

**Prepared to crash? A Preliminary Study on Traffic Accidents Caused by Risky Driver
Behaviors Captured on Livestream Social Media**

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2022

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A dissertation submitted to Auckland University of Technology in partial fulfilment of the requirements for the degree of Bachelor of Health Science (Honours) Psychology.

Abstract

Road traffic incidents result in 1.3 million deaths a year (World Health Organization, 2022). Typically, an understanding of factors contributing to accidents is derived from external evidential factors such as witnesses, skid marks, and closed-circuit television (CCTV) footage. However, new technologies are now capturing driving behaviours inside a vehicle as they occur. The present study attempts to shed light on traffic accidents, utilising livestream video footage to conduct Ecological Momentary Assessments of these real-time driver behaviours. In an Archival study, data was collected from the online domain (i.e., electronic news sources, web-based video networking sites, social networking sites), carefully screening potential videos for inclusion and then coded into relevant categories. Fisher's Exact Tests were then used to explore relationships between different variables (i.e., phone manipulation, driver injury, driving manoeuvres and behaviours). Although statistical power was low, trends were observed indicating potential relationships between phone use and poor driving manoeuvres, namely interference from talking was impairing lane overtaking or lane turning. Specific cases were then examined, revealing that these traffic incidents involved intoxication, speeding for personal thrills, driver distraction, and mobile phone use. This study offers insight into the capabilities of the proposed roadside cameras that are currently being implemented to capture driver distraction.

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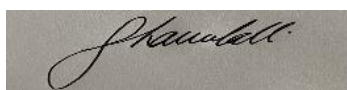
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Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of another degree or diploma of a university or other institution of higher learning.

A rectangular box containing a handwritten signature in cursive script, which appears to read "J. Howell".

25th November 2022

Acknowledgements

I would like to thank my supervisor James Phillips for his continuous guidance throughout my dissertation. I am grateful for his efficient responses and his belief in my work during the times I did not have any.

I would also like to thank my dad Kashmira who took care of me through every illness, sickness, and hospitalization this year and my aunty Noa who always supports and encourages me to continue my studies.

Lastly, I would like to express my deepest gratitude to Le Va for awarding me the 2022 Futures that Work Pacific Mental Health and Addiction Scholarship.

Fa'afetai tele lava.

ਵਾਹਿਗੁਰੂ ਜੀ ਕਾ ਖਾਲਸਾ, ਵਾਹਿਗੁਰੂ ਜੀ ਕੀ ਫਤਿਹ

Chapter One: Introduction

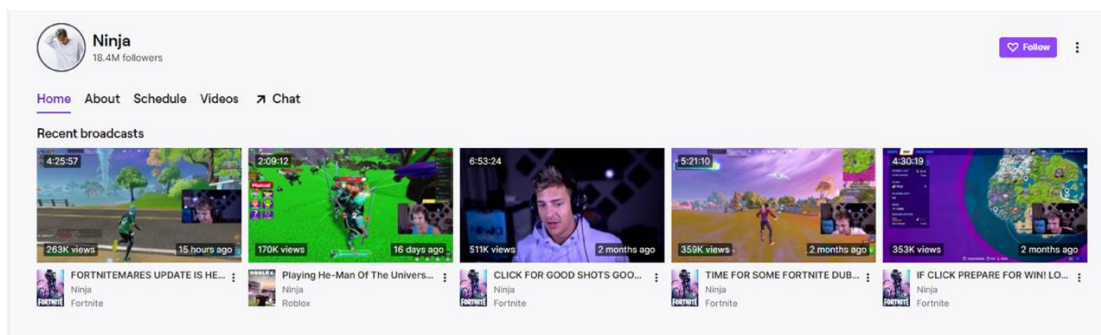
Social Livestreaming Services

The eighth most common cause of mortality worldwide is *traffic accidents* (World Health Organization, 2022). Hitherto, drivers, passengers, witnesses, and closed-circuit television (CCTV) were sources of information about road traffic accidents. However, given emerging telecommunications capabilities and Ecological Momentary Assessments there is a new method that allows relevant data to be collected ‘on site’ in ‘real time.’ In the last decade, social livestreaming services (SLSS) have emerged as a new social media element that provides users with the opportunity to broadcast and engage in a combination of social networking elements (Schiebe et al., 2016). The ready accessibility of these online services and individual use allows anyone with access to the Internet to livestream anything and everything, from snippets of everyday mundane tasks to lifetime achievements. This now means that a mobile phone can perform a similar function to a ‘black box’ flight recorder of an airplane. The pairing of driving and such ‘black box’ capability has opened a new gateway of research that considers the trend of SLSS with video evidence on driver behaviour. Researchers must be informed about the prevailing trends on social networks to better understand the behaviours associated with risky driving and to inform transportation agencies about how to mitigate traffic injuries. Due to the widespread use of cameras (e.g., www.autocar.co.nz/auckland-the-trial-city-for-cameras-to-catch-motorists-using-their-phone-while-driving), analytics on video feeds are crucial in the application of traffic planning and research, and further allow counseling psychologists and trauma specialists to understand contexts surrounding traffic accidents. The present study aims to provide a lens into driver behaviour through real-life video footage captured on SLSS.

Every year, approximately 1.35 million deaths around the world are due to road traffic crashes, with approximately 20 to 50 million people suffering from nonfatal injuries (World Health Organization, 2022). For children aged 5 to 20, fatal road accidents are the leading cause of death. Several factors have been identified as contributing components that affect the likelihood of traffic injuries, including inappropriate speeding, drinking under the influence, and the lack of motorcycle helmets, child restraints, and seatbelts (Pede, 2004). Distraction caused by mobile phone use has become of growing concern as drivers are approximately four times more likely to be involved in a vehicle accident when using a mobile phone (World Health Organization, 2022). The mobile phone is of interest, because it both distracts the driver, and documents attention that has been diverted from driving (Phillips et al., 2008). The camera feature of a mobile phone is of relevance to the present thesis as mobile phones have the potential to capture driver behaviour when an accident occurs, which could further be used as evidence by accident investigators.

Figure 1

Popular Twitch Streamer Tyler 'Ninja' Blevins with 18.4 Million Followers



Note. Ninja is reported to be one of the top streamers for the year 2022¹.

Watch me live, a common phrase used to engage interest and interactions from viewers, subscribers, and fans worldwide. The intimacy created between a live streamer, their viewers, and the livestreaming platform initiates a new realm of research that focuses on the primal desire of individuals within society to share their lives with the rest of the world (Contractor & DeChurch, 2014). The distinction of SLSS is the synchronous activities allowing for real time interactions between a streamer, the livestream, and their viewers (Zimmer, 2018). In the era of technology development, SLSS have been developed and designed with maximum scalability allowing for effective transcoding techniques to minimize broadcasting delay between a streamer and their viewers (Rodrigues-Gil et al., 2017). This ease of accessibility due to advances in Internet bandwidth allows the sharing of content to occur within seconds on mobile devices. Twitch is one of the leading social media platforms purchased by Amazon in 2014 with approximately 1.85% of internet traffic accounted for by Twitch gaming (Bründl & Hess, 2016). An example on the extent of its use is captured in Figure 1 which shows the popular Twitch streamer 'Ninja' with a current subscriber count reaching up to 18 million. It is important to recognize that livestreams are not restricted to large channels and subscriber counts, and one does not need high-quality technology to participate but rather a simple mobile phone that activates a livestream at the click of a button.

Death by Selfies

Social media use can be fueled by selfishness, recognition, and popularity (Franck, 2019). The term 'selfie' describing a person who takes a photograph of themselves or in a group with the intention of posting it on social media has become a phenomenon and was named word of the year in 2013 (British Broadcasting Corporation, 2013). Selfies are often portrayed as a form of self-expression (Diefenbach & Christoforakos, 2017). However, there are increasing reports in the news media of injuries and deaths associated with selfies. Selfies have been added to the list of risky activities associated with social networks. Examples of social media risks were highlighted in 2014 following the

¹ Retrieved in August 2022, from <https://www.twitch.tv/ninja>

death of a Lebanese man who was found dead after being killed in a car bomb moments after posing for a selfie (Jamjoom, 2014). In another instance, popular influencer Sophia Cheung, as shown in Figure 2, was known for her risky photos, some of which included her hanging from the edge of a cliff (Singh, 2021). Sophia died after falling into a 16-foot-deep pool while attempting to take a photo at the edge of a waterfall in Hong Kong. Indeed, a recent review indicated that **more than 255 deaths have been associated with selfies since 2014 indicating that these are not just trivial narcissistic acts of self-enhancement** (Weller et al., 2021).

Figure 2

Sophia Cheung Hanging from a Cliff, Posted to Her Instagram²



Figure 3

Travel Couple Kody Workman and Kelly Castille Post Unsafe Photos to Their Instagram³



² Retrieved in August 2022, from <https://www.instagram.com/hike.sofi/?hl=en>

³ Retrieved in August 2022, from <https://www.instagram.com/positravelty/?hl=en>

Instagram states that copyright protection does not last forever, and content eventually becomes part of the “public domain.” In particular, for fair use for not-for-profit educational purposes, retrieved from <https://help.instagram.com/126382350847838>.

How much is the virtual approval and acclaim of a media-driven century worth risking our lives for? Social comparison theory plays an integral role in this understanding, suggesting that people have innate tendencies to compare themselves with others (Festinger, 1954). As a consequence of social comparison, individuals derive benefits such as a self-evaluation, emotional control, psychological wellbeing, and ambitions to develop new abilities (Wood, 1989). These forms of social comparison have now featured in the phenomenon of Facebook Envy (Tandoc et al., 2015). There are two forms of social comparison: upward social comparison and downward social comparison. In upward social comparisons, people tend to compare themselves to others who they believe are better than themselves. This can decrease self-esteem and induce dissatisfaction (Meier & Johnson, 2022). Sometimes people identify with those they compare themselves to and seek to be more like them (Meier & Johnson, 2022). Conversely, downward social comparison occurs when an individual compares themselves to those who are less fortunate than they are, and such comparisons frequently result in a more favorable self-evaluation and improved mood (Verduyn, 2020).

Nevertheless, users who spend more time on social networking sites are more likely to agree that other people have “greater lives” and are more “satisfied” than themselves. This is not surprising given that the narcissistic and idealistic material supplies on social networking sites have seemingly raised standards and norms for comparison norms (Chou & Edge, 2012). However, it is questionable how hanging on the edge of a cliff with a partner, as shown in Figure 4, will actually equate to life satisfaction. Social media has proven to have great effects on the psychological wellbeing of its users (Kraut et al., 2002), and many researchers have argued the negative impacts that could arise from being a passive participant on the internet (Macrynika & Miranda, 2019). Furthermore, one could argue whether a strong sense of self is required to utilize social media accounts. The current study aims to take a step forward - away from photos and focus on video footage that has incorporated real life occurrences as they happened.

Social Media, Attention, and Self-Esteem

Giraldo-Luque et al. (2020) conceptualized and summarized four mechanisms of social media and their impact on the human attention: 1) notifications, 2) messages and posts, 3) fear of missing out (FoMO), and 4) likes and rewards. Electronic *notifications* are viewed as distractions to a primary task that causes issues of self-control, as they compete for scarce attention resources causing anxiety and hypervigilance (Iqbal & Horvitz, 2010; Raz, 2004; Shapiro et al., 1999). Second, the structural design of social media platforms is said to encourage user addiction considering its ability to facilitate social connections, especially through *messages and posts* (Gerlitz & Helmond, 2013). Third, *fear of missing out (FoMO)* refers to users of social media being preoccupied with missed opportunities when they are offline or unable to interact and contact with people (Gioia et al., 2021). Individuals who experience higher levels of FoMO tend to be more preoccupied with checking their social media (Albari, 2022).

Lastly, users of social media notice when other people enjoy their content by the *likes and rewards* received. Most people believe they receive ‘enough likes’ for their material, however, are more likely to believe that likes matter and to feel bad if they had not earned enough likes (Scissors et al., 2016). Therefore, social media is a method of eliciting and documenting approval, and thereby enhancing self-esteem. Indeed, in some cases this approval can be unwarranted (Hall, 2014).

Streamer Motivations

To better understand the concept of livestreaming, it is important to identify the motives behind user-generated content (UGC). UGC is characterized as online content that is made available to the public, shows some degree of creativity, and is produced outside of conventional working procedures (Bahtar & Muda, 2016). Providing an enjoyable and entertaining media experience via streaming is also a crucial component. It is assumed that people use digital and mobile devices to watch recorded movies and/or live broadcasts to satisfy their emotional and practical needs (Falgoust, 2002). The creation of UGC is spread through online mediums and has a great influence on social media user’s consumption (Bahtar & Muda, 2016). Prior to the development of the internet and social media, content that was published via newspapers and magazines required the completion of several processes before being sent to the print for publishing (Wilding et al., 2018). The impact of such barriers affected the economy, society, and the individual. Contrastingly, the development of a new kind of technology allowed for such barriers to be eliminated as social media has become an alternative source of unfiltered news (Wilding et al., 2018). The power behind social media allows for users to generate content that reflects, expresses, and expands current movements as they appear in a negative or positive light.

The creation of content is challenging and requires the understanding of social media values. The importance of UGC allows for the spread of information at a vast and rapid rate. An analysis of popular livestreaming site Twitch (Shen & Kairam, 2020) found that livestreaming emphasized common ground in encouraging self-disclosure and dialogue, while regular low-stake engagements allowed relationships to develop over time. This now means that social media users, including streamers, are no longer dependent on media companies to produce and deliver content, as the consumer now controls their own entertainment choices (Wilding et al., 2018). The accessibility of social networking systems for both content creators and consumers means that anyone can create and stream content that is enjoyed by both parties (Bahtar & Muda, 2016). The ability to express different ideas, beliefs, thoughts, creations, and hobbies continues to expand. Livestreaming platforms such as Twitch and YouTube have created browsing categories based on a user’s preference that range from any generic channel such as “just chatting” to more specific related channels such as game-specific channels.

User gratification theory (UGT) (Kalz & Blumer, 1974) is used to understand such online behaviours. According to UGT, people actively participate in media consumption, choosing which

media to use to satisfy certain needs, such as information demands, social contact, and enjoyment (Katz et al., 1973). Prior studies have looked at the motivational elements that affect the contribution of UGC in different types of on-demand content communities. The contribution of content to SLSS has not yet been quantitatively studied, making this a relatively new phenomenon. The belief is that motivational elements can vary from those discovered in other forms of online communities due to the distinctions between on demand and live content (Bründl & Hess, 2016). The UGT is fundamental in maintaining the idea that social media use is goal-directed. It is inevitable that human beings have needs that require satisfaction and in the context of media, the assumption is that individuals will seek media and content that satisfies those needs (Falgoust et al., 2022).

Friedlander (2017) conducted a study on information production behaviour that emphasizes UGC and streamer motivations for three different SLSS (YouNow, Periscope and Ustream). The study concluded that the motives of streamers include reaching a specific group (United States), boredom (Germany), socialization (Japan) and fun rather than means of becoming a celebrity or being the center of attention. Arguably, it is questionable whether attention seeking behaviors from live streamers should be dismissed. A YouTube channel by the name of Truthfully Trisha became known for her daily livestreams of her entire life and her love for entertaining people (Flinders, 2017). The content reported on her livestreams displayed behaviors of vicious bullying, slandering, and defamation of strangers that she had never met. In cases like Trisha, it is arguable that UGC is motivated by the need for connection and creativity and instead reinstates the notion of creating an internet persona for the means of gaining attention (Lasch, 1991).

Additionally, platforms such as Facebook contribute to the number of interactions between followers of user-generated content by measuring algorithms and analytics. The algorithm that Facebook employs to decide which articles should appear on a user's newsfeed is known as EdgeRank (Morgan, 2018). The EdgeRank calculates a score using the $\sum_{edges\ e} \mathbf{u}_e \mathbf{w}_e \mathbf{d}_e$ formula. In this equation, \mathbf{u}_e represents the compatibility affinity between the viewer and the edge developer, \mathbf{w}_e represent the weight for the type of edge, such as tagging, liking, and commenting, and finally \mathbf{d}_e represents the decay rate of time according to when the edge was formed (Widman, 2018). The relationship between a viewer and the item's creator is how the affinity score is calculated. If there is a tighter constraint between the two, then the affinity score is higher (Wyroll, 2014). When communications are exchanged, or a viewer often accesses the creator's Facebook profile, the restrictions are tightened. EdgeRank is based on user relationships, how other users respond to the entry, and the most recent entry. Therefore, it could be determined that UGC continues to be published when content creators are aware of both the algorithm and the analytics of their specific channels. Therefore, the motivations of UGC for streamers are based

on social media algorithms and the ability to engage with viewers and followers to generate the best revenue.

Social Presence

When using social media applications, viewers' perceptions of their social presence, their perception of how connected and engaged they seem to be with other people, are measured (Voorveld et al., 2018). Originally used to evaluate how social context influences media choice, social presence is described as the extent to which the other person is emphasized in the engagement and the importance of interpersonal relationships (Short et al., 1976). The level of social engagement and the authenticity of the online environment are indicated by social presence, which is often used to demonstrate emotional and cognitive behaviours (Voorveld et al., 2018). According to the social presence theory (Short et al., 1976), different media have varying capacities for transmitting both verbal and visual cues (e.g., facial expressions, physical distance, posture, etc.), which affect how well they can convey the psychological perception of others being physically present (Calefato & Lanubile, 2010). Live broadcasting creates the experience and the feeling of social presence. It frequently results from interactions and communication between viewers, streamers, or other watchers, as well as from other factors such as emotion, a live community vibe, and interaction (Chen & Liao, 2022).

Further investigation into the social presence hypothesis (Short et al., 1976) has revealed that there are three qualities to the theory: coexistence, psychological connection, and behavioural involvement. **Coexistence** is defined as being aware of another person's presence and responding accordingly (Loring, 2016). The application in online communities is to recognize the presence of the community interactions because, in practice, users frequently coexist inside perceived communities or groupings (Chen & Liao, 2022). The **psychological connection** develops through emotional communication that creates relationships. Virtual communities allow consumers to form relationships and unite with others online who share common interests and goals within that community (Chou & Sawang, 2015). Whereas **behavioural** engagement primarily refers to user contact and communication that describes the degree to which an individual perceives their actions to be interdependent, connected, or responsive to others (Cui et al., 2012). Emotional expression, honest communication, and group cohesion are viewed as essential factors in an online community (Chou & Sawang, 2015).

The application of social presence theory can be applied to livestreaming as people can virtually attend events through different social networking platforms (Mueser & Vlachos, 2018). With the use of one or more forms of communication technology, livestreaming achieves the immediate transmission of sights and sounds from one place to another, giving viewers the impression that they are in attendance (Chen & Lin, 2018). Social presence can be improved by providing livestreaming and goes beyond the anonymity in conventional e-commerce and social commerce transactions where the service providers'

identities were typically not known or displayed (Wongkitrungrueng & Assarut, 2020). Such reductions in faceless anonymity can be important as trust and reputation influence online transactions (Jøsang et al., 2007) and computer-mediated communication can modify trust. Lack of trust, especially in vulnerable online settings, restricts the sharing of information openly and increases opportunities of exploitation, and therefore transactions must be closely monitored (Mitchell, 1997). Bos et al. (2002) studied the development of trust in four different contexts: text chat, audio, video, and face-to-face. Results found that the three richer communication media were all vastly superior to text chat. Groups who used audiovisual conferencing performed almost as well as those that were in person, but both did exhibit some signs of delayed trust (delayed progress towards full collaboration) and unstable trust (susceptibility to opportunistic actions). Hence the importance of live feeds as a method of enhancing trust during advertising and marketing. Live feeds may have an important role promoting brands in social media. These transactions drive and underpin the business models of social media. Although the most influential form of social media is potentially live feeds; however, this can be a problem when the live feed distracts a broadcaster from their going responsibilities.

Multitasking While Driving

Distracted driving increases the opportunities for vehicle collisions (Sajid Hasan et al., 2022). There are countless research studies that investigate a range of distracting behaviours and their associated risks while driving (Sajid Hasan et al., 2022). Driving is considered to be the primary task, and anything identified as a non-driving related task are labeled as secondary tasks (Ortega, 2021). Secondary tasks include, but are not limited to, listening to music, talking to passengers, smoking a cigarette, and interacting with information systems inside the vehicle (Ortega, 2021). In fact, when drivers do not comply with the minimum standards necessary for the traffic situation, accidents on the road occur (Yamada et al., 2008). Distractions can lead to drivers taking their eyes off the road, diverting their attention from driving to other duties, and have lacking situational awareness (McEvoy, 2006). As a result of such distractions, the driver has less spare attentional capacity and reduced capabilities to respond to unexpected incidents.

Distractions can be minimal and have no impact on a driver's attention or driving performance however a distraction can also be sufficiently severe enough to prevent the driver from giving the task of driving the required attention - resulting in poorer driving performances (Young et al., 2007). Each cognitive process, such as decision making, daydreaming, mind wandering, solving of mathematical problems, the use of internal car information systems, including phone use, radio system, and navigation, are contributing factors that affect the driver's attention during the driving process (Almahasneh et al., 2014). Clearly, full, and focused attention while operating any motor vehicle is crucial in ensuring safety for the driver, passengers, and other road users. The term 'attention' refers to a dynamic cognitive state characterized by a preference for processing specific internal or external

stimuli (Brouwer, 2002, pp.223-248). Selectivity, intensity, and its dynamic nature are all significant characteristics of attention (Ghosh & Maunsell, 2022). The dynamic nature of attention is influenced by a variety of factors, including automatic processes that are activated by stimuli and the environment, passing conscious intentions and ideas, and ingrained emotional and motivational tendencies (Van Zomeren & Brouwer, 1994).

While research and literature reviews contend that multitasking while driving increases opportunities for vehicle incidents (Schumann et al., 2022), one could question whether there is a possibility of task demands not requiring perceptual or cognitive resources full time. Driving resources predominantly require visual and auditory perception; however, some research has found that in some cases only one resource may be required (e.g., driving on a quiet road would mainly require motor control and visual perception) (Wang et al., 2020). In some cases, it is acceptable to look away from the road for a short period of time (Nijboer et al., 2016). To accomplish balanced execution of all goals, cognition interweaves the process of many task goals on one core resource, prioritizing the least recent processed goal (Nijboer et al., 2016) (sometimes called threaded cognition). Two tasks are said to overlap when they both require the same cognitive or perceptual resource at the same time. Conflict over those resources is the result of overlap in the usage of resources by tasks carried out concurrently (Nijboer et al., 2016). Previous studies have been more inclined to attribute most vehicle accidents to visual distraction behaviour (Shaaban, 2020). As an example, the average amount of ‘eyes off the road’ reported at 33.1% and 59.5% respectively when a driver answered and dialed on a hand-held call (Flanagan et al., 2019; Fitch et al., 2015).

Driving and Mobile Phone Use

The concept of safe driving should be deeply embedded in society. ‘Vision Zero’ is a long-term objective that seeks to eliminate death and injury caused by vehicle incidents (Rosencrantz et al., 2007). The concept has been applied worldwide as a safety principle to road transportation systems to comply with the demands to meet requirements that have emerged from the objective (Karin Edvardsson Björnberg et al., 2022). The shift to a technology-based world has emphasized the consequences of using mobile phones while driving. In 2018, The World Health Organization reported 1.35 million deaths from traffic accidents. Statistics showed that approximately 80%-90% of the accidents were caused by errors, misbehaviours, fatigue, distraction, and inattention caused by operational driver errors (Ortega, 2021). Drivers who are on the phone while driving are four times more likely to be in an accident compared to those who are not on their phone (World Health Organization, 2022). The signs and statistics are there, yet incidents involving mobile phone use remain prominent every day.

Current research has found that the use of mobile phones while driving often includes the acts of answering calls, making calls reading messages, texting, and sending messages (Shi et al., 2016). Furthermore, when drivers were asked in a study to rank the order of activities that they thought were

the least dangerous to the most, the consensus suggested that answering phone calls was the least dangerous activity while texting and sending messages were the most dangerous (Lansdown, 2012). Some studies have found that in some instances where a driver is either switching or competing for task demands to help maintain a safe level of driving, following distance is increased while vehicle speed is reduced (Dingus et al., 2016). To compensate for the effects of using a mobile phone while driving, hands-free phone methods are employed, allowing drivers to activate or deactivate functions (answering phone calls, playing music) through a wireless or built-in feature (Ortega et al., 2021). Furthermore, to aid this ubiquitous behaviour, many countries have legalised hands-free mobile phone use while driving, however, research has shown that in terms of handheld phone use, there are no extra safety benefits that mitigate risks of a vehicle incident (Dingus et al., 2016).

The reasons as to why drivers use mobile phones while driving often do not require scientific research, as the activity itself is well known to the average driver. However, what is important is the education that both drivers and passengers should be aware about in relation to knowing how the brain functions when performing high risk and dual tasks. The capacity of human mental resources that can be used to analyze received information (i.e., mental burden) is limited, and the use of mobile phones claims additional cognitive resources (Chihara et al., 2020). According to reports, 95% of information is gathered and processed by vision, making driving a task that is largely dependent on vision and involves a high visual workload (Lee et al., 2013). The duration of visually functioning secondary tasks should not exceed 15 seconds, according to the '15-second rule', as doing so will increase the likelihood of a crash (Green, 1999). However, one could argue that 15 seconds of visual resources off the road and onto the contents contained on a mobile phone increase hazards and the potential for vehicle incidents. Klauer et al. (2006) further concluded that 15 seconds away from the road is significantly increases risks, while other researchers have suggested that even 2 seconds away from the road increases the likelihood of crashing or having a near crash (Zwahlen et al., 1988).

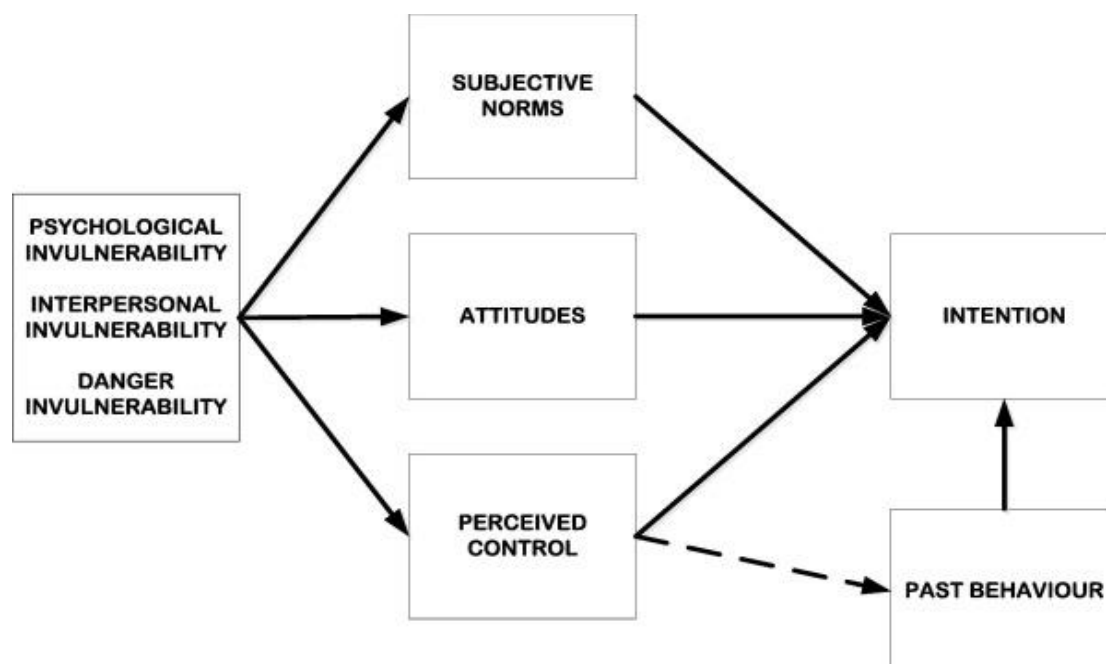
This has promoted nations all over the world to prioritize improvements in road safety, invest significantly in reducing injury profiles from traffic accidents, and create safer road traffic systems (World Health Organization, 2022). Examples of these efforts include improving vehicle safety, driver care, road infrastructure, traffic rules and regulations, and awareness campaigns. To this end, in 2020, the Netherlands introduced a new-generation camera that captured photos of drivers who were detected and determined by a system to have been holding a mobile phone (Carson et al., 2022). The photos of the driver were then forwarded to the relevant agency, who would then impose the required violation. Similarly, *Waka Kotahi (New Zealand Transport Agency) launched a six-month safety camera trial in 2022 to detect unsafe mobile phone use*. The trial collected data from three different locations within Auckland detecting drivers who were only steering with one hand, occupied with a mobile phone, and whether occupants were wearing a seatbelt.

Driving Under the Influence

Alcohol abuse causes 3 million deaths worldwide each year, accounting for 5.3% of all deaths (World Health Organization, 2022). Another 27% of all road injuries are caused by driving under the influence of alcohol (DUI) (World Health Organization, 2022). The dangers of drink driving have been well documented, and even though drink driving has been illegal for the past 20 years, drivers continue to drink drive, endangering road safety, and increasing medical costs (Chan et al., 2017). It can be challenging to anticipate a person's decisions, particularly when they entail unsafe driving behaviours that could have unfavorable consequences. Although drivers are aware of the dangers of intoxicated driving, it has been noted that the danger of DUI does not discourage them from engaging in risky behaviour (Chan et al., 2017). The Theory of Planned Behaviour (TPB) (Ajzen, 1991) contends that some motivating elements, such as attitudes towards a behaviour, subjective norms (i.e., one's perception of injunctive and descriptive norms in each community), and perceived behavioural control, influence one's desire to engage in a behaviour. According to TPB, as demonstrated in Figure 4, there are three influencing factors: (a) the attitude of the person towards the act (positive or negative); (b) normative beliefs or the impact of the social environment (family, friends, peers, etc.) on decision making; and (c) perceived behavioural control which refers to perceptions of control over an individual's behaviour while performing the act.

Figure 4

Components of The Theory of Planned Behaviour⁴



⁴ Image adapted from Potard et al. (2018) study driving under the influence of alcohol and perceived invulnerability among young adults: an extension of the theory of planned behavior. Retrieved in September 2022, from <https://www.sciencedirect.com/science/article/pii/S1369847816303138>.

According to TPB, an individual who positively assesses drinking and driving exhibits a larger inclination to partake in it (Ajzen, 1991). A person's overall assessment of driving while intoxicated, which includes a subjective assessment of how favorable or unfavorable, enjoyable or unpleasant, safe or hazardous, and convenient or inconvenient it is for them to drive, has been defined as attitude in this context (Ajzen, 1991). Research has repeatedly shown that favorable attitudes influences intentions to engage in dangerous driving as well as previous habits of driving while intoxicated (Ajzen & Madden, 1986). When an individual has full volitional control over a behaviour, they can freely choose whether to engage in it (Ajzen & Madden, 1986). Perceived control, however, offers crucial information and improves the model's prediction ability for activities like drinking and driving, which are not entirely within a person's volitional control due to both internal and external influences (Parker et al., 1992).

In essence, the idea holds that knowing a person's intentions regarding drinking and driving is necessary to forecast a behaviour like driving after drinking. Three key informational components must be measured to identify this: the persons opinion of drinking/driving, the persons perception of societal pressure to drink/drive, and the persons confidence in their ability to control such activities (Parker et al., 1992). Behavioural attitudes on drinking and driving are based on an individual's assessment of the results of this behaviour and subjective judgements of the likelihood that the results will occur (Ajzen, 1991). TPB asserts that a person is less inclined to drink and drive if they anticipate a bad consequence from the behaviour, feel that others should not approve of the action, and feel capable of avoiding a drinking/driving predicament (Ajzen, 1991).

Table 1
Details of driver injuries and reasons for vehicle incidents

ID	Driver Outcome	Reason for Crash	Report
Kenneth Hofler	Minor Injuries	Loss of control while speeding	abcnews.go.com/US/driver-livestreams-high-speed-crash-connecticut/story?id=68028413
Nikol Barbasova	Severe Injuries	Loss of control while speeding	dailymail.co.uk/news/article-4681698/Woman-inadvertently-films-death-Facebook-Live.html
Mia Marie	Fatality	Drinking, speeding, and loss of control	dailymail.co.uk/news/article-4588740/Couple-livestreamed-car-crash-death-Periscope.html
Tahmid	Minor Injuries	Loss of control while speeding	newsweek.com/tiktok-video-dangerous-driving-crash-fire-car-vehicle-1693235
Obdulia Sanchez	Minor Injuries	Drinking, and loss of control	latimes.com/local/lanow/la-me-ln-california-livestream-fatal-car-crash-20170725-story.html
Bryan Kirby	Minor Injuries	Loss of control while speeding	youtube.com/watch?v=Nw7TOk8IJOA
Gustavo Ray Hernan	Severe Injuries	Speeding	nypost.com/2022/06/23/texas-teens-live-streamed-joyride-in-stolen-audi-before-fatal-car-crash/
Onasi Olio Rojas	Severe Injuries	Speeding and loss of control	turnto10.com/news/local/driver-who-live-streamed-high-speed-joyride-crashes-again
Rina Angko	Minor Injuries	Poor turning	hype.my/video-woman-was-live-streaming-on-fb-before-she-tragically-died-in-a-road-accident/
Jazmine Cheave	No Injuries	Distracted driving	aceshowbiz.com/news/view/00149716.html
Sofia Magerko	Fatality	Drinking, speeding, and loss of control	thesun.co.uk/news/3923103/beauty-queen-live-stream-death-instagram-ukraine/
Siro Retonong	Minor Injuries	Drinking and loss of control	mvariety.com/siro-retonong/image_d94796fc-e6bc-11ec-850e-eb8446384a4c.html
Camilo Morejon	Minor Injuries	Drinking and speeding	abc13.com/camilo-morejon-fugitive-dui-crash-suspect-flees-on-the-run-fairview-drive/11127610/
Brooke Hughes	Fatality	Distracted driving	teenvogue.com/story/pennsylvania-teens-killed-car-crash-facebook-live
Dela Vega	Fatality	Drinking, speeding, and loss of control	kwch.com/2021/11/25/live-video-captures-moments-leading-up-deadly-crash-nw-kansas/
Unknown	Unknown	Loss of control and distraction	news18.com/news/auto/video-facebook-live-results-in-fatal-accident-1506681.html
Sitora Baratova	Fatality	Distracted driving	thesun.co.uk/news/3170815/woman-live-streams-own-death-hit-bus-driving-work/
Unknown	No Injuries	Distracted driving	newzandar.com/lady-gets-into-car-crash-but-she-continues-like-nothing-happened-video/
Peter Kalau	Fatality	Distracted driving and poor overtaking	dailymail.co.uk/news/article-5767693/Nine-passengers-minibus-driver-killed-head-crash-livestream
Unknown	No Injuries	Distracted driving	youtube.com/watch?v=n8Qd-4vq7Tc
Dallas Witherspoon	No Injuries	Distracted driving	youtube.com/watch?v=ZlWWSu2ymKU
Sabrina Vyntage	Minor Injuries	Rear ended crash	youtube.com/watch?v=BP0JtAUEVsc

The Present Study

Transportation systems in the modern era play an essential role in human civilization and, if improperly handled, could also be the most dangerous (Ashraf et al., 2019). Excessive horn blowing, dangerous and unpredictable lane changing, exceeding the speed limit, and disobeying traffic control devices (stop signs, traffic signals, and railway cross signals) are some examples of aggressive driving (Miles & Johnson, 2003). Approaches to road safety have created a new paradigm envisioning the reduction of injuries and deaths on roads across developing countries (Safarpour et al., 2020). The focus of many research papers are the consequences of vehicle accidents that in turn initiate public concern to mitigate such problems, however, much is yet to be researched on the contributing factors to these behaviours. While it is important to cover the fundamental underpinnings of contributing factors that lead to vehicle incidents it is even more important to understand why these behaviours from drivers and passengers come to be, and the effect of social livestreaming services. Given the very real emerging potential for New Zealand Transport to monitor driver behaviour, it is important to understand factors contributing to accidents. *As a livestreaming mobile phone potentially serves a similar function as an aircraft black box*, it has the potential to identify the nature of any attentional distraction and provide details of peripheral factors such as direction of gaze and the involvement of effectors. Therefore, the present study aims to examine media reports and online videos of vehicle accidents that were recorded on any social media livestreaming platform. The interest of this study lies in the relationships between driving behaviours, driver distractions, and driving abilities.

Hypothesis

H.1 It is expected that the manipulation of mobile phones during livestreaming will impair vehicle control (i.e., poor lane holding), and poor decision making (i.e., poor turning and overtaking).

H.2 Driver distraction (e.g., responding to an audience) will increase the severity of an accident.

Chapter Two: Methods and Procedures

Using Archival methods (Shaughnessy et al., 2006, ch.6), the present study examined online media reports, in an online analysis of vehicle incidents captured on livestream social media platforms. Vehicle incidents were defined as aggressive or reckless driving behaviours by an individual who engages in a series of traffic violations that tend to risk or threaten other people or property. The sample of 22 incidents was collected over a three-month period using repeated searches on the Internet. To ensure that cases were not duplicated, cross-checks were conducted on the of name, age, sex, and country for each case. Search terms such as ‘livestream’, ‘death’, ‘car crash’, ‘vehicle’ and ‘incident’ were used in various combinations. Table 1 lists all 22 cases included in this study. Since livestream crash reports and videos were available online and names associated with the incident (driver or passenger) were already identified and in the public record. The list includes public media from 2016 to 2022. Fourteen cases (63.6%) of vehicle incidents occurred in the United States of America and one case (4.50%) were from each of the following countries: Czech Republic, Finland, England, Malaysia, Ukraine, India, Russia, and Hungary.

Livestream

Social livestreams allow users to stream their own content in real time on the internet using cameras or mobile devices (Scheibe et al., 2016). As the primary interest of the current study was to explore livestreams *that drivers/passengers captured within vehicle cabins that contributed to accidents*, content that was explicitly captured when the driver and/or passenger were broadcasting live on any social media platform was included. The social networks most used to livestream were Facebook (50.00%) followed by Instagram (27.30%), Periscope (4.50%), TikTok (4.50%), and three were unknown (13.60%). To ensure that videos used met the criteria for inclusion the following exclusions applied:

- 1) Videos that did not specifically capture footage of the traffic incident were excluded. A video was excluded if recorded footage only covered the period **prior** to the accident or **subsequent** to the accident.
- 2) Videos that did **not** involve a livestream. Some videos (e.g., Snapchat) were recorded and then uploaded to social media eliminating interactivity and remote audience possibilities.
- 3) Reports and videos solely capturing footage of vehicle incidents on **CCTV** were excluded.
- 4) **Dashcams** were excluded from this study as cameras of these sort are not driver distracting. Dashcams are mounted inside a vehicle and continuously record a driving environment, however, they are not broadcasted live on a social media website (Vafaei-Zadeh et al., 2021) and do not afford audience participation.
- 5) **Road safety campaigns** across the globe have produced awareness and prevention videos that mimic livestream road accidents; to ensure that such videos were not included (e.g.,

The Association for Safe Driving Israel and the Drive Dry campaign in South Africa), further internet searches were conducted to confirm the origins of the videos.

- 6) Similarly, programs involving **simulated driving** were excluded from the study as external evidence confirmed that some video segments were being towed by production trucks to imitate driving (Schaffstall, 2020; The Late Late Show with James Corden, 2022).

Vehicle and Vehicle Incidents

Vehicles stated in accordance with the New Zealand Transport Agency (2022) class A (moped, motorcycles, passenger vehicles, and omnibus) and classes NB and NC (trucks, goods carrier, and tow trucks) deemed as legal on-road vehicles were included in this study. All-terrain vehicles (ATV) (quadbikes and amphibious vehicles) were excluded (e.g., Trent Jarrett ATV crash on TikTok) as their main designs are for off-road use (NZ Transport Agency, 2022). Accident severity is often measured based on injuries or fatalities that a driver and or passenger/s have succumbed to (George et al., 2017). The following study identified the impact of vehicle collision based on its physical damage and whether a vehicle had: no damage, damaged but still roadworthy, and unroadworthy or totalled vehicles. Codes were then generated as: Vehicle type – small or large car, rideshare, truck, bus, or motorbike; Impact of collision – minor, moderate, or severe.

In each of the 22 cases, the following variables were also coded: time of day, terrain, social media platform, age, and gender of the driver and/or passenger(s), driver and/or passenger(s) outcome, driver and/or passenger(s) under the influence, passenger livestreaming, and collision outcome. The following categories were also observed and coded: driver-passenger interactions (talking to front passenger, talking to back passenger), driver-phone interactions (use of front or back camera, holding phone, touching phone, use of more than one phone), driver-vehicle interactions (wearing seatbelt, reported speed, overtaking, crossing lanes, one handed vs two handed steering, interacting with object inside vehicle), and driver livestream interactions (reading comments, reading comments out loud, responding to live streamers, talking to livestream, livestreaming with another user). A total of fifteen cases were excluded from this study (e.g., were not livestreamed, involved CCTV or dashcams, were simulated or faked, did not meet criteria for vehicle type). Further information on the detailed coding and observation categories can be found in Appendix A.

Design and Analysis

Given that the study involves an analysis of categorical data and low sample sizes with cells less than 5, the Fisher's Exact Test is appropriate for analysis. The current study used the Fisher's Exact Test (Fisher, 1934), on the IBM SPSS software to undergo statistical analysis on the data. In contrast to the chi-square test (Pearson, 1900), which employs an approximation, Fisher's Exact Test is one of the exact tests. Fisher's Exact Test is used because using the approximation approach is insufficient, especially when more than 20% of the cells have predicted frequencies <5 . The hypergeometric distribution of the numbers in the table's cells is used in the Fisher's Exact Test and calculates exact probabilities for a given set of scores. The present thesis used a one-sided hypothesis for significance testing, considering whether phone manipulation and talking to livestream viewers affected driving capabilities and driver injury outcome. The SPSS statistical package automatically presents results in 2x2 contingency tables, therefore, the results for the present study are also presented in 2x2 contingency tables.

Chapter Three: Results

Phone Manipulation

As the use of mobile phones while driving is illegal in most jurisdictions, phone manipulation was examined. In the current analysis, phone manipulation was determined in instances where the driver was seen physically touching their phone but was not seen physically holding their phone in one or both hands. Two Fisher's Exact Tests were conducted to predict whether driver phone manipulation from a driver touching their phone could predict the outcome variables of driving performance. Driving performance was categorised in two different variables: 1) poor lane crossing or loss of control; and 2) appropriate or inappropriate lane turning or lane overtaking.

Table 2

Contingency Table for Cases of Phone Manipulation as Predictor Variable and Lane Holding or Loss of Control as Dependant Variable

	Control		No Control	
	n	%	n	%
Touching phone	1	50.00%	1	50.00%
Not touching phone	10	66.67%	5	33.33%
Total	11	64.71%	6	35.29%

Note. This table represents the fixed value and percentages of cases in each of the corresponding variables.

Primary outcome results for Table 2 indicated non-significant ($p=0.59$, Fisher's Exact Test, one tailed) interactions between poorly controlled driving or lane crossing in cases where there was phone manipulation (1/2), compared to cases of poor lane crossing or loss of vehicle control in cases where there was no phone manipulation (5/15).

Table 3

Contingency Table for Cases of Phone Manipulation as Predictor Variable and Lane Turning or Lane Overtaking as Dependant Variable

	Appropriately		Inappropriately	
	n	%	n	%
Touching phone	0	0.00%	2	100%
Not touching phone	5	33.33%	10	66.67%
Total	5	29.41%	12	70.59%

Note. This table represents the fixed value and percentages of cases in each of the corresponding variables.

Table 3 shows no relationship between phone manipulation and inappropriate lane turning or overtaking ($p=0.48$, Fisher's Exact Test, one tailed). Interestingly enough, there were no cases of appropriate lane turning or overtaking when a driver had phone manipulation, and a further two cases were reported to have inappropriate lane turning or lane overtaking when there was phone manipulation.

Talking to Livestream

Although the use of Bluetooth tends to be legal, driver interactions with a remote audience may still be distracting. Livestream variables included driver interactions with their viewers on any given livestream platform. Talking to viewers included cases where the driver was verbally heard speaking out loud including speaking out loud to themselves, speaking directly to their viewers, or answering viewers questions but did not include cases where the driver was interacting with other passengers in the vehicle. Furthermore, lane turning, and lane overtaking were measured for driver performance as appropriately (driver made safe judgement to either turn and/or overtake another vehicle safely) and inappropriately (driver made an incorrect judgement an unsafely turned and/or overtook another vehicle). Driver injury was also tested as the dependant variable. In cases where a driver was reported to have been injured, the measurement ranged from mild injuries to severe injuries.

Table 4

Contingency Table for Cases of Interference from Talking as Predictor Variable and Lane Holding or Loss of Control as Dependant Variable

	Control		No Control	
	n	%	n	%
Talking to viewers	7	70.00%	3	30.0%
Not talking to viewers	4	57.14%%	3	42.85%
Total	11	64.71%	6	35.29%

Note. This table represents the fixed value and percentages of cases in each of the corresponding variables.

Table 4 shows no significant relationship between talking to livestream viewers and poor lane holding or loss of control ($p=0.48$, Fisher's Exact Test, one tailed).

Table 5

Contingency Table for Cases of Interference from Talking as Predictor Variable and Lane Turning or Lane Overtaking as Dependant Variable

	Appropriately		Inappropriately	
	n	%	n	%
Talking to viewers	1	10.00%	9	90.00%
Not talking to viewers	4	57.14%	3	42.86%
Total	5	29.41%	12	70.59%

Note. This table represents the fixed value and percentages of cases in each of the corresponding variables.

However, there was a potential relationship between talking interference and lane turning or overtaking. The relationship approached significance ($p=.06$, Fisher's Exact Test, one tailed). Although the Fisher's Exact Test was non-significant, Table 5 indicated that nine out of 12 cases of inappropriate driver performance were from drivers who had interference from talking to their viewers on their broadcast.

Table 6

Contingency Table for Cases of Phone Manipulation as Predictor Variable and Driver Injury or No Driver Injury as Dependent Variable

	Injury		No Injury	
	n	%	n	%
Talking to viewers	1	50.00%	1	50.00%
Not talking to viewers	10	66.70%	5	33.30%
Total	11	64.71%	6	35.30%

Note. This table represents the fixed value and percentages of cases in each of the corresponding variables.

Table 6 indicated no significant link between phone manipulation and driver injury ($p=.59$, Fisher's Exact Test, one tailed).

Table 7

Contingency Table for Cases of Interference from Talking as Predictor Variable and Driver Injury or No Driver Injury as Dependent Variable

	Injury		No Injury	
	n	%	n	%
Talking to viewers	8	47.06%	3	17.65%
Not talking to viewers	3	17.65%	3	17.65%
Total	11	64.71%	6	35.30%

Note. This table represents the fixed value and percentages of cases in each of the corresponding variables.

Table 7 determined whether there was a significant association between interference from a driver talking with their broadcast viewers and driver injury. The results suggest a nonsignificant association between the two variables ($p= 0.33$, Fisher's Exact Test, one sided). The number of driver injury cases was highest in cases where a driver was interacting with their livestream compared to cases where a driver was not interacting with their viewers; however, a further nine cases were not attributable to driver injury from talking interference.

Drivers Under the Influence

Although the present study primarily considered the role of livestreaming, it is possible that these incidents were the result of intoxication. Hence, a potential role of intoxication was examined. In the current study, drivers under the influence were determined via video footage of the livestream or newspaper article reports. Livestream footage of drivers under the influence included drivers holding an alcoholic beverage in their hand and/or drinking an alcoholic beverage. This category included drinking before entering a vehicle, within the vehicle, while operating a vehicle, and after a vehicle incident. In cases where there was no video footage available of a driver consuming alcohol, news report articles provided confirmation that the driver was under the influence. The present study found that approximately 35.29% of cases involved a driver under the influence, and therefore were tested to determine potential relationship between lane holding and loss of control, lane turning or overtaking, and driver injury.

Table 8

Contingency Table for Cases Drivers Under the Influence as Predictor Variable and Lane Holding or Loss of Control as Dependent Variable

	Control		No Control	
	n	%	n	%
Drivers Under the Influence	5	83.33%	1	16.67%
Drivers not Under the Influence	8	57.14%	6	42.86%
Total	13	65.00%	7	35.00%

Note. This table represents the fixed value and percentages of cases in each of the corresponding variables.

Table 9

Contingency Table for Cases Drivers Under the Influence as Predictor Variable and Lane Turning or Lane Overtaking as Dependent Variable

	Appropriately		Inappropriately	
	n	%	n	%
Drivers Under the Influence	0	0.00%	6	100.00%
Drivers not Under the Influence	5	35.71%	9	64.29%
Total	5	25.00%	15	75.00%

Note. This table represents the fixed value and percentages of cases in each of the corresponding variables.

Table 8 found no significant associations between a driver under the influence and controlled lane holding or loss of control ($p=.27$, Fisher's Exact Test, one tailed). Results indicated that five drivers under the influence out of six cases were able to maintain controlled lane holding and did not lose control. Furthermore, results of the driving manoeuvres, as demonstrated in Table 9, did not determine a significant relationship between drivers under the influence and appropriate turning or overtaking of the lane ($p=.12$, Fisher's Exact Test, one tailed).

Table 10

Contingency Table for Cases Drivers Under the Influence as Predictor Variable Driver Injury or No Driver Injury as Dependent Variable

	Injury		No Injury	
	n	%	n	%
Drivers Under the Influence	4	57.14%	3	42.86%
Drivers not Under the Influence	8	57.14%	6	42.86%
Total	12	57.14%	9	42.86%

Note. This table represents the fixed value and percentages of cases in each of the corresponding variables.

Lastly, Table 10 did not determine any significance between drivers under the influence and driver injury ($p=.16$, Fisher's Exact Test, one sided). The current analysis determined that four out of seven cases of drivers under the influence resulted in a driver injury after a vehicle incident. Hence *these accidents could not be better explained by intoxication.*

Chapter Four: Discussion

The current study investigated associations between phone use and vehicle incidents. In the current realm of study, livestreaming and vehicle incidents are rare instances; however, the present study observed potential relationships between phone use and poor driving manoeuvres. A trend was observed indicating *possible relationships between talking interference and poor lane changing*. Given the observed trends, a power analysis was performed, and then individual cases were examined to illustrate key issues associated with livestreaming accidents while driving.

Fortunately, livestreaming while driving to the point where a reportable incident occurs is comparatively rare. The present study could only find 22 usable cases, but missing values effectively reduced the sample to 17. A power analysis indicates that 33 observations would be required to provide an 80% chance of rejecting H_0 at the .05 level of significance (Cohen, 1988). While the lack of significant relationships is disappointing, these cases are still sufficiently interesting as to warrant some individual consideration (Shaughnessy et al, 2006).

At the time of writing, there was no research or study that had investigated driver behaviours from the perspective of livestreamed videos. The core initiation of the current study was to utilise the important feature of the mobile phone that posed as a black box to account for driver behaviours moments *leading up to, during, and after* a vehicle incident. Unlike other forms of footage, livestreams not only provide crucial evidence that singlehandedly capture driver and passenger behaviours inside a vehicle but specifically conducts user authentication, and documents phone manipulation. Although results from the current study were just trends, the quality of data produced from watching the livestreams shows a significant number of relationships between driver behaviour, external influences, and driving capabilities, all captured on a single mobile phone. The following will discuss the findings of the current study which have been characterised into three different driver groups: drunk drivers, influencers, and speed drivers. In this study, *speed drivers* (i.e., Kenneth Hofler, Nicol Vorloviski, Tahmid, Abdulia Sanchez, Bryan Kirby, Gustavo Hernandez, and Onasi Rojas) were identified as drivers whose predominant reason for a vehicle incident was inappropriate driving speed that exceeded legal limits. *Drunk drivers* (i.e., Mia Marie, Sofia Magerko, Siro Retonong, Camilo Morejon, and Dela Vega) were identified as drivers who were under the influence of alcohol while operating a vehicle which resulted in a vehicle incident. Finally, *influencers* (i.e., Rina Angko, Jazmine Cheave, Brooke Hughes, Sitora Baratova, Peter Kalau, Dallas Witherspoon, and Sabrina Vyntage) were characterised as drivers whose vehicle incidents were apparently caused simply by distraction inside the vehicle cabin. In other words, of the 22 livestreamed incidents, there were seven in which there was no other explanation for the accident except driver distraction.

Drivers Under the Influence

In this study, six cases reported alcohol as a contributing factor to vehicle incidents. As previously discussed, consumption of alcohol impairs one's ability to process and comprehend information that exceeds the brain's capacity causing responses to be sluggish or erroneous (Fillmore, 2003; Fillmore & Van Selst, 2002). In New Zealand, the operation of a vehicle or heavy machinery is prohibited when alcohol limits have exceeded 50 milligrams per 100 millilitres of blood or 250 micrograms of alcohol per litre of breath (Transport Agency, 2022). These restrictions align with other countries; however, some countries such as the United Kingdom, Ukraine, and Malaysia have a higher limit of 80 milligrams (World Health Organization, 2018). The effects of driving under the influence are not an unknown phenomenon, and extensive research continues to explore responsible factors that contribute to this issue. The present study provides an unconventional lens into this research by examining accounts of vehicle incidents with alcohol as a contributing factor through real life experiences captured on a livestreaming platform.

However, the present data were not better explained by intoxication. As the results indicated, there were no statistically significant relationships (or trends) that suggested that lane control, lane departure decisions, and driver injuries were affected by drivers under the influence. The cases in the current study found that in many instances DUI often had a significant contribution to vehicle accidents; however, *intoxication was combined with distracted driving*. Alcohol intoxication and driver distractions are both well-known causes of vehicle accidents and are undoubtedly a simultaneous occurrence (Harrison, 2011). Alcohol use alone is believed to affect various aspects of driving, including selecting an adequate speed, frequency and timing of braking, steering, overtaking, and distance judging between other vehicles (Van Dyke & Fillmore, 2014). Phillips and Ogeil (2010) found that drivers under the influence appeared to be numb and insensitive to risks which impaired drivers' abilities to respond to driving tasks. Task demands exceed the available capacity, causing great difficulties in switching or dividing attention (Harvey et al., 2018). Previous research has focused on the two entities as sole considerations, however, in more recent years research has considered the examination of the two potential interactions with each other (Harrison, 2011). A study conducted by Wilson and Stimpson (2010) in the United States found that from the years 1999 to 2008, the rate for road fatalities caused by DUI remained at a constant 30%, however, proportions of drivers who were drinking and were distracted had increased rates from 26% to 30.8%.

The highest-profile incident in the media was the case of 18-year-old Obdulia Sanchez, who livestreamed the death of her sister on Instagram. Obdulia Sanchez was reported to have been under the influence when the vehicle swerved onto the shoulder of a highway (Arkin, 2017). She then overcorrected her steering, sending the vehicle spiralling across lanes, hitting a wire fence, and flipping

into a field. In the video, Obdulia is heard saying, “I fucking killed my sister, ok? I know I’m going to jail for life” while showing her viewers footage of her wounded sister. Obdulia was reported with suspicions of driving under the influence; however, the video footage also factored in several risky behaviours, including driving with one hand or no hands while making hand gestures with her other hand, propping her phone on the speedometer behind the steering wheel, and interacting with the livestream on her phone. It is important to note that while specific circumstances that mirror the case of Obdulia are unlikely, the pairing of contributing factors (DUI, distracted driving, livestreaming) is highly possible.

The cases in this study have demonstrated this combination of DUI and distracted driving. Many drivers who were intoxicated were also distracted by engaging in multiple tasks, not just driving but also livestreaming, talking, or consuming alcohol simultaneously. Approximately 50% of cases of DUI in this study were paired with some form of driver distraction, in many cases from phone manipulation or interaction with their livestream. There were trends indicating that phone manipulation by a driver influenced their ability to maintain vehicle control or perform appropriate vehicle overtaking or turning. Research has suggested that drivers under the influence display short-term behaviours in relation to their cognitive ability and skills to perform correct negotiations keeping within lanes and estimating curves (Miller et al., 2020). Drivers under the influence often held their mobile phone in one or both hands and spoke to their livestream audience. A key observation to be drawn from the present study on cases that involved intoxication was that driving under the influence alone had no significance but rather driving under the influence could be coupled with other risky behaviours within the vehicle cabin. This may be because alcohol reduces a sensitivity to risk (Phillip & Ogeil, 2010).

The concern from a societal perspective is the ability to intercept or mitigate such preventable issues. In the current study, 83.3% of DUI cases resulted in one or more deaths. The contribution of alcohol to traffic accidents is preventable. Roadside sobriety checkpoints have been created by law enforcement that allow police officers to stop passing vehicles in a systematic format to conduct a sobriety test on drivers (Morrison et al., 2019). However, only a small percentage of drivers are stopped at police checkpoints, as are the arrest rates from these checkpoints (Voas, 2008). Currently, Facebook has become a place of update, where some users have posted police checkpoints on their private pages and community pages to alert others of where the checkpoints may be (Nichol, 2016). Livestreaming is becoming a more useable social network format which is important in the field of vehicle incident management as remote viewers play an integral role in this concept. Although remote viewers are not law enforcers and do not have full capabilities to determine drivers under the influence, there is still a possibility for remote viewers to record these livestreams as they happen. In many cases demonstrated throughout this study, drivers were actively seen holding liquor bottles and/or drinking from liquor bottles and many livestreams were screen recordings from viewers. Therefore, remote viewers now play

a similar role to that of conventional witnesses of vehicle incidents, as remote viewers can witness driver behaviour inside the vehicle cabin.

Figure 5

Photo of High-Risk Behaviour Captured from Roadside Camera in Queensland⁵



While apprehending drivers under the influence can be difficult to manage, especially when there is no real-life interaction between law reinforcement and the driver, reductions in distracted driving has become a more attainable objective. The ability to detect high-risk behaviours is now captured on roadside surveillance cameras (Ho et al., 2019). An updated report on New Zealand Transport agencies six-month trial found that more than 50,000 people broke traffic regulations and rules (Block, 2022). The update three months after the initial implementation found 50,333 people using their mobile phones, averaging approximately 800 people per day or 1.14% of 4.4 million vehicles that drove past a hidden camera (Block, 2022). Images captured go beyond mobile phone use to more personal interactions, as shown in Figure 6, where the driver was fined \$1,078 for their high-risk act (News.com.au, 2022). Previous road safety research in simulators has arguably lacked ecological validity (Kaptein et al., 1996) which the present study aimed to address by focusing explicitly on footage captured on livestream.

⁵ Retrieved in November 2022, from <https://www.driven.co.nz/news/passenger-s-high-risk-behaviour-busted-by-roadside-camera-in-queensland/>.

The ability of remote viewers to report livestreams that indicate high-risk behaviours, including those of distraction, speeding, and drinking while driving, could be made readily accessible on any social media platform to help aid preventable incidents in a variety of environments. A similar example was noted in the Christchurch shooting where a gunman had livestreamed his footage of shooting victims within a Mosque (British Broadcasting Corporation, 2020). The social media company hosting the livestreamed video did not intervene in time and a further distribution of the video became widespread throughout the nation. According to the current study, DUI alone did not have significant associations with driver manoeuvres, and livestream viewers are not law enforcement agents who can breathalyse drivers like police officers. However, it is now possible for remote viewers, social media users and moderators to actively participate in not only preventing vehicle incidents and driver/passenger injuries by reporting high risk driving behaviours but also ensure that such footage is not being explicitly shared.

Influencers

The term “influencer” was initiated to describe individuals on social media that have a large following count, often due to content creation, and have the ability to invite their “followers” to align with brand promotions or political opinions (Fregberg et al., 2011). Influencers are a new group of unaffiliated third-party promoters that alter audience perceptions through the use of social media such as tweeting, blogging, and posting (Dumas & Stough, 2022). Research in the modern era has looked at the impact of influencers on the consumer and marketing audience. Initially, celebrity endorsement has been a common marketing strategy since the 1930’s, posing as a marketing tactic to promote brand products (Dumas & Stough, 2022). In the more recent phenomenon, influencers do not play the same role as celebrities, given that many influencers do not have expertise in a given field (Fregberg et al., 2011). Influencers were reported to be one of the key news sources on social media platforms such as Snapchat, Instagram, and TikTok (Digital News Report, 2021). It is important to recognise that younger adults who have grown up with the development of digital technologies have a unique experience in relation to the use of technology (Prensky, 2001). This experience is reflected in many aspects, from the type of content being created to the development of new terminology such as ‘selfie’ and ‘influencers.’ As the use of mobile phones continues to grow so has the need for social media platforms, however, younger adults who are yet to develop a sense of self are potentially vulnerable in the online world (Spies Shapiro & Margolin, 2013).

In the current investigation, it was considered whether livestreaming contributes to poorer driving capabilities. Consensus among road safety researchers is that driver distraction contributes to poorer driving (Young & Regan, 2007) while dual task research indicates two possible sources of

interference (Hiraga et al., 2009). A continuous bimanual coordination task and a discrete probe reaction time task have recently been investigated for interference using the dual-task paradigm (Hiraga et al., 2009). These studies have shown findings of dual-task interference causing an increase in reaction times and a decrease in coordination stability compared to a single-task performance (Abbas-Zadeh et al., 2021). Dual tasks have further been interpreted as interference effects described in the fixed-capacity resource model of attention (Abbas-Zadeh et al., 2021). When the resources required to complete two tasks concurrently exceed the system's overall capacity, resources provided to one or both tasks are lowered, which subsequently lowers performance (Kahneman, 1973). Prioritizing a task increases its resource allocation and reduces dual-task interference, but at the expense of a smaller resource allocation and more interference on the nonprioritized task (Kahneman, 1973). Structural interference occurs when receptors or effectors are not directly involved in necessary driving operations and functional interference when attentional resources are directed away from the driving task (McLeod & Mierop, 1979).

In the present data there was a trend indicating that drivers having conversations during their livestream contributes to the inability of making appropriate lane turning or overtaking manoeuvres. In the domain of driving, maintaining lane position with slight steering adjustments is frequently believed to represent automatic processes, whilst passing other vehicles requires deliberate thoughts and controlled action by the driver (Lappi, 2018). Applying the concept of dual-task performance to the current study on driving and livestream interactions indicate that driver distraction can contribute to poorer driving performance. In other words, simply conversing with viewers who are located remotely can be problematic. One study found that talking on a mobile phone while driving can cause tunnel vision in drivers, which makes it difficult to describe situations happening around them (Horwitt, 2002). This is explained by dual task performance and the inability for individuals to perform complex tasks simultaneously (Lappi, 2018). One of the most hazardous components of using a mobile phone while driving is the cognitive distraction created when engaging with a conversation over the phone as it reduces reaction times (Haque & Simon, 2013). Some studies have found that mobile phone use has similar effects on reaction times as driving under the influence (Haque & Simon, 2013).

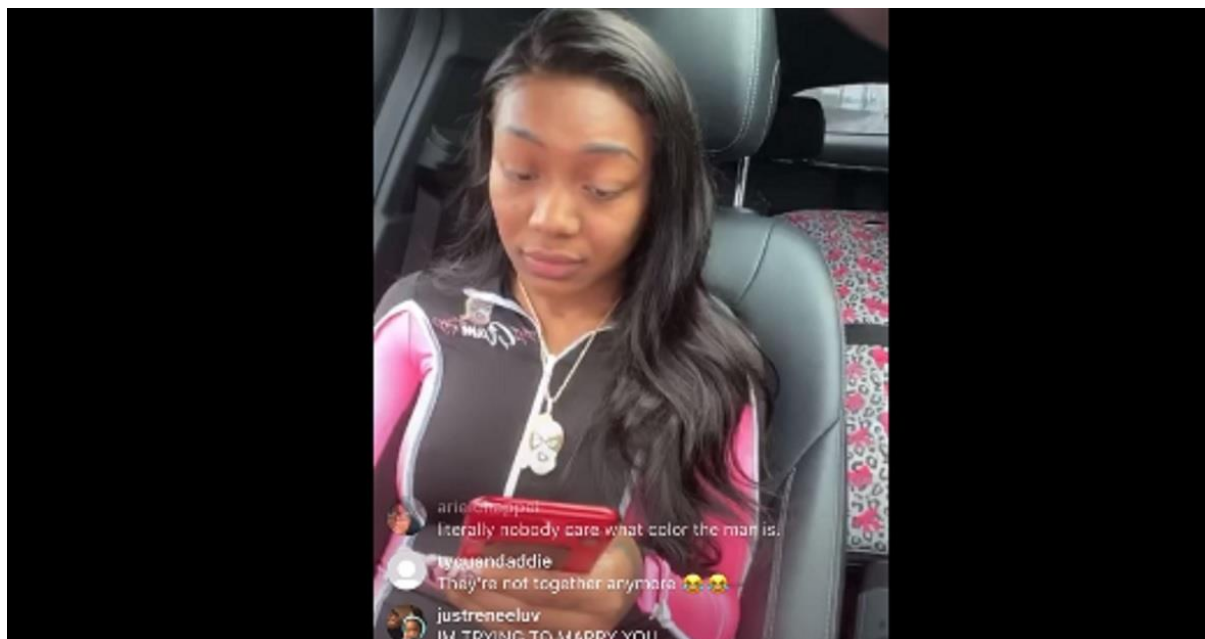
Often the primary reason influencers engage in livestreaming platforms, especially Instagram or Facebook Live, is to interact with their viewers and followers. The task of engaging with viewers goes beyond the traditional phone calls made while driving and also includes a visual component where drivers are required to read comments on a screen. As a consequence, when drivers are focused on their mobile phone screens, they lack awareness of the external driving situations. Furthermore, remote viewers are not aware of the current context and become a distraction to the driver during heavy traffic and critical driving manoeuvres. The case of American rapper Dallas Witherspoon, as included in the current study, is an example of a minor incident resulting from a minor dual-task performance. Dallas

was live on Instagram arguing with another user who was also broadcasting live on the same stream. There were two notable instances in the video; first the cognitive inability of Dallas to focus on the sentence he was trying to say while driving and second the inability to manoeuvre his vehicle in a previously known area. The framework for cognitive processing has been applied by driving researchers to aspects of driving and its reflections on automatic or controlled procedures of cognitive processing (Harrison & Fillmore, 2011).

According to the current study, automatic processes often lead to well-learned behaviours that require minimal conscious effort that can be carried out concurrently with other tasks (Nijboer et al., 2016). This is a common occurrence in drivers who often find themselves ‘zoned out’ or in a trance-like state while driving, reaching their destination with minimal remembrance of the journey. On the contrary, controlled behaviours require more work, greater cognitive resources, and are often disrupted by a secondary task (Nijboer et al., 2016). Ultimately, cases in the current study emphasize that audio-visual components of livestreaming require dual task performance. In such instances, a driver’s visual attention is taken off the road and audio processes are required to engage with livestream viewers. Vehicle incidents of this nature can reflect minor to more severe vehicle incidents and road traffic crashes which could be mitigated and prevented.

Figure 6

Snapshot of Jasmine Cheave Livestreaming on Instagram while Operating a Vehicle⁶



⁶ Retrieved in November 2022, from <https://www.instagram.com/p/B89Xr3enLXc/?hl=en>.

In a further discussion, the current study found differences between the audience's reaction to risky driving behaviour. The following case, included in the current study, of social media influencer Jazmine Cheaves is a prime example on the impact of influencers. Jazmine is known as a 'young visionary millennial' who became viral on social media as an entrepreneur. Figure 7 shows Jazmine livestreaming on a phone that was prompted on a car holder, driving her vehicle with one hand while scrolling on her phone with her other hand, not wearing a seatbelt, engaging in conversations with the passengers in her car (including looking over her shoulder to interact with the passenger in the back seat) and reading comments on her livestream. Whilst engaging in risky driving behaviours, livestream viewers were seen commenting love heart eyed emoticons on the stream. One viewer commented "you scaring me watch the road lol", in which another viewer replied "she scaring you then stop watching." The key finding from cases of influencers reflected differences between audience reaction: lack of concern and opposition to risky driving behaviours.

Influencers who build a platform on social media hold a powerful and important role as they have the ability to influence and shape behaviour and attitudes of their followers, many of whom perceive them as their own role model (Dekoninck & Schmuck, 2022; Zimmerman et al., 2020). Therefore, the impact of influencer behaviour has the potential to persuade followers, subscribers, and online users to develop a sense of trust and credibility to further structure behavioural intentions (Djafarova & Rushworth, 2017). Furthermore, influencers perceived as physically attractive are ranked higher in other attributes and are perceived as being smarter (Wang & Scheinbaum, 2018). In cases of livestreaming, viewers were not opposed to the risky behaviours due to the role of the influencer, and in some cases defend actions from the influencer against other audience members.

The key finding from social media influencers who were involved in a vehicle accident highlights risky driver behaviour that is caused by interactions with their livestream viewers. Simply conversing with viewers while operating a vehicle exceeds cognitive demands which in many cases, as found in the current study, led to minor and severe vehicle incidents. Furthermore, livestreaming involves an audio-visual processing that requires more attention than conversations on a mobile phone. Social media influencers have also built a platform and a networking system that is followed by a large audience around the world (Cheung et al., 2022). The behaviours displayed online reflect the perceptions of the audience and their ability to differentiate between their own personal beliefs and the actions of the influencer (Djafarova & Rushworth, 2017). This was explicitly seen in the comments of livestream videos where audience members were defending risky driver behaviours and/or continuing to hold conversations with the driver whilst the driver was employing a high-risk task.

Speed Induced Drivers

The current study found ten cases that included speeding as a factor of contribution to vehicle accidents. During the last two decades, researchers have focused on psychological literature to reduce the risks of car accidents by paying close attention to the behaviour of drivers behind the wheel (Lucid et al., 2019). Annual road safety reports affirm that speed is a factor contributing to road traffic incidents (World Health Organization, 2022). Previous research has shown a correlation between less speed variance and fewer collisions (Ghadiri et al., 2013). According to Kanitpong et al. (2013), reducing speed by just 1kmph reduces fatality and injury risk by 3%-5%. The impact of increased speed has been documented; however, the current study aimed to take a closer look at driver traits and behaviours that were ecologically validated through livestream videos. In cases of excessive speeding, ecological momentary assessment played a crucial role in understanding driver behaviour prior to a vehicle accident. In many cases, drivers who engaged in risky driving behaviours and excessive speed did so without considering the implications that followed. Indeed, in some cases, *drivers were flaunting their risky driving and enjoying the sensation of thrill* that followed.

An attempt to explain such behaviours has been developed through understanding of sensation-seeking behaviours and impulsivity control. To better understand sensation seeking, biological understanding of fight-or-flight responses (Cannon, 1911) is responsible for determining the release of hormonal responses. Adrenaline from excitement increases cardiovascular functions and releases adrenal catecholamines (Cannon, 1911). In the context of speeding, Zuckerman and Kuhlman (2000) theorised that fast speeds are desired because they stimulate the release of hormones, while dopaminergic reactions further encourage behaviours producing them. Further, while biological movements elicit speeding, other driving behaviours such as frustration from slow traffic and feelings of domination and power from swift acceleration may also be contributing factors (Zuckerman, 2007). Ulleberg and Rundmo (2003) have devoted a lot of their research to examine the relationship between personality, attitudes, and unsafe driving behaviours. Their study measured perception of risk, traffic safety attitudes, and self-reports of risk taking in traffic, finding that high scores on normlessness, aggression, and thrill seeking were linked to risk taking attitudes (i.e., disregard for road safety), as well as dangerous driving behaviour. Prior research aligns with findings from the current investigation. Drivers in our current study displayed impulsive or sensation-seeking behaviours stemming from personal characteristics were further fuelled by viewers watching their livestream.

In the current study, the case of Tahmid who, while broadcasting live on TikTok with another user, was seen swerving in and out of traffic on the motorway at high speeds. The video showed Tahmid inches away from hitting another car in which he was also heard saying “I just nearly fucking hit it.” Later videos taken from eyewitnesses reported that the car had flipped after hitting a barrier that caused

the vehicle to burst into flames on the highway. Sensation seeking is defined as a desire for a diverse range of novel, complicated, and profound experiences, as well as a readiness to accept financial, legal, social, and physical risks in fulfilment of such experiences (Zuckerman, 1994). This can be explained by the expectation that thrill seekers will seek out stimulation and excitement in traffic, which is mirrored in their unsafe driving behaviours (Wishart et al., 2017). Previous research has determined that car collisions and sensation seeking are less strongly associated with each other, often due to collision variance where car collisions are rare events and collision events not necessarily related to poor driver behaviours. Jonah (1997) conducted a literature review on 40 studies of sensation seeking and risky driving finding only four studies had no significant positive relationship between the two factors. Further, risk perception between sensation seeking and risky driving is mediated as individuals high in sensation seeking often do not perceive certain driving manoeuvres as risky (Jonah, 1997). Such drivers tend to believe that engaging in behaviours, such as speeding, has not resulted in a collision, and therefore their ability to drive safely is reflected in their 'superior' driving skills (Jonah, 1997), as might be expected from Ajzen's (1991) theory of planned behaviour.

Impulsivity is a character attribute referring to people who act with immediate action as a response to triggers or environmental cues with a preference for immediate gratification rather than long-term delayed rewards (Moeller et al., 2011; McCown et al., 1993). In this study, the highest profile case of speeding was 22-year-old driver Nicol Vorlovski and 22-year-old passenger Nikol Barabasova. The two were seen driving at a reported speed of 140kmh when Nicol made a left-hand turn crashing into a noise barrier. Passenger Nikol was seen showing viewers in the livestream both herself and the driver which prompted the driver to maintain the high speed in which passenger Nikol had commented "how fast are we going?" Impulsivity as a personality trait has been applied as a contribution to risky behaviour (Huang et al., 2017). The model was applied to a study conducted on self-reported risky driving in young drivers finding a positive association between reduced abilities of action planning (planning impulsivity) and ordinary driving violations. Hatfields et al. (2017) found in their driving stimulation study that speeding and risky driving maneuverers (e.g., hazardous stopping, overtaking) had positive associations with poorer performances in tasks involving impulse control. In the case of Nicol, there were demonstrations of attention impulsivity and non-planning impulsivity. Although there was increased attention to the current task on hand, Nicol was acting in the spur of the moment leading to the reduced ability in planning her actions which resulted in a vehicle incident.

In a further investigation, camera presence appeared as an influencing environmental factor that contributed to the engagement of risky driver behaviours. Psychologists have dedicated years of research to behaviour and attitude modifications that occur when individuals believe that others are observing them (Morin, 2011). The feelings of observation by an external source triggers self-awareness and heightens identity constructions as the complex cognitive process becomes triggered (Morin, 2011).

The general finding sustains that once an individual becomes aware of being observed their behaviours, attitudes, and responses are adapted to align with the socially acceptable norms (Sproull et al., 1996). Findings from the present study however did not observe that an audience encouraged prosocial behaviour, finding instead that in some cases the observation of remote viewers encouraged antisocial behaviours. The present study also found that unlike social media influencers, users with lower following counts or were not deemed as a social media influencer often had adverse viewer reactions with many livestream viewers opposing risk-driver behaviours. An example of this was seen in Tahmid's crash where viewers in the livestream were commenting on the driver's behaviours saying things such as "man is playing w death" and "tell him t drive safely." Similarly, in the case of Gustavo Ray Hernandez who was one of five passengers in a stolen vehicle chase that was livestreamed online, a concerned parent who viewed the livestream reported the video to the police.

Conty et al. (2016) argued that behaviour is altered by a subconscious management mechanism based on reputation that is brought on by observation from 'watching eyes.' In the case of speed drivers, some drivers continued with the excessive speed knowing that remote viewers were watching. Both Nicol and Tahmid's impulsivity was influenced by an external environmental cue where the role of the livestream and remote viewers contributed to the decision-making process that prompted both drivers to maintain unsafe driving speeds and uncalculated manoeuvres. In other instances, unsafe driving speeds and uncalculated manoeuvres would be dependent on audience members (Conty et al., 2016). The impact of subconscious reputation management creates a cue where individuals modify their behaviours by creating a narrative that the observation by others could potentially jeopardise their reputation - even in instances where this is not the case (Conty et al., 2016). From the data collected, the general consensus demonstrated that speeding was opposed by remote viewers. The most remarkable interpretation from this finding leads to the concept of reputation management, and how an individual may find their reputation to be at stake, and in the case of remote viewers who opposed such risky behaviours, even when their reputation was not at stake.

A consideration of individual cases suggest that some vehicle incidents primarily involved speed. Driver distraction in cases of speed related incidents had minimal influences on the contribution of vehicle incidents. Driver attitudes and personal characteristics however contributed to the likelihood of speed related incidents. In the cases demonstrated throughout this study, many speed related incidents factored out the distraction of the mobile phone and factored individualistic traits that were reinforced by viewers watching through a social livestreaming service. The humanistic component of social interactions proves to have an effect even if the interaction is through online mediations. While livestream viewers become remote witnesses to vehicle incidents, in many cases where the driver does not show viewers the speedometer, there is no possibility for viewers to gauge accurate vehicle speed.

However, despite this limitation, many viewers are able to differentiate between “fast” and “slow” driving from indicators such as movements in the background or within the car.

As discussed previously, many drivers who are engaging in risky driving behaviours demonstrate prior to an incident that there is no sense of fear or regard to safety. This thought has been validated through ecological momentary assessment, and now through the same concept has the ability to document behaviour *before*, *during*, and *after* an incident. The current study presents a new methodology that illustrates a potential to document incidents as they unfold in the moment. Regardless of how risky or lethal these behaviors are, these attempts are visible actions intended to build a sense of thrill paired with impulsive driving maneuvers which together initiate risky driving behaviour. At a societal level, it is crucial to mitigate such risky driving behaviour. In the current study, discussions of thrill-seeking behaviours were described as a contributing factor to many cases within the study causing unsafe road behaviours and vehicle incidents. It is important to address such issues for both drivers who have not yet been involved in a vehicle incident and for those who have already been involved in a vehicle incident to prevent future reoffences (i.e., Kenneth Hofler, Obdulia Sanchez, Onasi Olio Rojas).

Figure 7

Footage Snapshot of Obdulia Sanchez with Sister Jacqueline Sanchez Moments After Crash⁷



⁷ Retrieved in November 2022, from <https://scroll.in/video/845872/watch-teen-continues-live-streaming-after-she-crashes-her-car-in-california-killing-her-sister>.

A consideration of these cases in the current study indicates that risky-driver behaviour involving speed was merely for personal pleasure, and therefore, managing factors such as reducing *depression or building up self-esteem may not be an effective method to prevent re-offending for these people*. A prime example is the Obdulia Sanchez case where the most alarming component was the lack of emotional remorse or intention from Obdulia to help Jacqueline, as demonstrated in Figure 7 where she continues to livestream her deceased sister. Two years later, a news report stated that just 26 days after release on early parole from her original six-year sentence, Obdulia was involved in a vehicle pursuit where she drove through a red light and two stop signs (Sandrik, 2019). In other words, it seems conventional treatment were quite ineffective for this person.

There is a spectrum of impulse control disorders (Blaszczynski, 1999). At one end of this spectrum, some impulsive behaviours such as those occurring in patients with Tourette's or Obsessive-Compulsive Disorder are performed as an urge to escape - relieve an impulse or allay anxiety. In other words, the behaviours are negatively reinforced. At the other end of this spectrum behaviours are performed by patients with problem gambling, substance dependence or sexual compulsions, because these behaviours excite or reward and are positively reinforcing (Blaszczynski, 1999). Given that there is a spectrum of impulse control disorders, thrill seeking drivers may require specialised treatment to address their risk-taking behaviours.

In order to assist people in changing behaviours that they find rewarding, different treatment approaches may be required. When clients are less interested in seeking behavioural change (because they enjoy the inappropriate behaviour) techniques such as Motivational interviewing (MI) can be used. Motivational Interviewing is a clinical technique with empirical backing (Arbuckle et al., 2020). Motivational interviewing seeks to elicit a person's own fundamental values and aspirations to examine and address change ambivalence and develop motivation to alter maladaptive behaviours (Arbuckle et al., 2020). This strategy is an effective method for *improving offender motivation, treatment adherence, and recidivism rates* (Taxman et al., 2015). In the context of driving, treatment for thrill-seeking behaviours requires consideration and understanding of triggers that contribute to risky driving behaviour and replacing risky behaviours with safer alternatives and/or improving self-efficacy and driving skills.

Implications

Previous research has demonstrated results of vehicle incidents from accounts of self-reports, vehicle and road analysis measurements, witnesses, and CCTV operations. However, there have been limited studies that have been able to provide in cabin evidence of driver and passenger behaviour as they have occurred as the present study has done. Livestreams are crucial in ecological validity as

individuals that livestream do so in their natural day to day activities or in settings in which their skillset and behaviours are expected (Schlosser, 2003). The current study aimed to pioneer livestreaming for accountable and demonstrative purposes that helps to explore the occurrences of risky driver behaviours in daily activities and in natural settings that are not amplified by driving stimulators or researchers.

Initially, this study hypothesised that interactions of phone manipulation from a driver during a livestream will impair vehicle control. Results, although non-significant, indicated potential relationships between the two factors. Video evidence likewise suggested instances of impaired vehicle control when a driver was engaging with their livestream or were using their phone simultaneously. Secondly, this study hypothesised a relationship between driver distraction and an increase in accident severity. Results once again were non-significant, however, 54.6% of cases resulted in one or more passenger/driver fatality indicating that distraction plays a crucial role in vehicle related incidents. From a societal perspective, the current study anticipates the forthcoming use of roadside cameras. As handheld devices continue to develop and emerge so has roadside technology. Drivers who are under the influence correspondingly undergo breathalysers from law enforcers, drivers who exceed legal speed limits are captured on mobile digital safe speed cameras, and now drivers who are distracted will be captured on roadside cameras.

Limitations

In the development of this study limitations were observed. Livestreaming while driving is fortunately rare. Such restrictions in sample size caused difficulties with statistical power, and problems rejecting the null hypothesis. The current research employed the Fisher's Exact Test. Statisticians have argued that the p value rises discretely because it is the sum of a particular number of table probabilities. Although the estimated p value is contrasted with a predetermined level of significance, the actual likelihood of a Type 1 mistake is lower than the nominal threshold (Korosteleva, 2018). The test then becomes conservative as a result. It is important for future research to consider larger sample sizes to mitigate such statistical limitations so that results can identify potential associations between risk factors and road traffic incidents. Further, a more suitable sample size provides accurate reflections on general populations and allows for the study to detect clinically significant differences (Faber & Fonseca, 2014).

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Appendix A - Coding Sheet

The following guide gives an explanation on the procedures used to code and categorise information found on accounts of car incidents captured on livestreaming platforms. Detailed descriptions of the procedure methods are included, and the detailed coding list is provided at the end of this document.

Description of Coded Material

The material coded included videos that were reported on news articles and video sites (e.g., youtube.com). This was not limited to any popular news sites (e.g., abcnews.com, dailymail.co.uk) and included secondary news sites (e.g., newsweek.com, latimes.com). The videos selected assumed to meet all the inclusion criterions.

Inclusion Criteria

- Participants must be either be a driver or a passenger in an on-road motor vehicle (e.g., small, or large car, moped/motorcycle, passenger vehicle, truck, or bus).
- Participants must be livestreaming at the time of their vehicle accident on any given livestreaming website (e.g., Facebook, Instagram, Twitch, YouTube).

Exclusion Criteria

- Videos that have been recorded prior or post vehicle incident.
- Videos that were recorded outside of the vehicle with no video footage from inside the vehicle (e.g., bystanders, security footage).
- Videos that were recorded on a dashcam.
- Videos that imitate driving but are solely used for entertainment purposes (e.g., James Cordon Carpool Karaoke).

Observation Categories

1. **Driver** – Gender (Male/Female), Age (Youth, Adult, Senior), Under the Influence of Alcohol, Wearing Seatbelt
2. **Passenger/s** – Number of Passenger/s, Gender of Passenger/s (Male/Female/Mixed), Age (Youth, Adult, Senior), Under the Influence of Alcohol
3. **Vehicle** – Type of On-Road Vehicle (Small Car, Large Car, Ride Share Passenger Vehicle, Truck, Bus)
4. **Driver-Vehicle Interactions** – Driver Driving with One Hand vs Two Hands, Driver Interacting with Objects Inside Car While Driving, Driver Speed
5. **Driver-Phone Interactions** – Driving Holding Phone in Hand/s, Driver Using One or Two Phones, Driver Switching Camera

- 6. Driver-Livestream Interactions** –Driver Reading Out Comments on Livestream, Driver Responding to Comments on Livestream, Driver Livestreaming with Other Users
- 7. Driver-Passenger/s Interactions** – Driver Talking with Passenger/s, Passenger Showing Driver Phone, Driver Turning Around to Talk to Backseat Passenger
- 8. Driver-Road Environment Interactions** – Time of Day, Type of Terrain, Crossing Centre of Line, Incident Involving Another Vehicle

Category	Code	Data Type
Driver	Gender	Male/Female
	Age	Youth/Adult/Senior
	Under the Influence	Yes/No
	Wearing Seatbelt	Yes/No
Passengers	Gender	Male/Female/Mixed
	Age	Youth/Adult/Senior
	Under the Influence	Yes/No
Vehicle	Type of On-Road Vehicle	Small Car, Large Car, Ride Share Passenger Vehicle, Truck, Bus
Driver-Vehicle Interactions	Driver – Driving with One Hand on Steering Wheel	Present/Absent
	Driver – Driving with Two Hands on Steering Wheel	Present/Absent
	Driver – Interacting with Other Objects Inside Vehicle	Present/Absent
	Driver – Vehicle Speed	Reported/Not Reported
Driver-Phone Interactions	Driver – Holds the Phone	Present/Absent
	Driver – Touches the Phone	Present/Absent
	Driver – Livestreaming on Front Camera of Phone	Present/Absent
	Driver – Livestreaming on Back Camera of Phone	Present/Absent
	Driver – Use of More Than One Phone	Present/Absent
Driver-Livestream Interactions	Driver – Reading Comments	Present/Absent
	Driver – Driver Reading Comments Out Loud	Present/Absent
	Driver – Responding to Comments	Present/Absent
	Driver – Driver Talking to Livestream	Present/Absent
	Driver – Livestreaming with Another User Online	Present/Absent
	Passenger – Livestreaming	Present/Absent
Driver-Passenger/s Interactions	Driver – Talking to Front Seat Passenger	Present/Absent
	Driver – Talking to Backseat Passenger	Present/Absent

Driver-Road Environment Interactions	Time of Day	Day/Night
	Type of Terrain	Highway/Back Road
	Driver – Crossing Centre of Line	Present/Absent
	Driver – Swerving	Present/Absent
	Incident Involving Another Vehicle	Present/Absent