

**Evaluating Divided Attention, Impulsivity,  
Mobile Phone Dependency and their  
effects on Driver Distraction**

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### **Abstract**

The aim of the study evaluated events that led to driver distraction and whether human behaviours like Divided Attention, Impulsivity or problematic phone use independently or collectively impeded with driver distraction. A snowball sample group of (N=150) participants, recruited over a 30 day period, participated through an online survey host site. The survey structure incorporated the divided attention questionnaire, the Bis- Brief questionnaire, the problematic use of mobile phone questionnaire and the driver distraction survey. A quasi experimental design through 3 correlational and 5 differential analyses tested 8 hypotheses, and concluded significant relationships with driver distraction, problematic phone use and divided attention. No significant difference between the gender split occurred with two t-tests comparing driver distraction and problematic phone use. Significant findings were indicated between the age groups by applying the same dependent variables. A t-test revealed a significant difference between individuals who drive for work and those who did not.

## Introduction

Irish consumer's users have been identified as the leading users of mobile phone users in the Western world according to Irish based research firm Statcounter (Weckler, 2015). Further statistics released by the Commission for Communications Regulation in Ireland suggests that Irish mobile phone users are utilising mobile phones for a growing number of services, no longer limited to phone calls and texts (Commission for Communications Regulation, 2017). The increasing use of mobile phone devices has resulted in an increasing dependence on such devices and also engagement in risk taking behaviours, in particular using hand held devices while driving. The origin of this research stems from observing the driving behaviours of fellow road users that are engaged in the physical process of driving a vehicle while interacting with a mobile phone, whether it may be texting, reading, having a conversation, map reading or engaging with social media. According to Lyngsie, Pedersen, Stage and Vestergaard (2013), 51% of young drivers admitted to texting while driving. Although individuals consciously know they are breaking the law, and are aware of the risk factors involved and the possible consequences, they still overtly apply their skills and abilities to control the tasks at hand (Lyngsie *et al*, 2013). Although we may think we are in control, statistics indicate otherwise. Using a hand held or hands free phone while driving, can be a major contributory factor toward driver distraction and increases crash/near crash incidents (RSA 2015). Taking this into consideration, the aim of this research is to examine utilisation of mobile phone devices while driving causing driver's distraction as a result.

Within 25 years the mobile phone has evolved from being a single wireless method of communication, into a computerised multi tool with endless features that keep our attention

in constant demand. Continuous progressive design features that provide instant global access at your fingertips reveal excessive amounts of time spent interacting with social media networks, text messaging, and emailing and app engagement. Phone manufacturers have successfully tapped into competing natural human behaviours that stimulate our senses and have also managed to permanently embed and penetrate the realm of our human psyche (Lyngsie *et al*, 2013).. Advancements in technology don't always result in productive outcomes. Surprisingly, empirical studies by Lyngsie et al (2013) compared the original T9 button phone with the modern touch screen Smartphone. Results indicate drivers with touch phones spent significantly more time looking away from a task, and double the amount of long eye glance tasks away from driver task performance. As a result, media and communication methods result in our cognitive capabilities being tested to maximum performance, our stimulus intake increasing in intensity, and our concentration levels become diluted (Lyngsie *et al*, 2013). In a recent RTE article, Michael Bannon, Aviva Insurance stated, "Technology has revolutionised our lives for the better in many respects but when it comes to road safety, its ability to distract can prove lethal"(Byrne 2017).

Driving a motorised vehicle can become a regular everyday type task, but constantly requires complex, visuomotor skills (Mac Kensie and Harris 2017). Attention is needed to constantly monitor environmental conditions, and an awareness of hazards can arise while also managing control of the vehicle (Mac Kensie and Harris 2017). Contributing factors to road accidents can arise from inattention and failure to scan possible future outcomes (Mac Kensie and Harris 2017). Using a mobile phone while driving can significantly reduce a range of performance measures which include visual scanning, longitudinal and lateral vehicle control, cognitive processing, hazard perception and decision making (Young, Brown, Patten, Ceci and Lenni 2014). Driving and texting alone result in varying vehicle

speed, longer eyes-off road times and increased subjective workloads (Young *et al*, 2014). Writing a text message while driving reveals greater driver performance impairments (Young *et al*, 2014). In a recent AA survey, 46% of the general public witnessed non hands free mobile phone use every day and four out of five (84%) of Irish drivers admit to using electronic devices (Byrne 2017).

Evaluating human behaviour and personality traits that impinge on driver distraction can amount to a collection of alternating factors that make up an individual's characteristics. To gain a better insight into this current dilemma, an analysis of dual process theories are scrutinised to help expose and highlight contributing factors that result in driver distraction. Research investigating cognitive and behavioural models compare and contrast the disassociations between controlled and automatic responses (Deutsch & Strack, 2007). The Multi Resource model (1984) devised by Christopher Wickens proposed humans do not operate on a single informational processing source, the model also suggested individuals have a limited capacity for processing information in relation to time sharing abilities and task performance. The four dimensional model posits that interference between binary tasks integrating areas of divided attention and workloads, multitasking and dual performance under the one umbrella from a cognitive perspective (Wickens 2002).

Further examining the multifaceted nature of task performance, Strack and Deutsch (2004) developed the reflective impulse model (RIM) as a dual process mechanism to explain a combination of planned deliberate actions and thoughts which are caused by spontaneous impulses. They suggest impulses operate unconsciously, are effortless and activate through either perceptual input or reflective processes (Strack & Deutsch, 2004). The reflective system functions according to propositional principles and behaviour is consequential of an unconscious decision making process (Strack & Deutsch, 2004). It is flexible and needs

motivation and functions in the conscious. By interacting, the reflective system is activated by propositionally altering the structure of the impulse system.(Krishna & Strack 2017).According to Zajonc (1980) ,as cited in Strack *et al*(2004), “The impulsive system can be understood as a system experiential primacy, in which affective and nonaffective feelings are generated quickly and without syllogistic processes of inference”(p.224).

Progressive studies again by Deutsch and Strack (2007) suggest the RIM model can be applied to understanding the phenomena of addictive cognition and behaviour. Instances of the negative aspect of addictive behaviour occur against all better knowledge including mobile phone usage while operating a vehicle. Deprivation of a basic need can call for an instant reversal of a situation, and thus call for a specific disposition to act on it. The disposition is created by a mechanism of reward and incentive learning. Further research by Stacy and Wiers (2010) suggests the connection between implicit memory and addiction are influential cognitions that are activated during critical decision making points.

### ***Divided Attention***

Driving a vehicle can be perceived as a fluid, automatic type process to most people, which can encourage drivers to engage in secondary activities (Iqbal, Ju, & Horvitz 2010). Some rapid peripheral tasks may take only a momentary shift in attention from driving (Iqbal, Ju, & Horvitz 2010). Other activities can take more time and effort than realised, and can result in overestimating ones abilities and result in prolonged periods of divided attention (Iqbal, Ju, & Horvitz 2010).Divided attention incorporates paying attention to two or more simultaneous tasks and attempting to respond appropriately Collet *et al* (2009) as cited in Matlin (2014). As a result, both speed of response and accuracy diminish. Multitasking

strains limits of attention, and affects limits of working memory and long-term memory. Studies by Collet et al (2009), tested individuals talking on a handheld phone while using a driving simulator, concluded that reaction times to be 20% slower to not using a cell phone. Significantly, studies by Strayer et al (2003) as cited in Matlin (2014) found that even using a hands free cell phone while driving took longer to apply the brakes than a control group, and behaviour of inattention blindness occurs resulting in information deficits from the centre of the visual field (Matlin 2014). Divide attention in vision is about dependence versus independence in relation to visual processing across stimuli, and observes multiple sources of information and not single sources (Matlin, 2014). The effect of Divided Attention relate to behavioural consequences as a result of impaired performance. Controlled studies apply two paradigms. Visual search, is tested where an individual has to search for a target stimulus in a “target presence versus absence” task where multiple stimuli are applied. Dual task tests incorporate performing two tasks together, and are compared to a single task condition (Palmer 2014).

Iqbal et al (2010), investigated interference in relation to the cognitive load of phone conversations and driving tasks. Findings concluded in a dual task setting, shifting resources from one task to another, improves performance on the second task such as mobile phone use but as difficulty levels of one task increases, performance levels on the other task decrease such as in the case of driving. Further indications suggest while performing dual tasks, cognitive resource demands can exceed resource availability especially when the task involves memory retrieval. FMRI studies by Yeung, Nystrom, Aronson and Cohen (2006) hypothesised that task switching performances is affected by levels of interference from task irrelevant cognitive processing. They observed interactions between brain regions and scans indicate that the Pre Frontal Cortex (PFC) is incorporated in the process of cognitive control

by observing individuals perform dual tasking activities. Neural activity was also active in the lateral PFC and the parietal cortex indicating task competition as a critical determinant of behaviour. In evaluating the construct of divided attention, tests will be conducted with application of Tun and Wingfields (1995) questionnaire. This may help indicate errors that occur and may be at play to support the study that is being undertaken.

### ***Impulsive Behaviour.***

According to Moeller, Barratt, Dougherty, Schmitz and Schumann (2001) as cited in Stanford, Mathias, Dougherty, Lake, Anderson and Patton (2009) impulsiveness is characterised by a spontaneous reaction stimulated by internal or external stimuli without consideration for positive or negative consequences for oneself or others. According to Dickmann (1990), also investigated impulsivity and cognitive functioning and suggested that consequences of impulsivity may not always be negative. A brief example would be a simple task; resulting high impulsive rapid responses develop little cost in error. Also, when given little time in relation to decision making, higher impulses tend to result in better accuracy than low impulses (Dickman & Meyer 1988).

Suggestions by Billieux, Van der Linden, Dacremont, Ceschi and Zermatten (2007) indicate impulsivity is associated with the use of and dependence on the mobile phone, and is also similarly linked to that of addictive behaviours. Whiteside & Lynam (2001) developed the UPPS (Urgency, Premeditation, Perseverance, Sensation Seeking) questionnaire that incorporated four components that are connected to impulsive behaviour. Urgency may be considered an immediate impulsion to act. Premeditation may indicate consideration given to the consequence of an action before engaging in an act. Perseverance, to persevere with a

task whether it be satisfactory or not. Sensation seeking is a tendency toward pursuing enjoyable, satisfactory activities (Billieux *et al.*, 2007).

Investigations by Billieux, Gay, Rochat and Van der Linden (2010) analyse the role of urgency in relation to problematic behaviour and suggest positive and negative urgency equates to certain types of maladaptive behaviour. Increased levels of urgency are related to a wide range of problematic behaviours that occur with problematic mobile phone use (Whiteside & Lynam 2001).

It is also suggested that the construct of urgency, the correlation between positive and negative urges indicate an individual may be prone to participate in maladaptive behaviour like risky mobile phone use in order to regulate negative emotion experiences (Whiteside & Lynam 2001). These urgency related behaviours also occur in a positive sense, and can cause an individual to act rashly and also participate in risky problematic behaviours, and these positive urges are proactive in maintaining and enhancing these problematic behaviours, indicating positive and negative urgency exists in the emotional regulation of impulsivity (Billieux *et al.* 2010). The application of Barratts Impulsivity Questionnaire (1959) is applied but reduced by Steinberg *et al.* (2013) to the (BIS-Brief).

### ***Problematic Mobile Phone Use.***

Observations by Cholz (2012) reveal the mobile phone is a device that has become the most used and desired item on the planet. The psychological relationship that ensues between the individual and the phone, in relation to interacting with and attachment to provokes a fascination which explains how a mobile phone elicits a form of dependency relationship between the two (Cholz, 2012). The social impact of Mobile phones and its rapid development has infiltrated so many of our senses that it enables individuals to express

an unlimited amount of their being through a device that fits in the palm of their hand (Choliz, 2012). These advantages enable us to live our lives through the reality world of mobile phone social media and through interaction, and enables one to reinforce autonomy, identity and entertainment as well as supporting maintenance of personal relationships through numerous pathways including social media (Choliz, 2012).

However, all this activity comes at a price. Problematic phone use occurs when an issue arises in a person's behaviour which may affect their compulsive, financial, sleeping habits, and their concentration and dependency levels (Choliz, 2012). The International Telecommunications Union, (ITU2013) report phone subscribers worldwide increased from 2 billion in 2005 to 6.8 billion in 2013, which evaluates to 96% of the world's population. As the issue of mobile phone dependency escalates, it has been categorised as being a subscale of a behaviour that has come to be known as technology "cyber" addiction. (Drouin, Kaiser & Miller 2015).

Choliz (2012) compares the uncontrollable, inappropriate and excessive use of mobile phones to behaviours that are reflective of abuse in addiction. Definitions of substance abuse and substance dependence are categorised in "Diagnostic and Statistical Manual of Mental Disorders" (DSM) and progress in being sought into applying a "Technological Addiction" subsection specifically to address the emerging problematic issues pertaining to abuse of mobile phones and other forms of wireless communication and media because of their comorbidities with Psychological Disorders (Choliz 2012). They suggest, especially in relation to the younger demographic, the mobile phone has become a much larger part of their culture. Self-esteem is developed by our self-worth, our views and identity and how we interact socially. Addictive mobile phone use may be used as a form of escape from certain situations that the user may find aversive, and uses the phone as a coping mechanism for communication methods, thus mobile phone dependency occurs (Choliz 2012). As a target

for intervention, Merlo, Stone & Bibbey(2013) suggested it seems plausible that issues relating to problematic mobile phone use is like psychological dependence, and is similar to gambling, video gaming use and they also seem to parallel with substance abuse and substance dependence. Mobile phone dependency will be tested with the application of the PUMP scale which was devised by Merlo (2013) to evaluate problematic mobile phone use. By applying this measure in the study, it may go some way toward understand if these variables that do assist or have similar motivated behaviours.

### ***Driver Distraction.***

Research conducted by Young and Regan (2007) found inattentive driving equates for one quarter of vehicle crashes in the U.S. Australian research reviewed the effects of in-vehicle devices on driving behavior. They concluded that driving performance is significantly impeded by any secondary activity which divides driver attention, behavior such as mobile phone use has detrimental effects for road safety (Young and Regan, 2007). Suggestions that driver distraction occur when the normal cognitive processes of attention sharing is compromised, is categorized into four distinct areas: visual, auditory, biomechanical/physical and cognitive distraction (Young and Regan, 2007). To compensate these deficits in cognition, drivers tend to self-regulate their driving ability. According to Haigney, Taylor & Westerman (2000), drivers tend to engage in conscious and unconscious compensatory behaviours while trying to maintain safe levels of driving and these adaptive behaviours vary in level from strategic,(choosing not to use a phone) to operational(controlling a vehicle safely). Further simulator studies by Haigney, Taylor and Westerman (2000) suggest drivers tend to reduce speed while engaging in a secondary task. Evidence indicates the driver is modifying their performance goals to the task at hand, or it is the result of allocating too

much attention to the secondary task and not enough attention to the driving task (Haigney *et al*, 2000). Either way, it results in the driver not allocating sufficient resources to driving, and potentially compromising road safety awareness for themselves and other road users (Haigney *et al*, 2000).

Similar driving studies by Groeger (1999) and Drews, Pasupathi and Strayer (2008), suggest there are three levels of driving performance. The first is operation or control level, which involves keeping a vehicle on a predetermined course (Drews *et al*, 2008; Groeger, 1999). When driving and conversing on a cell phone, deficits occur where a vehicle will drift from side to side, results in a reduction in lateral control. The second level involves tactical behaviour and incorporates driving skills while maneuvering a vehicle in traffic (Drews *et al*, 2008; Groeger, 1999). When driving and conversing on a cell phone, deficits occur through speed variation, delayed reaction times and approaching vehicles too closely. The third level incorporates executive, goal directed aspects of driving in relation to strategic performance (Drews *et al*, 2008; Groeger, 1999). When driving and conversing on a cell phone, failures occur in the execution of navigation and trip related planning tasks.

According to Strayer (2003), Cell phone conversations while driving impair implicit and explicit recognition memory and hypothesized that the observed impairment of visual information could be attributed to withdrawal of attention resulting in a form of inattentional blindness. The application used for this test is the Driver Distraction survey which was devised by Bergmark *et al* (2016).

In order to form a better understanding of the systems that are play from an external perspective, or from an internal perspective, we will form a collection of hypotheses that will indicate in coming to an understanding the factors that make up the behaviour of Driver Distraction by assuming that:

Hypothesis 1: Divided Attention, Impulsivity, and Problematic Use of Mobile Phone will predict Driver Distraction.

Hypothesis 2: Problematic Use of Mobile Phone will predict Driver Distraction.

Hypothesis 3: Divided Attention will predict Driver Distraction.

Hypothesis 4: There will be a difference between males and females and levels of Driver Distraction.

Hypothesis 5: There will be a difference between males and females and Problematic Phone Use.

Hypothesis 6: There will be a difference between age groups and Driver Distraction.

Hypothesis 7: There will be a difference between age groups and Problematic Phone Use.

Hypothesis 8: There will be a difference between participant who drive as part of their occupation and those who don't, against levels of Driver Distraction.

## **Methodology.**

### ***Participants***

In order to recruit a non biased, liberal sample demographic group, a convenience snowball sampling process was applied by constructing an online survey. Participants were encouraged to complete the process using a hand-held device, simply being it had some relevance to the study at hand. Prior to completing the survey, participants were informed of the criteria required to complete the survey including an age restriction of 18 years and must be in possession of a current drivers licence. Further criteria included ownership of a mobile phone or smart phone.

Data was obtained throughvoluntary participation via a survey monkey online questionnaire link. Initially, the invitation was circulated to family and friends via Facebook, Whatsapp, LinkedInand by email asking them to participate, and to share the link on to their own contacts. The Facebook link was also open for the general population to participate. No incentives were offered, though it was noted that the survey would take less than 8 -10 minutes to complete, in order to encourage participation interest. The survey expired after 30 days, and accumulated one hundred and fifty participants (N = 150). Out of the four age groups listed, (N = 10) were 18-25 years, (N = 68) were 26-40 years, (N = 66) were 41-60 years and (N =10) representing 61+ years, (N = 2.45, SD .68). The gender difference amounted to 52% (N= 78) female and 47% (N = 71) male with one participant choosing to remain gender neutral.

In order to develop an evaluation of work and driving trends, participants were asked, “ Do you drive a motorised vehicle as part of your occupation ?” respondents (N = 150)

amounted to (N = 54) saying yes while ( N = 96) saying no. Another question further scrutinised

“ Approximately, how many hours a week would you spend driving a motorised vehicle. This was broken into 5 separate time frames, in order to develop on average, how many hours a respondent would spend driving on a weekly basis.

### *Design*

The construct of the testing was interpreted with the assistance of SPSS 24 software technology. Correlational designs were applied using regression analysis in hypotheses (Hyp) 1, 2 and 3 in order to determine whether a covariation or correlation between the variables had occurred. The primary Criterion variable (CV) of interest related to Driver Distraction in all of these three tests. The predictor variables (PV) ranged from the behaviours of problematic use of mobile phones, impulsivity and divided attention which were collated to form a multiple regression in (Hyp 1). In (Hyp 2), problematic mobile phone use was the (IV), and in (Hyp 3) was divided attention. Hypothesis 4 and 5 incorporated a quazi experimental design. The difference between males and females represented the independent variables (IV) in this cross sectional study and was determined by the dependent variables of driver distraction (Hyp 4) and problematic mobile phone use (Hyp 5). Both hypotheses were tested by means of an independent samples t-test. With (Hyp 6), the test was conducted using a one way between groups anova, with the (IV) representing the 4 ranges of age groups and the (DV) being driver distraction. In (Hyp7), another one way between groups anova was used to test the difference between the (IV) which represented the 4 ranges of age groups and the (DV) being problematic use of mobile phones. IN (Hyp8), an

independent sample t-test was applied to test if there is a difference between the (IV) which is whether a person drove a vehicle as part of their occupation and those who did not with the (DV) being driver distraction.

### ***Materials***

The content, accumulated through an online questionnaire, (Appendix 1) and commenced with an introduction to the research and contact details. An ethical approach was taken with regard to participation, anonymity, information storage, security and right to withdraw were highlighted before the survey commenced. The Psychological Society of Ireland's (PSI 2010), Code of Ethics was adhered to in the survey's construction and moral guidelines assisted toward the rights of the individual. Contact details regarding support services were provided at the end of the study. This was a voluntary study and no reward was offered to the participants. The questionnaire commenced with a collection of demographic questions. Question 1 (Q1) related to consent and driving licence requirements. Question 2 (Q2) related to gender status. Question 3 (Q3) related to age which was divided into four sections, 18-25,

26-40, 41, 60 and 61+. Question 4 (Q4) related to whether the participant drove a vehicle as part of their occupation. Question 5 (Q5) related to how many hours each participant drove on a weekly basis. This ranged from 1-5hrs, 6-14hrs, 15-23hrs, 24-39hrs and 39hrs+. The survey proceeded into the four individual questionnaires: starting with the problematic use of mobile phone questionnaire (20 qs); the driver distraction survey (11qs); the Barratt impulsivity brief (8qs) and the divided attention questionnaire (15qs) with each given a brief

introduction. In total, the four questionnaires amounted to 54 questions taking approximately 8 minutes to complete.

### ***The Problematic Use of Mobile Phone Scale.***

This questionnaire, devised by Merlo, Stone and Bibbey (2013), assesses the expanding issues that relate to excessive use of mobile phones and how they are impeding on every day activities by prompting the public's interest in the negative consequences of mobile phone. Merlo et al (2013) for clarification purposes, suggested that problematic use of mobile phones includes excessive usage which may impair areas of function such as concentration therefore impairing judgement and impeding on normal tasks.

Of course there are many benefits to mobile phones such as efficiency, convenience and social connection. Negative behaviours have ensued especially in relation to additive usage and dependence on mobile devices resulting in issues such as driver distraction which has become a public health concern (Merlo *et al*, 2013).

The questionnaire construct is primarily designed around problematic mobile phone use symptoms, which have been based around the adaptations of DSM-5 substance use disorder criteria and pathological gambling, which resides under disorders involving impulsivity simply because there is no formal classification for problematic phone use (Merlo *et al*, 2013) . The questionnaire consists of twenty questions that were developed from informal interviews with individuals who have expressed issues with mobile phone dependency (Merlo *et al*, 2013). Each item was rated on a five point Likert scale which rated from 1 being = strongly disagree to 5 being = strongly agree. Results of the new PUMP scale indicated excellent internal consistency ( $\alpha = .94$ ). Factorial validity of the 20 item scale

supported a one factor solution, which explained 49.05% of the variance, meeting Carmines and Zellers criterion. PUMP scale scores correlated positively with “excessive mobile phone usage” and with “ self-reported feelings of addiction to the mobile phone,” also correlated with similar existing problematic phone measures ( $r = .76$   $p < .001$ ). (Merlo et al 2013).

### ***The Driver Distraction Survey.***

The Driver Distraction Survey (DDS) was developed by Bergmark, Gliklich, Guo & Gliklich (2016) to create a more refined short list of questions that had a primary interest in certain behaviours that incorporated writing and reading of text messages while actively driving. Emphasis also focused on interaction with emailing and social media, using maps and at what speed these events would usually be performed. The Questionnaire has a total of just 11 items and takes approximately 2 minutes to complete. Answers were chosen by way of a 5 point Likert scale and the structures of the questions and answers were developed to include multiple option items that reflected the most common reading and typing tasks performed on a phone. Scores range from 0-4 per item and 0-44 overall.

Development of the questions were compiled by conducting open ended interviews with a sample of 20 participants, 10 experienced drivers, 30 years or older with ten years driving experience and 10 novice drivers (18-25). Out of the 11 questions, 10 questions commence with “in the last 30 days”, to evaluate frequency and each question also incorporates reading and writing activities whilst driving. Another additional factor included in the questions focused on driving at a particular speed while reading or writing text. The format of the questions was constructed and modelled utilising the Centers for Disease Control and Prevention National Youth Risk Behaviour Survey.

Initially, the survey had a total of 29 questions and after pilot testing for reliability and validity, the 11 question survey reported excellent internal consistency, and good face validity. Standardised Cronbach's Alpha remained excellent overall at 0.93, DDS alpha reading activities were rated at 0.86 and writing activities at 0.85. The DDS was primarily designed for a demographic age group between 18-24 years, but can be applied to any age group and further studies are suggested to validate this. The DDS indicates strong test retest reliabilities and can be highly recommended as a use for a self-reported validated survey when analysing cell phone use while driving and as an application for public health interventions and can be used in larger studies (Bergmarket *et al*, 2016).

### ***The Barratt Impulsivity Brief***

The Barratt Impulsivity Scale (BIS) was originally designed in 1959 containing 80 true-false items and was developed to measure impulsive personality traits. A second version, designed by Patton & Stanford 1995, developed the (BIS - 11) 30 item self-report questionnaire. The construct measures three subtraits, (attentional impulsiveness) which relates to focusing and persisting in a task, (motor impulsiveness) relates to a tendency to act on the spur of the moment, and (non planning impulsiveness) which relates to poor future planning. The scale has been very influential for contemporary conceptualisations of impulsivity. The BIS- 11 reported good internal consistencies with Cronbachs alpha revealing a positive .79 - .83. The BIS is in its 11<sup>th</sup> version. Steinberg, Sharpe, Stanford and Tharpe, 2013 further reduced and refined the item content down to develop the BIS – Brief. This version consists of 8 suggestions which are answered by means of a 4 Point Likert Scale. Answers range from 1. Rarely/Never, 2. Occasionally, 3. Often, 4. Almost always/Always. After close scrutiny of correlated testing, validity scores observed a similar significant

outcome between the BIS-11 and the BIS Brief. The more condensed version not being regarded as a replacement of the BIS-11, but a more refined version (Steinberg et al, 2013).

### *The Divided Attention Questionnaire*

The Divided Attention Questionnaire (DAQ) originally developed by Tun & Wingfield (1995) is still used widely to assess perceptions of our Divided Attention abilities, in relation to age and divided attention performance. This area of cognitive functioning has been further scrutinised by Salthouse & Siedlecki (2005) through various investigations into testing the reliability and validity of this classic 15 item questionnaire. Answers to the questionnaire were evaluated with a 5 point Likert Scale that ranged from Very Easy, Easy, Medium, Hard, and Very Hard. In the more current study, each item has been individually tested in relation to difficulty, perceived change and frequency and has been further tested over 2 separate studies. Adjustments were made from the original sample in relation to demographics and include a more balanced age difference (Tun & Wingfield, 1995). In relation to Salthouse & Siedlecki, 2005, Study 1 incorporated participants performing multiple tasks such as keeping a cursor tracked on a randomly moving target on a computer screen while 1, simultaneously remembering a list of paired associates. 2, answering question in relation to verbal directions and 3, remembering a continuous sequence of numbers. Study 2 was similar method except additional tasks were applied. Results from both studies were correlated to create a single data set. Items with least difficulty ratings were item 3, “driving while listening to the radio”, item 10, “walking and talking” and item 15 “doing household chores while thinking of something else”. Items that were deemed most difficult were item 12 “talking on the phone with someone in the room”, item 14 “remembering names when introduced to someone new.” Comparisons between Tun&Wingfield’s (1995) study and

Salthouse&Siedlecki (2005), indicate similar average ratings overall. In the three variables tested, Cronbach's alpha coefficient in difficulty rated Tun&Wingfield's .88 and Salthouse&Siedlecki .87. With regards to perceived change, Tun&Wingfield's .89 and Salthouse& Siedlecki.81. Frequency in Tun & Wingfield's .70 and Salthouse & Siedlecki was .79. Test-retest estimations and internal consistency of reliability along with other variables indicate similar positive correlations. Overall findings indicate Tun & Wingfield's Divided Attention Questionnaire (DAQ) is a reliable measure to assess Divided Attention. However, suggestions by Salthouse & Siedlecki (DAQ) indicate low levels of external validity, due to tasks being undertaken in a laboratory setting. Notwithstanding, they concur self-ratings of difficulty, change and frequency that involve divided attention can be assessed reliably with age with the application of the (DAQ). (Salthouse & Siedlecki 2005)

### ***Procedures***

This study was developed from observational research of fellow drivers going about their daily business, while conducting the act of using their mobile phone while driving. The preliminary investigations warranted safety and ethical concerns for fellow drivers and the general public. A draft proposal was submitted to Dublin Business School detailing the basic construct of the research, outlining a brief interpretation of this study. Ethical approval was granted by the ethics board and was scrutinised to meet the PSI guidelines in order to proceed. The survey was constructed with the assistance of survey monkey and the content of the questionnaire has been explained in the preceding methods sections. The survey commenced on the 3<sup>rd</sup> of January 2018, and closed on the 2<sup>nd</sup> of February 2018. Data was transferred via excel and collated by SPSS 24 software. Analysis was conducted through regression, t-tests and between group's anovas.

## RESULTS

The results section did show the quantitative analysis of the data collected in both descriptive and inferential format. Data collection detected vital information regarding trends of mobile phone use. Driver distraction and problematic phone use became the main dependent variable tested and through a series of differential and correlational analysis, the (IVs) were scrutinised through a series of 8 Hypotheses. Inferential analysis included multiple regression, linear regression, independent samples t-test and one way anova tests.

### *Descriptive Statistics*

Descriptive Statistics is shown in Table 1 for Driver Distraction (mean =46.64), Problematic Phone Use (mean=47.77), Divided Attention (mean= 38.68) and Impulsivity (mean=19.72). Problematic Phone use is showing the highest mean value with Impulsivity indicating the lowest mean value.

Table 1. *Descriptive Statistics for Driver Distraction, Problematic Phone Use, Divided Attention and Impulsivity.*

<b>Variable</b>	<b>N</b>	<b>Mean</b>	<b>Standard.</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Cronbach's</b>
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			Deviation		Alpha	
<b>Driver</b>	149	46.64	7.86	15.00	55.00	.918
<b>Distraction</b>						
<b>Problematic</b>	147	47.77	14.00	20.00	86.00	.898
<b>Phone Use</b>						
<b>Divided</b>	146	38.68	8.11	22.00	64.00	.838
<b>Attention</b>						
<b>Impulsivity</b>	148	19.72	2.25	15.00	26.00	.003
<b>Brief 8</b>						

Demographic analysis indicated out of a sample of (N=150) participants, a relatively equal gender balance were Female 52% (N= 78) and Male 47% (N = 71) arose. Probing demographic questions in relation to whether individuals drive as part of their occupation and how many hours a day did they spend driving is illustrated in Figures 1 and 2 below. A further breakdown of the variation of age groups is displayed in figure 3.

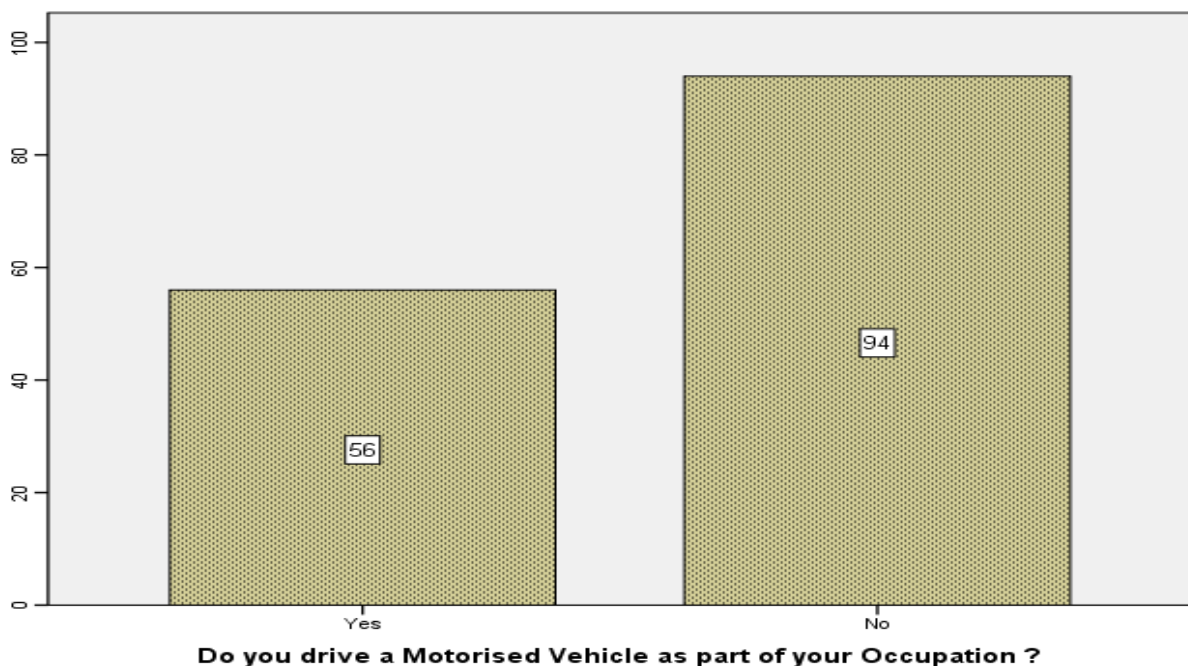


Figure 1. Driving a Motor Vehicle as part of your occupation.

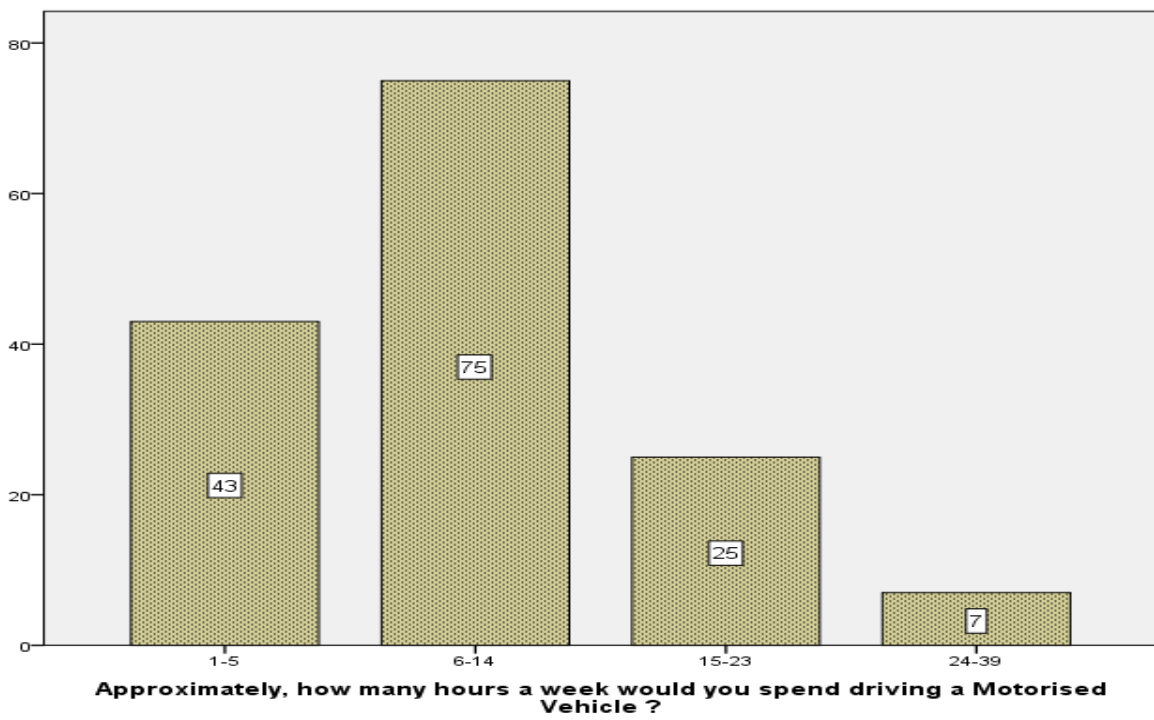


Figure 2. How many hours a week spent driving a motorised vehicle.

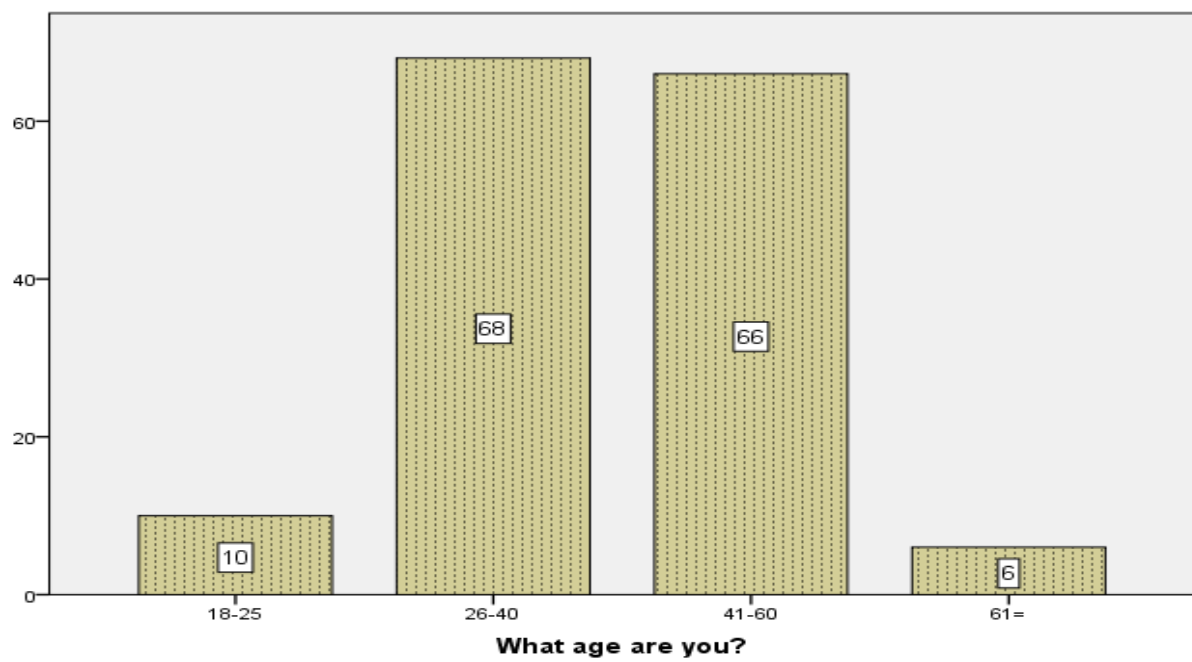


Figure 3. Age of participants.

### *Inferential Statistics*

In hypotheses 1, a multiple regression was used to test whether problematic mobile phone use, impulsivity and divided attention were predictors of driver distraction. The results of the regression indicated that the three predictors explained 26% of the variance ( $R^2 = .256$ ,  $F(3, 137) = 17.09$ ,  $p < .001$ ). It was found that problematic mobile phone use significantly predicted driver distraction ( $\beta = -.5$ ,  $p < .001$ , 95% CI =  $-.35$  -  $-.19$ ), as did divided attention ( $\beta = .21$ ,  $p = .005$ , 95% CI  $.06$  -  $.34$ ), although impulsivity did not reach the significant cut off point of  $.05$  ( $\beta = -.13$ ,  $p = .081$ , 95% CI  $-.95$  -  $.6$ ). Results on survey performance revealed a concerning measure on the reliability measures of the BIS Brief 8 Impulsivity scale in comparison to its counterparts as shown in table 1.

Table 2. *Multiple Regression analysis on Problematic mobile phone use, Impulsivity and Divided attention on Driver Distraction.*

<b>Variables</b>	<b>Driver Distraction</b>	<b>Problematic Phone Use</b>	<b>Divided Attention</b>	<b>Impulsivity Brief</b>
<b>Driver distraction</b>	1.000	-.457	-.060	.177
<b>Problematic phone</b>	-.457	1.000	-.168	.83
<b>Divided Attention</b>	-.060	-.168	1.000	-.064
<b>Impulsivity Brief</b>	.177	.83	-.064	1.000

This led to testing the remaining variables separately to determine individual validity. In hypotheses 2, Using simple regression, it was found that problematic mobile phone use predicted driver distraction ( $F(1, 144) = 40.04$ ,  $p < .001$ ,  $R^2 = .21$ ). (Problematic phone use,  $\beta = -.47$ ,  $p < .001$ , CI (95%)  $-.337$  ->  $-.176$ ). In hypothesis 3, Using simple regression, it was found that Divided Attention did not predict Driver Distraction ( $F(1, 143) = 3.62$ ,  $p =$

.059,  $R^2 = .018$ ). However it come close to meeting the significance range of .05. Therefore accepting the null hypothesis . (Divided Attention,  $\beta = .16$ ,  $p = .059$ , CI (95%)  $-.006 < .309$ ).

In Hypotheses 4, an independent t-test revealed Females ( $N = 77$ ), (mean = 47.60, SD = 6.42) were measured against males ( $N = 72$ ), (mean = 45.63, SD = 9.09) on levels of driver distraction. The 95% confidence limits show that zero is present and lies between -4.54 and .59 so the difference of the variables are not assumed. An independent samples t-test found that there was no significant difference between males and females on levels of driver distraction ( $t(126.52) = -1.52$ ,  $p = 1.31$ ). Therefore accepting the null hypothesis. A similar t-test was applied to develop a gender comparison trend in the data. Females ( $N = 77$ ), (mean 47.69, SD 14.07) were tested against males ( $N = 70$ ), (mean 47.86, 14.01) as to whether there was a difference in problematic mobile phone use. The 95% confidence limits show that zero is present and lies between -4.42 and 4.75 so accepting the null hypothesis. An independent samples t-test found that there was no significant difference between males and females and levels of problematic mobile phone use ( $t(145) = .07$ ,  $p = .942$ ). Therefore the null is present.

In Hypotheses 6, A one way analysis of variance showed driver distraction did not differ significantly between the 4 age groups  $F(3, 145) = 2.38$ ,  $p = .072$ ), although the result came very close to complying, the null hypothesis was accepted. Although the test of homogeneity of equal variances was not met, (.040). Tukey HSD post hoc analyses highlighted that the 61+ group reported more errors in Driver Distraction than the 18-25 cohort (Mean difference 10.67,  $p = .42$ , CI (95%) 2.6, 21.07) than in comparison to the similar scores of the 26-40 group (Mean difference, 7.08,  $p = .144$ , CI (95%) 1.55, 15.66) and the 41-60 group (Mean difference, 7.05,  $p = .48$ , CI (95%) 1.55, 15.65). Figure 4 below reveals a gradual trend highlighting driver distraction occurs more as you age.

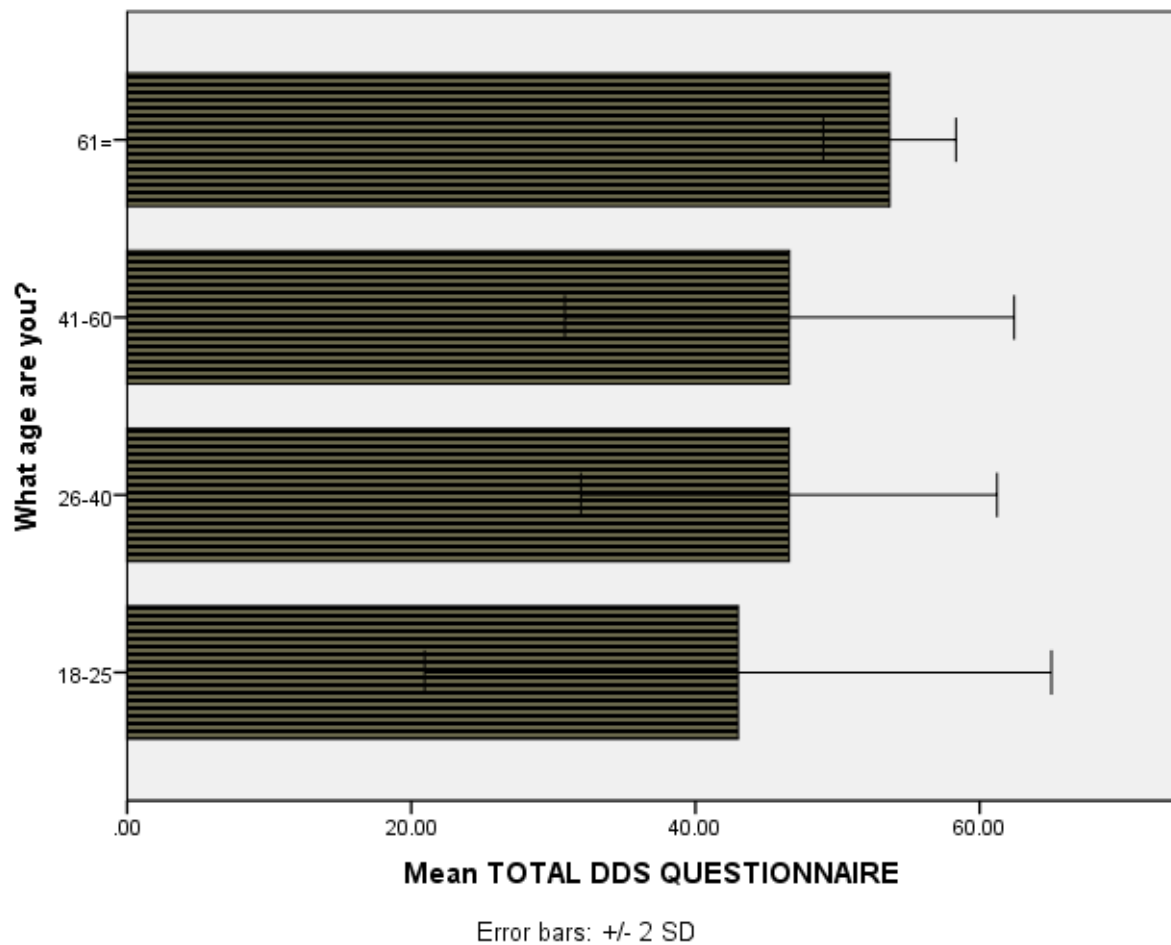


Figure 4. Driver distraction across age groups.

In hypotheses 7, A one way analysis of variance showed problematic mobile phone use differed significantly between the 4 age groups  $F(3, 143) = 6.22, p < .001$ ). More specifically, Tukey HSD post hoc analysis highlighted that the 18-25 age group exhibited significantly more problematic mobile phone use than the 61+ cohort (Mean difference = 18.22,  $p = .071$ , CI (95%) – 1.06, 37.51) and in comparison to the 26-40 age group (Mean difference = 2.44,  $p = .955$ , CI (95%) – 9.82, 14.71) and also, the 41-60 age group 10.64,  $p = .071$  CI (95%) -1.06, 37.51). Thus highlighting that younger age groups from 18-25s indicate significantly more problematic behaviour when using mobile phones.

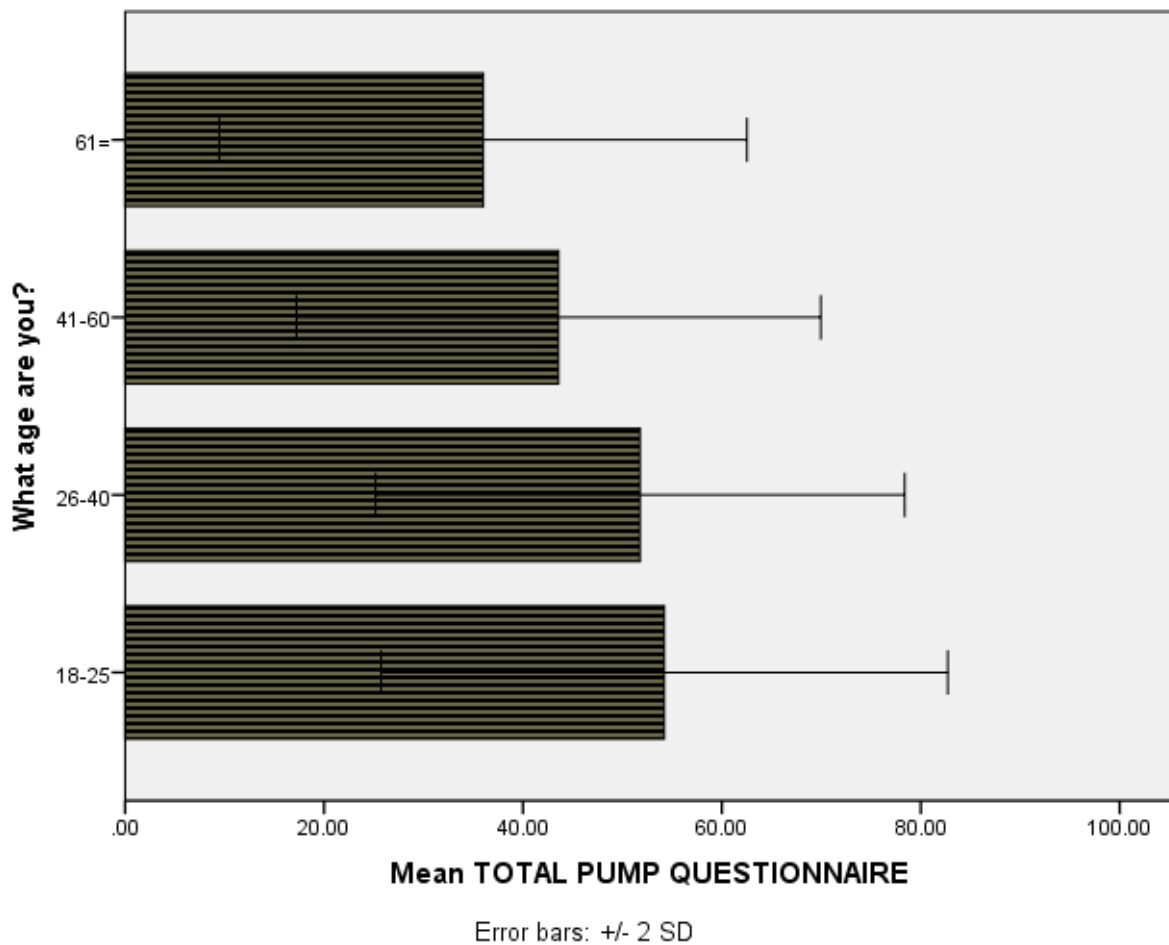


Figure 5. Problematic Phone Use Across Age Groups.

In Hypothesis 8, participants were asked if they drove a vehicle as part of their occupation and was there a difference with levels of driver distraction. Participants ( $N = 56$ ) who did work as part of their occupation (mean = 44.96,  $SD = 8.54$ ) indicated lower levels of driver distraction than those who did not drive ( $N = 93$ ) as part of their occupation (mean = 47.66,  $SD = 7.28$ ). The 95% confidence limits show that the population mean difference of the variables lie somewhere between -5.29 and -.09. An independent samples t-test found that there was a statistically significant difference between participants driver distraction levels in those who drove and those who did not drive as part of their work ( $t(147) = -2.05$ ,  $p = .043$ ). Therefore the null can be rejected.

## Discussion

The primary aim of this study was to develop an insight into the combined human behaviours of driving a vehicle while attending to a secondary task of interacting with a mobile phone. Results indicate contrasting evidence in relation to driver distraction and confirm competing variables develop negative outcomes. In support of validating this research and with relevance to our findings, Young and Regan (2007) states that driver distraction can be defined by a driver's attention being involuntarily or voluntarily, diverted away from a driving task by an event or object to the extent that a driver is no longer able to conduct the driving task adequately and safely.

Through a summary of 8 hypotheses, in (Hyp 1) Multiple regression analysis reported significant correlations between driver distraction (DD), Problematic Use of Mobile Phone (PUMP), Impulsivity (IMP) and Divided Attention (DA). Also, (Hyp 2) + (Hyp 3) through Linear regression tests indicated positive relationships between each of the associated variables of (Pump) and (DA) and the dependent variable of (DD). No significant difference were indicated in two t-tests between males and females in relation to the individual behaviours of (DD) and (Pump). Significant results were reported through a one way anova in relation to Age groups and (PUMP). Not so significant but very close to the .05 cut off point was reported through another one way anova test indicating differences with age groups and (DD). A final t-test reported significant differences in (DD) between the sample group in relation to whether an individual drives or does not drive as part of their occupation. Credible findings from the survey indicate justifiable support for a thorough analysis of the research hypotheses chosen, and highlight the strengths and weaknesses as potential indicators towards future studies.

To emphasise the focal point of the study and to highlight the mechanisms that are play, Young &Regan's (2007) state driving a vehicle is a complex task, requiring a concurrent execution of various cognitive, sensory, physical and psychomotor skills. Activities that compete for the driver's attention while operating vehicle can potentially degrade driving performance and can have serious consequences for road safety (Young & Regan, 2007). The cognitive, physical or visual demands that the non-driving task placed on the driver has a significant influence on the degree to which performance of the task will distract drivers. Similar evidence occurs in (Hyp1) by confirming a significant correlation of the multiple variables tested in relation to a causation toward driver distraction. One such issue is the escalation of problematic mobile phone use which warrants investigation for safety, moral and ethical purposes, especially when it impedes with driver distraction. Out of the three variables in (Hyp1), problematic phone use shows the strongest correlation toward driver distraction.

To further test this statement, confirmation of a direct relationship through regression analysis between (Pump) and (DD) is evident in (Hyp2). Billieux, 2012 suggests that despite its unambiguous advantages, the use of cellular phones have been extensively associated with harmful or potentially disturbing behaviours. While Choliz (2012) regards the mobile phones characteristics combined with the psychological processes involved in its use, gives an indication of the excitement it elicits and the abuse and dependence that come to encourage or provoke problematic mobile phone use.

Other competing behaviours such as divided attention (DA) is tested in (Hyp1) and results in a significant correlation with driver distraction. In concurring with this evidence, Mackensie & Harris (2017) states that the misallocation of a driver's visual attention has become a contributory factor in road accidents. Divided attention is also tested independently

with (DD) in (Hyp3) to confirm a direct relationship but it does not prove as significant. It comes a very close .059. Similar findings by Young and Regan (2007) suggests that drivers can become distracted by an activity or event, that they no longer allocate sufficient attention to the driving task rendering their driving performance being compromised. To further emphasise this evidence, Young and Regan (2007) state that driver distraction occurs when a drivers' normal cognitive processes (i.e., attention-sharing) and adaptive strategies fail in so far as they are no longer able to divide their attention between the driving and secondary tasks and maintain driving performance to a satisfactory level.

The remaining variable in (Hyp1) is impulsivity (IMP), and had no significant relationship to the previously discussed variables or the dependent variable of driver distraction. Although the survey chosen for this study was developed from the historical Barratt Impulsivity Scale (1995) BIs-11 30 item questionnaire and had a consistent reliability measure of .83, the revised version of the BIS Brief devised by Steinberg *et al* (2013), failed to provide a sufficient interpretation of scores. The Cronbach's alpha measure revealed a reliability score of .003 which amounted to series of negative results that became incorporated into the data analysis from the SPSS interpretations. So this was a major setback in relation to the construct of the study. It would be regarded as a potential problem and a weakness in the study as the behaviour of impulsivity is a multi-faceted construct and infiltrates many personality traits (Billieux et al, 2010). According to Moeller, Barratt, Dougherty, Schmitz and Schwann (2011), as cited in Milla (2013) impulsivity is regarded as a predisposition toward rapid unplanned reactions to external and internal stimuli and shows disregard for negative the consequences of these reactions to the impulse individual or to others. The same can be said about driver distraction. Modern society's conscious mind seems to be in a constant tug of war state when the combination of the dual behaviours involved in driving and behaviours involving mobile phone use.

Despite the setback of the impulsivity measure, support and relevance to the findings in relation to the overall performance of the study, the application of the three outstanding measures of the Driver Distraction survey by Bergmark et al (2013), revealed a consistent reliability value of .92. The Problematic use of Mobile Phone Scale devised by Merlo (2013) recorded a reliability value of .89 and the Divided Attention questionnaire by Salthouse and Siedlecki (2005) returned a reliability performance value of .84. All the measures applied recorded significant findings contrary to implications involved in having a single weaker measure.

To further clarify the distinctions and conflicts that arise between dual task behaviours, similar to that being tested in our hypotheses and to gain a better insight into the mechanisms of attention and workload, Moray (1979) as cited in Wickens et al (2002) elaborates by claiming “mental workload describes the relation between the quantitative demand for resources imposed by a task and the ability to supply those resources by the operator” (Wickens2002) p.161. These hypotheses can be copper fastened by the theoretical predictions of Wickens (2002) Multiple Resource Model, which reiterates that the 4 dimensional model posits there will be greater interferences occurring between two tasks so much so they share stages , sensory modalities, codes and channels of visual, sensory and auditory information. This theory primarily focuses on and predicts performance breakdown in high workload circumstances (Wickens 2002). And in doing so, if a task is demanding more resources, it will interfere and impede with the concurrent task. This theoretical construct correlates and concurs with the attention sharing deficits that is occurring between hypotheses 1, 2 &3 in the presented study. To further validate the multiple resource theory in relation to the fractured anomalies that occur as a result of driving while using a mobile phone it states that, if two tasks, performed concurrently will inevitably compete for similar

perceptual, cognitive or motor resources so it is then dual-task interference occurs. Wickens (2002) concurs that because driving is basically a visual-spatial-manual task and according to the (MRT), tasks that have visual inputs and require a manual response will cause greater dual- task interference resulting in impairment in driver performance.

In (Hyp4) and (Hyp5), both gender based hypotheses revealed no indication of a difference in behaviour across the spectrum of (DD) and (PUMP)so there was nothing significant to report.

In (HYP6) and (Hyp7), significant findings were recorded between the four age groups indicating driver distraction more occurs as one ages, and problematic phone use occurs more in the younger age group. To elaborate on the findings of the younger age group, Billieux (2008) clarifies by stating that younger adults are more likely to use mobile phones in an exaggerated manner, which can be extenuated toward the area of behavioural addiction. Additional clarification in a similar previous study by Billieux (2007) reveals problematic phone use is predicted by behaviours of high extraversion, which is a structural factor of impulsivity and extraverts naturally tend to be more outgoing and sociable in personality and are more likely to overuse their mobile phone. (In Hyp8), a significant result concurred that people who drove a vehicle as part of their occupation encountered less driver distraction than those who did no drive as part of their occupation.

### ***Strengths and weaknesses***

The strengths of the study revealed significant results and goes some way to understanding the behaviours that are at play in managing one's self –control and contrasting behaviours that expose bilateral methods of dual task management. Previous studies tend to concentrate on a singular behaviour that can lead to driver distraction whereas the present

study has highlighted numerous behaviours that are at play which ultimately result in having to divide attention when committing dual task activities, similar to that of driving a vehicle while interacting with a mobile phone. It is as a result of this the study can suggest future research scrutinise the contrasting variables by further delving into the multi-faceted methods of human behaviour.

A number of recommendations are suggested in relation to the weaknesses that occurred during the study. Although the sample variables between genders resulted in an even cohort to test, age groups were quite unevenly balanced. Recruitment was primarily targeted at people who interacted with social networks, the general public was not taken into consideration. Although a number of hypotheses were tested and incorporated into the study, some of them had no significance or relevance to the overall study. The demographic questions could have been better designed to have more impact on the overall validity of the study. The performance of the Impulsivity Scale rendered some of the Hypotheses wanting. In conclusion more emphasis on the construct and test retest mechanisms should have been validated prior to submitting the online survey.

### ***Conclusion.***

When evaluating the four variables incorporated in this study, a contrast of pairings and behavioural outcomes arise and each pairing seems responsible for their reactions. Driver distraction and problematic mobile phone use occur as a result of intrusive automatic internal and external forces, while divided attention and impulsivity seem to be responsible for instigating behavioural action that results in a negative outcome. Research is racing to compete with society's over-reliance on hand - held technology. It requires a parallel approach toward addressing the problematic issues that have evolved from the dependent

relationship humans have developed with their mobile phones and the unhealthy outcomes that ensue as a result. Everyday tasks like driving a vehicle can create a conflicting dichotomy of negative distractions and interference with the task at hand. It is imperative that continuous research extrapolates behavioural trends which may be addressed in order to eradicate the toxic combination of mobile phone use while driving a vehicle. It may be suggested that for future research, emphasis should be directed toward the area of automated unconscious responses in a bid to eliminating problematic behaviours in particular mobile phone usage while driving. To reiterate the findings of the present study, significant results indicate correlations in driver distraction as a result of divided attention and problematic mobile phone use. Contributions to the escalating trend of reveal contrasting behaviours that are at play require continuous investigations which are necessary toward finding an intervention.

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## APPENDICES

### APPENDIX 1

My name is Larry Morris. I am a fourth year student at Dublin Business School and I am compiling research on Driver Distraction and Mobile Phone Use as part of my thesis, and toward acquiring a BA Honours Degree in Psychology. I am inviting you to participate in this study by completing the survey below. By taking part, which is completely anonymous and voluntary, requires you to fill out the following questionnaire. If the content of the questions arouse negative feelings, information is provided on the last page of the survey regarding contact information for support services etc. Every effort is made to avoid this scenario. The questions have been tried and tested in previous studies.

Any information compiled from this online survey will be based on the overall scores and not individual scores; therefore it will not be possible to withdraw from the questionnaire after submission. The information will remain confidential and will be stored securely offline for a period of 1 year.

If you require additional information, don't hesitate to contact me at [@mydbs.ie](mailto:mydbs.ie)

My supervisor may be contacted to verify any queries by email at [@dbs.ie](mailto:dbs.ie)

Participants must be over 18 years of age and have a driving licence.

Participants must also own or use a Mobile/Smartphone device.

Many thanks for your time; your contribution will be gratefully received.

1. I consent to participate in this study, I am over 18 years of age and I possess a driving license.

Yes

No

2. Gender

Male

Female

Other

3. What age are you?

- 18-25  
 26-40  
 41-60  
 61+

4. Do you own a Mobile/ Smartphone?

- Yes  
 No

5. Do you drive a Motorised Vehicle as part of your Occupation ?

- Yes  
 No

6. Approximately, how many hours a week would you spend driving a Motorised Vehicle ?

- 1-5  
 6-14  
 15-23  
 24-39  
 39 +

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**This section refers to the levels of Mobile Phone usage, our tolerance levels, how much time we spend on phones etc. . . . This five point scale gives an indication as to whether you agree or disagree with the related statements.**

7. When I decrease the amount of time spent using my cell phone I feel less satisfied.

- Strongly Disagree  
 Slightly Disagree  
 Agree  
 Slightly Agree  
 Strongly Agree

8. I need more time using my cell phone to feel satisfied than I used to need.

- |   |                                      |
|---|--------------------------------------|
| <input type="radio"/> Strongly Disagree | <input type="radio"/> Slightly Agree |
| <input type="radio"/> Slightly Disagree | <input type="radio"/> Strongly Agree |
| <input type="radio"/> Agree             |                                      |

9. When I stop using my cell phone, I get moody and irritable.

- |   |                                      |
|---|--------------------------------------|
| <input type="radio"/> Strongly Disagree | <input type="radio"/> Slightly Agree |
| <input type="radio"/> Slightly Disagree | <input type="radio"/> Strongly Agree |
| <input type="radio"/> Agree             |                                      |

10. It would be very difficult, emotionally, to give up my cell phone.

- |   |                                      |
|---|--------------------------------------|
| <input type="radio"/> Strongly Disagree | <input type="radio"/> Slightly Agree |
| <input type="radio"/> Slightly Disagree | <input type="radio"/> Strongly Agree |
| <input type="radio"/> Agree             |                                      |

11. The amount of time I spend using my cell phone keeps me from doing other important work.

- |   |                                      |
|---|--------------------------------------|
| <input type="radio"/> Strongly Disagree | <input type="radio"/> Slightly Agree |
| <input type="radio"/> Slightly Disagree | <input type="radio"/> Strongly Agree |
| <input type="radio"/> Agree             |                                      |

12. I have thought in the past that it is not normal to spend as much time using a cell phone as I do.

- |   |                                      |
|---|--------------------------------------|
| <input type="radio"/> Strongly Disagree | <input type="radio"/> Slightly Agree |
| <input type="radio"/> Slightly Disagree | <input type="radio"/> Strongly Agree |
| <input type="radio"/> Agree             |                                      |

13. I think I might be spending too much time using my cell phone.

- |   |                                      |
|---|--------------------------------------|
| <input type="radio"/> Strongly Disagree | <input type="radio"/> Slightly Agree |
| <input type="radio"/> Slightly Disagree | <input type="radio"/> Strongly Agree |
| <input type="radio"/> Agree             |                                      |

14. People tell me I spend too much time using my cell phone.

- |   |                                      |
|---|--------------------------------------|
| <input type="radio"/> Strongly Disagree | <input type="radio"/> Slightly Agree |
| <input type="radio"/> Slightly Disagree | <input type="radio"/> Strongly Agree |
| <input type="radio"/> Agree             |                                      |

15. When I am not using my cell phone, I am thinking about using it or planning the next time I can use it.

- |   |                                      |
|---|--------------------------------------|
| <input type="radio"/> Strongly Disagree | <input type="radio"/> Slightly Agree |
| <input type="radio"/> Slightly Disagree | <input type="radio"/> Strongly Agree |
| <input type="radio"/> Agree             |                                      |

16. I feel anxious if I have not received a call or message in some time.

- |   |                                      |
|---|--------------------------------------|
| <input type="radio"/> Strongly Disagree | <input type="radio"/> Slightly Agree |
| <input type="radio"/> Slightly Disagree | <input type="radio"/> Strongly Agree |
| <input type="radio"/> Agree             |                                      |

17. I have ignored the people I'm with in order to use my cell phone.

- |   |                                      |
|---|--------------------------------------|
| <input type="radio"/> Strongly Disagree | <input type="radio"/> Slightly Agree |
| <input type="radio"/> Slightly Disagree | <input type="radio"/> Strongly Agree |
| <input type="radio"/> Agree             |                                      |

18. I have used my cell phone when I knew I should be doing work.

- |   |                                      |
|---|--------------------------------------|
| <input type="radio"/> Strongly Disagree | <input type="radio"/> Slightly Agree |
| <input type="radio"/> Slightly Disagree | <input type="radio"/> Strongly Agree |
| <input type="radio"/> Agree             |                                      |

---

19. I have used my cell phone when I knew I should be sleeping.

- |   |                                      |
|---|--------------------------------------|
| <input type="radio"/> Strongly Disagree | <input type="radio"/> Slightly Agree |
| <input type="radio"/> Slightly Disagree | <input type="radio"/> Strongly Agree |
| <input type="radio"/> Agree             |                                      |

20. When I stop using my cell phone because it is interfering with my life, I usually return to it.

- |   |                                      |
|---|--------------------------------------|
| <input type="radio"/> Strongly Disagree | <input type="radio"/> Slightly Agree |
| <input type="radio"/> Slightly Disagree | <input type="radio"/> Strongly Agree |
| <input type="radio"/> Agree             |                                      |

21. I have gotten into trouble at work because of my cell phone use.

- |   |                                      |
|---|--------------------------------------|
| <input type="radio"/> Strongly Disagree | <input type="radio"/> Slightly Agree |
| <input type="radio"/> Slightly Disagree | <input type="radio"/> Strongly Agree |
| <input type="radio"/> Agree             |                                      |

22. At times, I find myself using my cell phone instead of spending time with people who are important to me and want to spend time with me.

- |   |                                      |
|---|--------------------------------------|
| <input type="radio"/> Strongly Disagree | <input type="radio"/> Slightly Agree |
| <input type="radio"/> Slightly Disagree | <input type="radio"/> Strongly Agree |
| <input type="radio"/> Agree             |                                      |

23. I have used my cell phone when I knew it was dangerous to do so.

- |   |                                      |
|---|--------------------------------------|
| <input type="radio"/> Strongly Disagree | <input type="radio"/> Slightly Agree |
| <input type="radio"/> Slightly Disagree | <input type="radio"/> Strongly Agree |
| <input type="radio"/> Agree             |                                      |

24. I have almost caused an accident because of my cell phone use.

- |   |                                      |
|---|--------------------------------------|
| <input type="radio"/> Strongly Disagree | <input type="radio"/> Slightly Agree |
| <input type="radio"/> Slightly Disagree | <input type="radio"/> Strongly Agree |
| <input type="radio"/> Agree             |                                      |

25. My cell phone use has caused me problems in a relationship.

- |   |                                      |
|---|--------------------------------------|
| <input type="radio"/> Strongly Disagree | <input type="radio"/> Slightly Agree |
| <input type="radio"/> Slightly Disagree | <input type="radio"/> Strongly Agree |
| <input type="radio"/> Agree             |                                      |

26. I have continued to use my cell phone even when someone asked me to stop.

- |   |                                      |
|---|--------------------------------------|
| <input type="radio"/> Strongly Disagree | <input type="radio"/> Slightly Agree |
| <input type="radio"/> Slightly Disagree | <input type="radio"/> Strongly Agree |
| <input type="radio"/> Agree             |                                      |

**The next section relates to Driving and how distraction can affect concentration. It primarily asks questions relating to the task of Driving and conducting another behaviour/task at the same time. The answers range from five choices and suggestions for answers alternate with each question.**

27. Do you think that you can safely text and drive?

- |  |                              |
|--|------------------------------|
| <input type="radio"/> Always           | <input type="radio"/> Rarely |
| <input type="radio"/> Most of the time | <input type="radio"/> Never  |
| <input type="radio"/> Some of the time |                              |

28. In the last 30 days, have you READ text messages while driving?

- |   |                              |
|---|------------------------------|
| <input type="radio"/> Every time I drive        | <input type="radio"/> Rarely |
| <input type="radio"/> Most of the times I drive | <input type="radio"/> Never  |
| <input type="radio"/> Some of the times I drive |                              |

29. In the last 30 days, WHEN have you READ text messages?

- |  |  |
|--|--|
| <input type="radio"/> While driving at any speed                 | <input type="radio"/> While stopped at a red light |
| <input type="radio"/> While driving at low speeds (under 25 mph) | <input type="radio"/> None of the above            |
| <input type="radio"/> While in stop-and-go traffic               |  |

30. In the last 30 days, have you READ Email while driving?

- |   |                              |
|---|------------------------------|
| <input type="radio"/> Every time I drive        | <input type="radio"/> Rarely |
| <input type="radio"/> Most of the times I drive | <input type="radio"/> Never  |
| <input type="radio"/> Some of the times I drive |                              |

31. In the last 30 days, WHEN have you READ Email?

- |  |  |
|--|--|
| <input type="radio"/> While driving at any speed                 | <input type="radio"/> While stopped at a red light |
| <input type="radio"/> While driving at low speeds (Under 25 mph) | <input type="radio"/> None of the above            |
| <input type="radio"/> While in stop-and-go traffic               |  |

32. In the last 30 days, have you viewed maps or directions on your phone while driving?

- Every time I drive  Rarely  
 Most of the time I drive  Never  
 Some of the time I drive

33. In the last 30 days, have you WRITTEN text messages while driving?

- Every time I drive  Rarely  
 Most of the time I drive  Never  
 Some of the time I drive

34. In the last 30 days, WHEN have you written text messages while driving?

- While driving at any speed  While stopped at a red light  
 While driving at low speeds (Under 25 mph)  None of the above  
 While in stop-and-go traffic

35. In the last 30 days, have you WRITTEN Email while driving?

- Every time I drive  Rarely  
 Most of the time I drive  Never  
 Some of the time I drive

36. In the last 30 days, WHEN have you written Email while driving?

- While driving at any speed  While stopped at a red light  
 While driving at low speeds (Under 25 mph)  None of the above  
 While in stop-and-go traffic

37. In the last 30 days, have you read messages or viewed information on social media apps or sites while driving? (e.g. Facebook, Twitter, Snapchat, etc.)

- Every time I drive  Rarely  
 Most of the time I drive  Never  
 Some of the time I drive

**The next section looks at our impulsive nature and how often we act on the spur of the moment. Answers to questions range from 1-4 to predict how quick or how slow we respond to a stimulus, a suggestion or an event.**

38. I plan task carefully.

- Rarely / Never
- Occasionally
- Often
- Almost always / Always

39. I do things without thinking.

- Rarely / Never
- Occasionally
- Often
- Almost always / Always

40. I don't "pay attention"

- Rarely / Never
- Occasionally
- Often
- Almost always / Always

41. I am self-controlled.

- Rarely / Never
- Occasionally
- Often
- Almost always / Always

42. I concentrate easily.

- Rarely / Never
- Occasionally
- Often
- Almost always / Always

---

43. I am a careful thinker.

- Rarely / Never
- Occasionally
- Often
- Almost always / Always

44. I say things without thinking.

- Rarely / Never
- Occasionally
- Often
- Almost always / Always

45. I act on the spur of the moment.

- Rarely / Never
- Occasionally
- Often
- Almost always / Always

**The last section asks how we divide our attention when either dual tasking or multitasking in relation to performance. Here we measure the difficulty level when performing multiple behaviours and these range from 1-5**

46. Driving while talking with someone

- |                                 |                                 |
|---------------------------------|---------------------------------|
| <input type="radio"/> Very easy | <input type="radio"/> Hard      |
| <input type="radio"/> Easy      | <input type="radio"/> Very hard |
| <input type="radio"/> Medium    |                                 |

47. Driving while reading road signs to exit from a highway

- |                                 |                                 |
|---------------------------------|---------------------------------|
| <input type="radio"/> Very easy | <input type="radio"/> Hard      |
| <input type="radio"/> Easy      | <input type="radio"/> Very hard |
| <input type="radio"/> Medium    |                                 |

48. Driving while listening to music on the radio

- |                                 |                                 |
|---------------------------------|---------------------------------|
| <input type="radio"/> Very easy | <input type="radio"/> Hard      |
| <input type="radio"/> Easy      | <input type="radio"/> Very hard |
| <input type="radio"/> Medium    |                                 |

49. Driving while planning a schedule or a shopping list

- |                                 |                                 |
|---------------------------------|---------------------------------|
| <input type="radio"/> Very easy | <input type="radio"/> Hard      |
| <input type="radio"/> Easy      | <input type="radio"/> Very hard |
| <input type="radio"/> Medium    |                                 |

50. Watching TV while reading a book or newspaper

- |                                 |                                 |
|---------------------------------|---------------------------------|
| <input type="radio"/> Very easy | <input type="radio"/> Hard      |
| <input type="radio"/> Easy      | <input type="radio"/> Very hard |
| <input type="radio"/> Medium    |                                 |

51. Talking with someone while a television show is on in the room

- |                                 |                                 |
|---------------------------------|---------------------------------|
| <input type="radio"/> Very easy | <input type="radio"/> Hard      |
| <input type="radio"/> Easy      | <input type="radio"/> Very hard |
| <input type="radio"/> Medium    |                                 |

52. Talking while playing games

- |                                 |                                 |
|---------------------------------|---------------------------------|
| <input type="radio"/> Very easy | <input type="radio"/> Hard      |
| <input type="radio"/> Easy      | <input type="radio"/> Very hard |
| <input type="radio"/> Medium    |                                 |

53. Talking to someone in the midst of a crowd of people talking

- |                                 |                                 |
|---------------------------------|---------------------------------|
| <input type="radio"/> Very easy | <input type="radio"/> Hard      |
| <input type="radio"/> Easy      | <input type="radio"/> Very hard |
| <input type="radio"/> Medium    |                                 |

54. Talking to someone while preparing a meal or doing chores

- |                                 |                                 |
|---------------------------------|---------------------------------|
| <input type="radio"/> Very easy | <input type="radio"/> Hard      |
| <input type="radio"/> Easy      | <input type="radio"/> Very hard |
| <input type="radio"/> Medium    |                                 |

55. Walking while having a conversation with someone

- |                                 |                                 |
|---------------------------------|---------------------------------|
| <input type="radio"/> Very easy | <input type="radio"/> Hard      |
| <input type="radio"/> Easy      | <input type="radio"/> Very hard |
| <input type="radio"/> Medium    |                                 |

56. Talking on the phone while checking a calendar or appointments

- |                                 |                                 |
|---------------------------------|---------------------------------|
| <input type="radio"/> Very easy | <input type="radio"/> Hard      |
| <input type="radio"/> Easy      | <input type="radio"/> Very hard |
| <input type="radio"/> Medium    |                                 |

57. Talking on the phone while someone in the room is talking to you

- |                                 |                                 |
|---------------------------------|---------------------------------|
| <input type="radio"/> Very easy | <input type="radio"/> Hard      |
| <input type="radio"/> Easy      | <input type="radio"/> Very hard |
| <input type="radio"/> Medium    |                                 |

58. Listening to someone talk while planning your reply

- |                                 |                                 |
|---------------------------------|---------------------------------|
| <input type="radio"/> Very easy | <input type="radio"/> Hard      |
| <input type="radio"/> Easy      | <input type="radio"/> Very hard |
| <input type="radio"/> Medium    |                                 |

59. Trying to remember a person's name while you are being introduced

- |                                 |                                 |
|---------------------------------|---------------------------------|
| <input type="radio"/> Very easy | <input type="radio"/> Hard      |
| <input type="radio"/> Easy      | <input type="radio"/> Very hard |
| <input type="radio"/> Medium    |                                 |

