving. Finnish respondents did report lower rates of hands-free mobile phone usage while driving. Notwithstanding, the rate of engagement was low for all behaviours. Mean scores were less than 2 (out of a possible 5) for the three questions indicating that these happened never to sometimes across the 30 days prior (Table 3).

When asked about their attitudes towards mobile phone usage, participants tended to disagree with using a mobile phone while driving to save time, or so that they were available to others. Subjective norms indicated that participants felt it was unacceptable personally and from a community perspective to use a mobile phone while driving. However, views were more positive towards talking on hands-free devices, which is legal in Finland while driving. On average drivers did not feel they had the ability to safely use a phone while driving, their intentions were to not use a mobile phone while driving in the future, and there was a belief that hand-held mobile phone usage was linked to crash risk. However, respondents felt it was unlikely that police would enforce mobile phone use on a typical journey. While on average there was slight opposition towards stricter policy regarding mobile phone use while driving.

Binary logistic regressions were performed using engagement in the three distracting behaviours (no/yes) for drivers as dependant variables. Independent variables included age, gender, factors from the TPB, habits, risk perception, social desirability, enforcement perception, and support for policy measures.

Age, habits, and risk perception were found to be significantly associated with engagement in the use of a hands-held mobile phone while driving (Table 4). Older drivers were found to have increased odds of hand-held mobile phone usage (OR = 1.021). Respondents who self-reported habitually using a mobile phone had twice the odds of engaging in the behaviour in the past 30 days, while those that perceived a higher risk associated with mobile phone usage had 10 % lower odds of using a hand-held phone while driving.

When considering factors for hands-free usage (Table 5), age was not a significant factor, however gender was, with women having 30 % lower odds of hands-free mobile phone usage while driving compared to men. Drivers with more positive attitudes towards mobile phone usage while driving had 30 % higher odds of using a mobile phone hands-free while driving. Intentions to refrain from using a mobile phone while driving was an indicator of whether participants used mobile phones hands-free while driving. A perception of being caught by police using a mobile phone was a deterrent to use, while drivers who opposed policy to restrict phone usage were more likely to use a hands-free phone while driving.

Finally, when considering engagement with mobile devices to read text messages, emails or to check social media while driving (Table 6), younger adults were increasingly likely to self-report these behaviours. Perceived behavioural control (PBC) was significantly associated with those participants with greater belief that they can drive a car safely while using a mobile phone more inclined to text. Similarly, participants who habitually used a mobile phone were more inclined to report texting while driving. Finally, those that showed higher socially desirable behaviours were less likely to self-report texting while driving.

4. Discussion

Mobile phones represent one of the most common distractions for drivers (Young et al., 2007) and phone use while driving is particularly problematic in Finland. By way of example, results from the ESRA study in 2015 found that Finnish drivers reported the highest rates of hand-held mobile phone usage among 17 European nations included in the study (Torfs et al., 2016). Similarly, in the follow up survey in 2018, Finnish respondents self-reported the highest rate of hand-held mobile phone use while driving and the third highest rate of texting while driving (Ross et al., 2018) compared to their European counterparts. Despite the high prevalence of self-reported usage among Finnish drivers, there is little research exploring factors for this behaviour.

Table 2
Self-reported distraction while driving.

ESRA2 Variable	Finland (%)	Europe24* average (%)
Over the last 30 days, how often did you as a car driver (responses 2–5)		
Talk on a hand-held mobile phone while driving?	49.4	28.9
Talk on a hands-free mobile phone while driving?	41.4	48.0
Read a text message/email or check social media (e.g. Facebook, twitter, etc.) while driving?	35.6	24.4

* Europe24 includes results from Austria, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Serbia, Slovenia, Spain, Sweden, Switzerland, and United Kingdom.

Table 3
Frequency for mobile phone use and distracting behaviour (mean and standard deviation) (N = 703).

Factor	ESRA2 Variable	Mean	Standard Deviation
Self-reported distraction while driving (1 = never, 5 = almost always)	*Over the last 30 days, how often did you as a car driver*		
	talk on a hand-held mobile phone while driving?	1.81	1.003
	talk on a hands-free mobile phone while driving?	1.95	1.321
	read a text message/email or check social media (e.g. Facebook, twitter, etc.) While driving?	1.55	0.859
Attitudes (1 = disagree, 5 = agree)	*To what extent do you agree with each of the following statements?*		
	I use a mobile phone while driving, because I always want to be available.	1.70	1.048
	To save time, I often use a mobile phone while driving.	1.61	0.98
Subjective Norms (1 = unacceptable, 5 = acceptable)	*Where you live, how acceptable would most other people say it is for a car driver to*		
	talk on a hand-held mobile phone while driving?	2.26	1.79
	read a text message/email or check social media (e.g. Facebook, twitter, etc.) while driving?	1.06	0.909
	How acceptable do you, personally, feel it is for a car driver to		
	talk on a hand-held mobile phone while driving?	1.96	1.025
	talk on a hand-free mobile phone while driving?	3.69	1.385
	read a text message/email or check social media (e.g. Facebook, twitter, etc.) while driving?	1.53	0.773
Perceived Behavioural Control (1 = disagree, 5 = agree)	*To what extent do you agree with each of the following statements?*		
	I trust myself when I check my messages on the mobile phone while driving.	1.70	0.992
	I have the ability to write a message on the mobile phone while driving.	1.68	1.065
	I am able to talk on a hand-held mobile phone while driving.	2.18	1.294
Intentions (1 = disagree, 5 = agree)	*To what extent do you agree with each of the following statements?*		
	I will do my best not to use my mobile phone while driving in the next 30 days.	3.98	1.391
Habits (1 = disagree, 5 = agree)	*To what extent do you agree with each of the following statements?*		
	I often talk on a hand-held mobile phone while driving.	1.59	0.943
	I often check my messages on the mobile phone while driving.	1.58	0.933
Risk perception (1 = never, 6 = almost always)	*How often do you think each of the following factors is the cause of a road crash involving a car?*		
	using a hand-held mobile phone while driving	4.07	1.18
	using a hands-free mobile phone while driving	3.13	3.00
Social Desirability (1 = very untrue, 5 = very true)	*To what extent are the following statements true?*		
	I always respect the highway code, even if the risk of getting caught is very low.	3.76	1.034
	I would still respect speed limits at all times, even if there were no police checks.	3.61	1.169
	I have never driven through a traffic light that had just turned red.	3.00	1.332
	I do not care what other drivers think about me.	3.31	1.273
	I always remain calm and rational in traffic.	3.80	0.978
	I am always confident of how to react in traffic situations.	3.77	0.899
Enforcement perception (1 = very unlikely, 7 = very likely)	On a typical journey, how likely is it that you, as a car driver, will be checked by the police for the use of hand-held mobile phone to talk or text while driving?	2.35	1.413
Support for policy measures (1 = oppose, 5 = support)	Do you support or oppose a legal obligation to have zero tolerance for using any type of mobile phone while driving (hand-held or hands-free) for all drivers?	2.96	1.386

Table 4
Factors influencing talking on a hand-held mobile phone while driving.

Parameter	B	Std. Error	Sig.	OR	95 % CI for OR	
					Lower	Upper
Age	0.021	0.006	0.001	1.021	1.009	1.034
Gender (Female)	0.187	0.187	0.318	1.205	0.835	1.739
Attitudes	−0.049	0.076	0.522	0.952	0.820	1.106
Subjective Norms	0.060	0.034	0.078	1.062	0.993	1.134
Perceived Behavioural Control	0.089	0.046	0.052	1.093	0.999	1.196
Intentions	0.040	0.071	0.575	1.041	0.905	1.196
Habits	0.845	0.111	0.000	2.328	1.872	2.896
Risk Perception	−0.097	0.049	0.049	0.907	0.824	0.999
Social Desirability	−0.030	0.021	0.157	0.970	0.930	1.012
Enforcement perception	0.085	0.066	0.194	1.089	0.958	1.238
Support for policy measures	−0.064	0.077	0.406	0.938	0.806	1.091
(Constant)	−3.687	0.982	0.000	0.025		
Nagelkerke $R^2 = 0.378$						

Our results provide further evidence of the problematic usage of mobile phones while driving in Finland. Mobile phone use was considered across three specific types of usage: (1) handheld phone call while driving; (2) handsfree phone call while driving; (3) texting, emailing or social media use while driving. Almost half (49.4 %) of the sample reported using a handheld mobile phone to make a call while driving at least once in the 30 days prior to the survey. A similar percentage (41.4 %) of the sample had used a phone hands-free and 35.6 % had texted, emailed, or used social media. These findings align with previous research which show that text messaging is a less common driver behaviour, compared to talking on the phone (Drews et al., 2009; Gras et al., 2007). Sullman, et al

Table 5
Factors influencing talking on a hands-free mobile phone while driving.

Parameter	B	Std. Error	Sig.	OR	95 % CI for OR	
					Lower	Upper
Age	0.010	0.005	0.060	1.010	1.000	1.021
Gender (Female)	−0.336	0.170	0.048	0.714	0.511	0.998
Attitudes	0.284	0.070	0.000	1.328	1.159	1.522
Subjective Norms	0.028	0.031	0.366	1.028	0.968	1.092
Perceived Behavioural Control	−0.089	0.045	0.047	0.915	0.837	0.999
Intentions	−0.145	0.063	0.021	0.865	0.765	0.978
Habits	−0.014	0.083	0.862	0.986	0.838	1.160
Risk Perception	0.019	0.045	0.670	1.019	0.933	1.114
Social Desirability	0.041	0.020	0.041	1.042	1.002	1.085
Enforcement perception	0.135	0.059	0.023	1.145	1.019	1.286
Support for policy measures	−0.324	0.072	0.000	0.723	0.627	0.833
Constant	−0.954	0.866	0.271	0.385		
Nagelkerke $R^2 = 0.172$						

Table 6
Factors influencing reading a text message/email or checking social media while driving.

Parameter	B	Std. Error	Sig.	OR	95 % CI for OR	
					Lower	Upper
Age	−0.029	0.007	0.000	0.972	0.958	0.985
Gender (Female)	0.102	0.221	0.644	1.107	0.718	1.708
Attitudes	0.113	0.082	0.170	1.120	0.953	1.316
Subjective Norms	0.058	0.038	0.125	1.060	0.984	1.141
Perceived Behavioural Control	0.232	0.050	0.000	1.261	1.144	1.391
Intentions	−0.009	0.086	0.914	0.991	0.838	1.172
Habits	0.560	0.103	0.000	1.751	1.430	2.144
Risk Perception	0.060	0.062	0.336	1.062	0.940	1.199
Social Desirability	−0.077	0.025	0.002	0.925	0.881	0.972
Enforcement perception	0.073	0.078	0.349	1.075	0.924	1.252
Support for policy measures	0.017	0.093	0.855	1.017	0.848	1.221
Constant	−2.567	1.100	0.020	0.077		
Nagelkerke $R^2 = 0.540$						

(2018) suggests that this may be due to the added level of distraction that texting tasks impose, compared to receiving a call, with texting leading to higher levels of visual, manual and cognitive distraction.

The main aim of the study was to provide insight into the determinants and decision-making processes that result in these three mobile phone use behaviours. This will provide evidence for countermeasures to reduce problematic phone use while driving. This aim was addressed using the components of the Theory of Planned Behaviour (TPB) (Ajzen, 1991; Meesmann et al., 2019) linked to each of the three mobile phone use behaviours. Specifically, these were: attitudes toward mobile phone use, social acceptability (i.e., subjective norms) regarding phone use while driving and perceived behavioural control (PBC). Perceptions regarding crash risk and enforcement were also measured.

Our results show that the underlying determinants for mobile phone usage differed depending on the different types of engagement. Positive attitudes to mobile phone usage were found to be associated with hands-free usage while driving, which itself is allowed in Finland. These attitudes were related to time efficiency and connectivity (e.g., using a mobile phone to save time while driving and to always be available). There were also high levels of subjective norms towards mobile phone usage with drivers reporting hands-free phone usage as the most socially and personally acceptable distracting behaviour. A substantial proportion of drivers reported that friends and family would disapprove of other distracting behaviours while driving. This is in line with recent findings from the Ukraine (Hill et al., 2021) and may also provide an avenue for interventions such as the those previously trialed in the UK to target speeding behaviour using the TPB (Stead et al., 2005).

We also found that drivers with higher PBC were more likely to text while driving. Conversely there was a negative relationship with PBC and hands-free usage. Drivers tend to engage in risky behaviours when they believe the benefits outweigh the risk (Hill et al., 2021), as such drivers who believe they are in control of the situation may be more inclined to engage in risk taking behaviours such as texting while driving, while conversely, the negative relationship between the legal behaviour of talking hands-free may indicate that those who feel less in control are more inclined to engage in legal behaviours when engaging with their mobile phone while driving. Thus, the TPB emerged as a suitable framework within which to understand mobile phone use while driving for Finnish drivers.

Beyond the TPB, perceptions of crash risk and enforcement were also indicators of phone use while driving. Participants were generally neutral towards the crash risk associated with mobile phone usage while driving. However, there was a significant negative relationship between risk perception and hand-held phone usage. Previous research has shown that most drivers are aware of the risk of using a mobile phone while driving (Nelson et al., 2009; White et al., 2007) however, they still engage in this behaviour as the

perceived benefits outweigh the associated risks (White et al., 2004). There also appears to be an element of mobile phone usage being a habitual behaviour while driving, with significant relationships identified between hand-held phone usage and texting. While most drivers agreed that they intended to not use their mobile phone while driving in the next 30 days, previous research has conceptualised mobile phone involvement as a form of behavioural addiction (Brown, 1997), as such more target interventions may be required to support reduced engagement in this distracting behaviour.

In general drivers did not feel that there was a good chance of them being fined by police for using a mobile phone while driving. This is likely to reinforce the behaviour that they can drive while using a mobile phone and there are unlikely to be consequences. Interestingly, when considering social desirability, most drivers responded positively, albeit in general there was opposition towards stricter enforcement. The perception of not being caught using a mobile phone while driving presents an avenue for increased enforcement of unsafe driver behaviours which could help to reduce the prevalence of mobile phone usage. However, studies have shown that enforcement alone is not effective in reducing the use of mobile phones while driving (Foss et al., 2009; Rajalin et al., 2005).

Demographic characteristics of age and gender were also associated with different behaviours, with younger drivers more likely to self-report texting while driving while older drivers were more likely to talk on the phone while driving. Male drivers were also more likely to self-report talking hands-free on their mobile phone while driving, while no significant gender differences were identified for texting or talking on a hand-held phone. These findings in themselves demonstrate that different interventions are needed to target different demographics and the ways in which they choose to engage with their mobile phones while driving.

Overall, the findings from this research highlight that mobile phone use while driving is complex and multifaceted, as such there is a need for a systems-based approach when addressing this behaviour that incorporates legislation, enforcement and education campaigns (Hill et al., 2021). This could include campaigns to raise the awareness of the risks of distracted driving, incorporating information on the risks of distraction into education programmes and driver license training, increasing enforcement and trialling new enforcement methods to target mobile phone usage and distraction. One such campaign, called "Kun Ajat Aja" (When You Drive, Drive) targeted mobile phone usage (Sorjonen, 2016). Results of the campaign were positive with 63 % of participants in a program evaluation remembering the campaign. While it is unclear if the campaign resulted in long term behaviour change, relaunching this program or a similar campaign could be a useful measure to raise awareness of the risks of mobile phone usage in Finland. Changes in legislation may also be an effective measure to reduce phone usage in the short term. When laws were introduced in Finland in 2003 that prohibited the use of hand-held mobile phones there was an initial reduction in use, however when subsequent surveys were conducted in the following year rates of self-reported use had increased (Rajalin et al., 2005).

Clearly there is a need for further research into this area, while the ESRA survey provides insight into the rates of engagement in mobile phone distraction and the underlying determinants. Mobile technology is rapidly advancing, and people are finding new ways to engage with their mobile phones. As such, further naturalistic and observational research is required to understand the differing ways that drivers and other road users are engaging with mobile phones, furthermore additional surveys can be developed to help quantify engagement and develop insight into the underlying factors that influence and motivate road users to engage in these behaviours. This could involve including a more comprehensive list of items for assessing each construct in the TPB which would provide added confidence in the construct reliability.

Furthermore, there is a need to understand the specific context in which people are engaging with their mobile phones, given that data collection for the ESRA2 survey was undertaken in winter months, there is a potential that fewer drivers were willing to use their mobile phone due to the increased workload associated with driving in dark, icy conditions which are typical of Finnish roads in December (O'Hern et al., 2021). Future research could consider seasonal differences in mobile phone engagement to better understand times when risks are greatest to drivers. Crash statistics should also be investigated to gain further understanding of the risks associated with mobile phone distraction within a Finnish context.

Finally, it is noted that this research is susceptible to many of the biases of self-reported data. These may include a desirability bias amongst participants to respond in a socially desirable manner. Participant may also suffer from recall error when reporting their engagement in behaviours, while the Likert scales are also somewhat subjective and there is the potential that not all participants interpret the gradation between points on each scale in the same way. Online surveys can also suffer from representativeness issues and exclude participants without internet access. However, when designing the study, a representative age and gender sample were sought to try to address some of these issues and no identifiable information was collected. Further, despite the high rate of self-reported phone usage, it is also worth noting that the three distracting behaviours do not capture the full range of ways that people in Finland engage with their mobile phones, it is also noted that third behaviour combines three different tasks, i.e., texting, emailing, and checking social media. Recent naturalistic research in Finland found that Finnish drivers engage with a diverse range of phone applications while driving including, maps, internet banking, emails, video streaming services, social media, and messaging applications (Kujala & Mäkelä, 2018) and that road users were distracted for different durations and the frequency of engagement differs depending on the task. This indicates that it would be appropriate to only consider one behaviour in each question rather than combining similar tasks. Kujala and Mäkelä's research also suggests that it is likely that the self-reported mobile phone usage captured in the ESRA2 survey underestimates phone usage by Finnish drivers.

Notwithstanding these limitations, the study provides insight into the factors influencing distraction from mobile phone usage while driving in Finland. The study highlights how mobile phone usage is a complex issue and that there are a broad range of underlying factors that influence mobile phone usage depending on the way in which people engage with their mobile phone while driving. This suggests that a systematic approach to addressing mobile phone distraction is needed that addresses the issue through a combination of legislation, enforcement, and education.

CRediT authorship contribution statement

Steve O'Hern: Conceptualization, Methodology, Investigation, Writing – original draft, Writing – review & editing. **Amanda N Stephens:** Conceptualization, Methodology, Investigation, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

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