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Is it all about mobile phones? Exploring drivers' perceptions of government information and road rules on distracted driving

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ABSTRACT

Distracted driving is a traffic safety issue worldwide. While the development of comprehensive information and road rules about distracted driving by governments is essential to address the issue, there is evidence showing that existing road rules and information may not always deter drivers from engaging in distractions while driving. Therefore, this study explored drivers' views on government information and road rules concerning distracted driving, aiming to understand how these rules and information have shaped drivers' perceptions and behaviour towards distractions. Interviews ($n = 35$) were conducted with Queensland drivers aged between 21 and 70 years and a thematic analysis was used to explore the data. Based on the findings, government information on distracted driving was believed by participants to be incomprehensive, not effectively communicated, and focused on mobile phone use. Road rules and enforcement measures often prioritise mobile phone use and contain grey areas that may confuse drivers about legal and illegal distractions. The results showed that the perceived risk of distractions varies among drivers, with some distractions not being considered as risky as other behaviours (e.g., using a smartwatch). Findings showed that government practices are believed to influence drivers' perceptions and behaviour about distracted driving, encouraging an inaccurate perception about driver safety and with the potential to prompt drivers to engage with distracting behaviours without knowledge nor consideration of the risks. The results of this study offer important insights for policymakers in developing and disseminating comprehensive information and road rules for distracted driving.

1. Introduction

Distracted driving is a significant safety issue worldwide, representing a primary factor in road crashes and resulting injuries. Regan et al. (2011) defined distraction as the diversion of attention away from driving towards a secondary competing activity that can originate from inside the vehicle, outside the vehicle, or from the driver themselves. Distractions can be categorised based on how drivers perceive stimuli including visual, cognitive, auditory, and physical distractions (WHO, 2011).

Distractions can significantly affect driving performance, leading to reduced ability to maintain safe speeds, slower reaction times, impaired lane-keeping, and delayed responses to other road users' behaviours (Regan and Oviedo-Trespalacios, 2022). Drivers who engage with mobile phone's visual-manual interaction tasks have been shown to experience decreased speed selection and increased braking durations, resulting in higher risk of safety–critical events and collisions (Caird et al., 2018; Oviedo-Trespalacios et al., 2016; Simmons et al., 2016). Further, based on a simulator study, Li et al. (2018) found that cognitive distraction can result in decreased time-to-line crossing safety margins, impairing the safety of lane keeping. Although it is important to note that simulation results may not always reflect a driver's natural behaviour (Wijayaratna et al., 2019), past evidence highlights the important role of distracted driving in risking safe driving behaviour.

Even in countries with advanced road safety infrastructure, empirical data indicates that distracted driving can lead to road crashes and

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subsequent injuries and fatalities (Rejali et al., 2024a). For instance, NHTSA (2021) reported that distracted driving contributed to 3522 fatalities, representing 8 % of all traffic-related deaths in the US in 2021. In Australia, distracted driving has been identified in up to 16 % of severe crashes (Beanland et al., 2013). Similar patterns were observed in Norway, as distraction was shown to be a contributing factor in 12–14 % of fatal crashes (Sundfør et al., 2019). The share of crashes resulting from distracted driving shows the significant role that distracted driving plays in road crashes.

1.1. Research background

The risky nature of distracted driving has led countries to adopt various strategies and countermeasures to mitigate this issue. Interventions to prevent distracted driving can involve all levels of the transport system. Among these, administrative controls such as establishing road rules, enforcement of traffic regulations, and driver education are the most prevalent (Toriumi et al., 2022). Studies that have evaluated the impact of road rules and legislation on distracted driving are limited, frequently focusing on mobile phone use, and showing minimal effects on behaviour. For instance, Rudisill et al. (2019) reported that texting bans did not result in a reduction in mobile phone use or texting while driving in Virginia, USA. This limited impact may be linked to the difficulties and challenges in enforcing road rules. Enforcement has been found to be essential to ensure that legislation is effective. Wickens et al. (2020) found that enforcement measures, such as increased penalties, can decrease texting while driving among adults in Ontario, Canada. Further, a recent study found that mobile phone use rates were lower during and after the targeted enforcement activities in Michigan (Megat-Johari et al., 2023).

However, education is also important to ensure regulations are understood by the public, to encourage prioritisation of road safety and increase willingness to comply with road rules (Toriumi et al., 2022). According to Kaviani et al. (2020), a lack of awareness about current rules can result in a higher chance of illegal behaviour, specifically for the use of mobile phones while driving. Information and education programs to prevent drivers engaging in secondary tasks while driving include web-based and media interventions, and community-based campaigns (Allee et al., 2018; Pettinico and Debevec, 2020). These also can encompass technological supports, such as using phone blocking applications to reduce mobile phone use (Oviedo-Trespalacios et al., 2020), using wearable glasses and wristbands to reduce visual and cognitive distraction (Dehzangi et al., 2018), and warning systems to improve hazard perception (Arslanyilmaz, 2020).

Recently, Demir et al. (2024) conducted a review of interventions aimed at reducing mobile phone use while driving, exploring strategies across various areas such as understanding consequences, gaining knowledge, managing emotions, and social and behavioural influences. The findings showed that these interventions are generally effective in reducing phone usage when driving. Another systematic review by Nicolls et al. (2024) concluded that the majority of interventions for reducing engagement in distracted driving (program-based interventions, active interventions, and message-based interventions) are effective; however, limitations exist in the evaluation of these interventions due to lack of control groups and lack of long-term evaluations. Although the ecosystem of interventions for distracted driving is diverse and complex, there may be limited public awareness about these interventions, and a need exists to transform them from evidence into practical implementation.

Therefore, both effective road rules and comprehensive education play important roles in preventing distracted driving by raising public awareness of the issues, regulations, penalties and solutions in order to support development of appropriate mental models of behaviour. However, in certain cases, policies can lack clarity, thereby failing to adequately deter distracted driving behaviours and allowing drivers to evade enforcement of the rules. For example, according to the Supreme Court Library Queensland (2022), a man was able to successfully defend himself against a hand-held mobile phone use fine, captured by a mobile phone camera, by explaining to the court that the object he was holding while driving was a music player. The man was not fined as the road rules at the time were explicit about phone use and did not acknowledge that drivers can be distracted by similar devices to mobile phones. A recent investigation by Rejali et al. (2024b) reported that government information and road rules about distracted driving are insufficient or ambiguous in some cases, overlooking many aspects of the issue such as providing information on certain sources of distraction, specifically other technological devices. Further, Kaviani et al. (2021) found that there exists a necessity for clearer, readily available, and effectively communicated legislation regarding distracted driving in Australia. Road rules and policies provide a behavioural standard for road users to follow. Incomplete, or unclear rules may result in risky and incorrect mental models of behaviour; such as perceptions that multitasking while driving is without consequences and controllable by task-managing strategies, thereby underestimating the risks associated with certain distractions, such as mobile phone conversation (Oviedo-Trespalacios et al., 2017; Useche et al., 2024).

1.2. Current study

There is evidence indicating that the current information and road rules about distracted driving may not provide a comprehensive understanding of the issue to drivers. These materials are insufficient or ambiguous in some cases and often focus on certain aspects of distracted driving, such as mobile phone use (Rejali et al., 2024b). However, there exists a gap in the literature regarding how government-provided information and road rules shape drivers' attitudes and behaviour towards distractions. This study aims to address this gap by 1) exploring drivers' views on current information and road rules and 2) exploring drivers' perceptions and experiences with distractions.

This study has two main contributions and addresses the following three research questions. First, this study explores how drivers perceive government information and road rules on distracted driving and how these materials impact drivers' attitudes toward the issue. This provides insight into the potential implications of current legislation and information in shaping driver attitudes and behaviour. Second, this study explores drivers' perceptions and experiences of different distractions, aiming to identify how their distracted driving perceptions and behaviours may be influenced by current government practices. This provides insight into how drivers define distracted driving and whether they have a complete understanding of the concept. The research questions are:

RQ1. How do drivers perceive government information and road rules about distracted driving?
RQ2. How do drivers perceive and engage with distractions while driving?
RQ3. How do government information and road rules shape drivers' perceptions and behaviour about distracted driving?

The context of this study is Queensland, Australia where distracted driving is legislated through a set of rules. First, hand-held mobile phone use is illegal in Queensland and drivers must not drive and operate any function on a mobile phone including holding a phone in their hand or resting a phone on any part of their body (Queensland Government, 2024). The current penalty for this offence is AUD$1,141 and 4 demerit points. Drivers who receive a fine for using a mobile phone within one year of a prior offence will receive double the demerit points (Queensland Government, 2024). This offence is enforced by police and administratively via use of mobile phone cameras throughout Queensland. Further, drivers must not drive a vehicle with a television receiver or visual display unit if it is visible to the driver from the normal driving position. There are also general rules, including careless driving, interfering with the driver's control of a vehicle, and having proper control of a vehicle, which can also involve distracted driving offences

(Queensland Government, 2009).

2. Method

2.1. Procedure

To ensure efficient participant recruitment, a range of options including a university webpage and snowball sampling were used. Participants were informed about the study's objectives through an information sheet provided to them before their participation. To collect data for this study, face-to-face semi-structured interviews were conducted. This method was adopted to gain nuanced and in-depth understanding of drivers' perceptions, rather than to reach results that could be generalised to a larger population (Opdenakker, 2006). Further, the semi-structured nature of the interviews permitted discussions that aligned with the scope of the study, while also encouraging a sense of flow and openness in the conversations. Each interview was audio-recorded and took between 45 and 75 min. Two techniques of providing stimulus materials and mind mapping were adopted during the interviews to maximise the elicitation of drivers' perceptions. Stimulus materials, including examples and texts of distracted-related information and road rules, were provided to participants for each topic. These materials, with the associated questions, were designed to prompt participants to critically engage in conversations during the interviews (Törrönen, 2002). Further, during each interview, the interviewer and participant jointly created a mind map to enhance understanding of topic relationships. Participants were encouraged to contribute to and modify the mind map as needed, fostering a hierarchical visual representation of information. This approach assisted participants in effectively tracking the topics while comprehending their perceived interrelationships (Frerichs et al., 2018). The study was approved by the QUT Human Research Ethics Committee (approval number: 7385). Each participant received an AUD$40 gift card as a token of appreciation.

2.2. Materials

The interview questions were presented in four main topics (see supplementary materials). The first topic focused on drivers' perspectives regarding sources of distraction. As an icebreaker, participants were prompted to list or illustrate the distractions they encounter while driving on a provided paper template. The interviewer then posed follow-up questions to uncover the motivations behind each distraction mentioned by the participant. Following this, a distraction framework, adopted from Rejali et al. (2024b), comprising in-vehicle, external, and internal distractions was presented to participants. Participants reviewed the framework and shared their opinions on the significance, frequency, impact on driving performance, and severity of consequences associated with each distraction source.

The second topic focused on participants' perceptions regarding Government-provided information on distracted driving. Following initial questions about drivers' knowledge of available information and resources, participants were presented with two examples of Government-provided information as stimulus materials. The first example was an information sheet about distraction sourced from the Queensland Government website, typically one of the primary resources when drivers search online for materials related to distracted driving in Queensland. The second example was an information sheet distributed by the Queensland Department of Transport and Main Roads (TMR), available as a flyer in TMR customer service centres, focusing on distracted driving. Participants were prompted to share their opinions on these examples or any previous knowledge they may have had regarding Government-provided information.

In the third topic, the study investigated participants' perceptions regarding distracted-driving road rules in Queensland. Participants were asked about their awareness and resources for obtaining information about road rules concerning distraction. After sharing their opinions, a list of current road rules directly addressing distracted driving in Queensland, as well as general rules that may also encompass distracted driving, was provided to participants. Participants were prompted to express their views on various aspects of the current rules and how effectively they addressed distracted driving. In the final topic, participants were questioned about the enforcement of road rules, including their effectiveness as a deterrent, participants' perceptions of mobile phone cameras, and general compliance with laws.

Following the interviews, participants were requested to complete a short survey in order to determine the diversity of the sample. The survey encompassed demographic questions (age, gender, education, employment, type of driving licence, driving experience, and driving frequency), the number of crashes participants had experienced, the number of driving-related offences participants had committed, and their engagement with twenty-one different sources of distractions while driving. For drivers' engagement with distractions, the survey enquired "*Please indicate how often you experience the following potential sources of distraction while driving*" scored on a 5-point Likert scale (1 = Never, 5 = Always).

2.3. Participants

In qualitative research, the emphasis is on the depth, richness, and complexity of data rather than the sample size. The aim is to achieve a comprehensive understanding of the phenomena under investigation, typically through purposive sampling, which ensures that participants provide relevant and rich data aligned with the research objectives (Opdenakker, 2006). In this study, thirty-five Queensland drivers aged between 21 and 70 years (Mean = 39.80 years, SD = 13.31) were included, with a balanced gender distribution of 21 females (60 %) and 14 males (40 %). This sample size was deemed sufficient as data saturation was achieved after interviewing 30 participants, indicating that additional data collection no longer provided new insights. Saturation is a key criterion in qualitative research, where the goal is not to generalize findings but to provide a detailed and nuanced understanding of the research question. Additionally, the information power of the sample was considered adequate due to the specificity of the participants, the strong quality of the dialogues, and the focused nature of the research, which required an in-depth exploration of specific experiences and perceptions (Malterud et al., 2016).

The eligibility criteria for participating included being able to attend an in-person interview, be aged 18 years or older, hold a current provisional (restricted) or open (unrestricted) Queensland driving licence, reside in Queensland, and drive a car at least once a week. Most participants (N = 33) reported holding an open Queensland driving licence and two participants reported holding a provisional driving licence. Participants reported an average of 19.70 years (SD = 14.24) having held a valid driving licence. Twenty participants (57.1 %) reported driving 6–10 h per week, 9 (25.7 %) reported driving less than 6 h per week, and 6 (17.1 %) reported driving 11–20 h per week. Further, six participants reported being involved in a crash during the past three years, with 3 of these participants reporting involvement in a distraction-related crash. Four participants also reported receiving a distraction-related fine in the last three years. Participants reported engaging with visual display units, such as monitor display, navigation systems, and smartwatches (Mean = 3.34, SD = 1.32), and vehicle audio systems and personal music entertainment (Mean = 3.34, SD = 1.10) as the most common in-vehicle distractions. For external distractions, other road users' acts and behaviour (Mean = 3.45, SD = 0.85) were mentioned by the participants as the most common external distractions, followed by looking at external objects such as advertisement billboards (Mean = 3.17, SD = 0.82). Regarding internal distractions, respondents reported daydreaming and getting lost in thoughts (Mean = 2.94, SD = 1.05) as the most frequent source of distraction while driving (see Table A1).

2.4. Data analysis

To analyse the qualitative data, a reflective thematic analysis was applied (Braun and Clarke, 2021). The first phase, familiarisation, was undertaken by the first author, who conducted all interviews and subsequently reviewed the transcription of all interviews. Following familiarisation, data were analysed to identify codes relevant to the research aims, with a focus on assigning an underlying meaning to the quotes. The initial stage of coding was assigned by the first author, while subsequent refinement and review of the codes were conducted by the other authors. Following the reflective thematic analysis, similar codes were grouped together to form initial themes, reflecting their shared meaning across the dataset. This stage was conducted through group discussions between all authors. The themes were cross-checked against the research aims to ensure that they adequately addressed the objectives by highlighting the most significant patterns within the dataset. Subsequently, these themes underwent further refinement by all authors to enhance the reliability of the findings, were assigned descriptive names, and were documented in detail. This whole process ensures that the findings adequately address the study's objectives and accurately reflect the participants' perspectives, thereby confirming the validity of the research, as the validity in qualitative research is defined by how precisely the analysis captures the characteristics of the phenomenon it seeks to describe, explain, or theorise (Pyett, 2003). To maintain the anonymity of participants, all quotations are referenced using gender and age identifiers (e.g., Male, 25).

3. Results

Four main themes were identified and the relationships between them as expressed in the interviews are outlined in Fig. 1. Theme 1, Government Information, included participants' perceptions of government information on distracted driving, such as the emphasis of current information, the comprehensiveness of the materials, and the way information is communicated to drivers. Theme 2, Road Rules and Enforcement included participants' expressed views on road and enforcement efforts on distracted driving including their knowledge of current rules, the focus of these practices, unclear and grey areas in road rules, and their perceived effectiveness of enforcement measures. Theme 3, Perceptions of Distracted Driving, included participants' perceptions of distracted driving including their perceived risk of distractions and perceived impact on driving performance. Further, the impact of government practices on participants' perceptions of distracted driving was elaborated. Theme 4, Distracted Driving Behaviour, included views on engagement with distractions and the influence of participants' perceptions of distracted driving on their safe driving behaviour. In addition, the impact of current government information, road rules and enforcement on participants' distracted driving behaviour was identified. The following sections provide a detailed explanation of the themes, supported by quotes to present the concepts within each theme.

3.1. Theme 1: Government information

Within the first theme, participants expressed their perceptions of government-provided information on distracted driving. Three subthemes were identified including drivers' views on the 1) *emphasis of government information*, 2) *completeness of government information*, and 3) *communication of government information*.

3.1.1. Emphasis of government information

Within the first subtheme, respondents unanimously indicated that government information on distracted driving is limited to information regarding the risks of using mobile phones. They stated that this information primarily focused on mobile phone use and paid little attention to other sources. Some participants also stated that mobile phone use was often introduced in the information as the primary source of distraction compared to other sources.

> *"I think that the emphasis has been placed too much on mobile phone distraction, and not enough on any other sort of activity that the driver takes part in." (Female, 60)*
>
> *"I think they probably will definitely inform people of the danger of using phone by phones. but doesn't cover everything like all the other potential hazards." (Male, 42)*

3.1.2. Completeness of government information

Second, many respondents highlighted that government information about distracted driving may not comprehensively cover this issue. They stated that current information does not encompass everything that can be attributed to distracted driving based on its definition. For instance, several participants noted a gap in information regarding internal and external sources of distractions and mentioned that government information does not explicitly talk about these different types of distractions. A few participants also mentioned that current information does

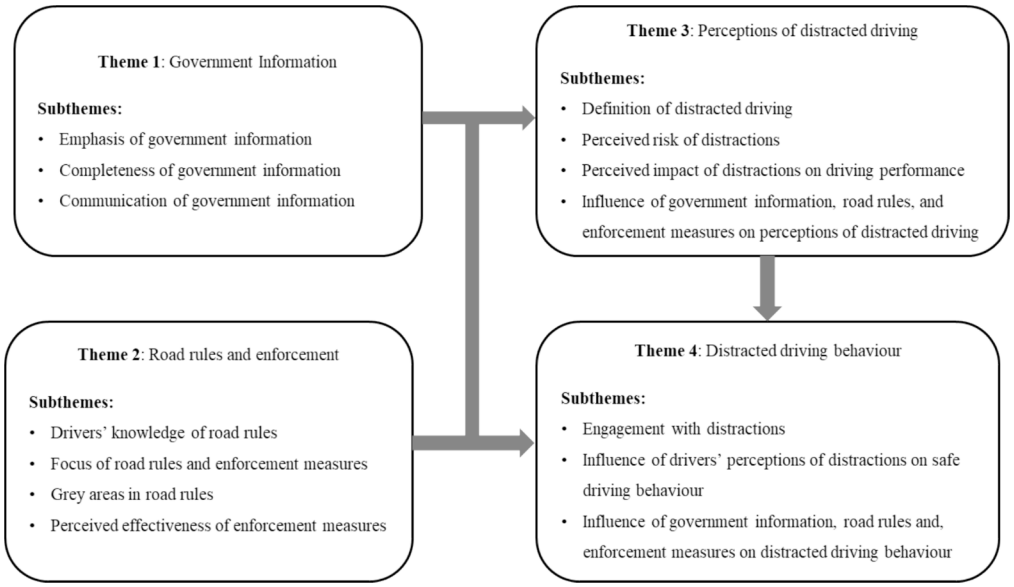

Fig. 1. Summary of identified themes and interrelationships expressed in interviews.

not keep pace with the new technological changes in cars to inform drivers about their potential distractions.

"There's not really any mention of a lot of the other things, like external distractions are not really talked about explicitly as a distraction. And like the distractions in your head not really discussed, there's not really anything about you know, if you're in a certain frame of mind, try and manage that., this is really just about phones." (Female, 46)

"They're not focusing on other distractions at all. So, there's so many more out there, like those big advertising billboards, you know. But yeah, then we need to have more information about other distractions." (Male, 43)

3.1.3. Communication of government information

Regarding the third subtheme, many respondents noted that government information is not effectively communicated and reported encountering challenges in obtaining specific information on distractions from authoritative sources. Several participants mentioned that they have only received this information through a few different channels, such as TV advertisements and billboards.

"I think that you if you were looking for rules, you'd know to go to the road rule, like Queensland Government website. But I'm not sure if when drivers were after something specific, like if they were to have stuff on driving with pets or going on long trips with kids to reduce the chances of distraction." (Female, 25)

"[The Government] just wants to carry the responsibility to drivers. You know, just go there. Bring the information. It's up to you. We're not responsible anymore, because we gave you two sources of information." (Female, 33)

3.2. Theme 2: Road rules and enforcement

Within the second theme, participants' views on current road rules and enforcement measures about distracted driving were categorised in four subthemes including 1) *drivers' knowledge of road rules*, 2) *focus of road rules and enforcement measures*, 3) *grey areas in road rules*, and 4) *perceived effectiveness of enforcement measures.*

3.2.1. Drivers' knowledge of road rules

Regarding the first subtheme, nearly all participants indicated that their understanding of current road rules for distracted driving is primarily limited to the rules about mobile phone use. They mentioned having very limited knowledge about other rules addressing distracted driving, including the general rules that can involve distracted driving, such as careless driving, or having proper control of the vehicle.

"Do not use your phone while driving. That is essentially the only thing that comes up." (Female, 29)

"I'm really aware of mobile phones being a distraction and their fines. And then that's where my understanding of distraction stops." (Male, 43)

3.2.2. Focus of road rules and enforcement measures

For the second subtheme, several respondents highlighted that the current road rules and enforcement efforts prioritise addressing mobile phone use specifically, rather than covering distracted driving more broadly. They pointed to the presence of significant fines for mobile phone use and mobile phone cameras as evidence supporting this belief. A few drivers expressed that they do not consider this focus reasonable, as they perceive distractions related to technology, aside from mobile phones, to be equally important and requiring appropriate enforcement measures. Some participants also mentioned that road rules should encompass all technological devices instead of just mobile phones.

"There are so many significant penalties and I know that around using a phone, whereas I don't I know that there are technically penalties for other distractions. But they are not enforced in the same way." (Female, 31)

"If you're gonna ban phones, you may as well ban other technologies." (Female, 29)

3.2.3. Grey areas in road rules

A third subtheme focused on respondents' noting the existence of grey areas and uncertainties regarding distracted driving rules, both in specific and general rules. For instance, most participants reported experiencing confusion regarding legal and illegal distractions, with hand-held mobile phones prohibited, yet other technological devices apparently legally allowed. Some participants specifically mentioned smartwatches, which can be used to read and send texts and to receive other notifications while driving, as an example that poses similar distraction risks to mobile phones. Additionally, using in-vehicle monitor displays while driving was mentioned by some participants as another example that can legally replace mobile phone use while having a similar risk.

"I think rules can confuse drivers at some point. Because they say it's illegal to use a handheld phone. But it's not illegal to use hands-free. Also, it's not illegal to use other devices. It is okay to use your CarPlay or screen while driving. As well as your smartwatch. So, what's the difference? I think they should put a very fine line between what's legal and what's not." (Female, 25)

"What's the difference between a touchscreen, your phone and a smartwatch? And maybe an analogue device? For me, I think smartwatch and phone are the same." (Female, 25)

Further, some drivers expressed confusion regarding certain aspects of mobile phone rules, such as the permissible duration of touching a mobile phone when it is located in a car holder. Additionally, several drivers expressed that general rules, including those related to inattentive driving or proper control of a vehicle, lacked specificity and would benefit from more examples to help clarify these rules.

"I don't know how long I can touch [mobile phone] for what constitutes touching is it just like, you know, like, because you know, when you're touching a phone when it's in the holder, sometimes you're looking at the GPS and you're zooming in and out and things and that can take a while. Is that not considered distracting?" (Female, 29)

3.2.4. Perceived effectiveness of enforcement measures

Regarding the fourth subtheme, drivers expressed their views on the effectiveness of current enforcement measures, including mobile phone cameras. Several participants expressed that while enforcement efforts can be effective in reducing mobile phone-related distractions, other types of distractions are often overlooked and enforcement cannot reduce these types of distracted driving effectively. Two drivers mentioned that this gap in enforcement stems from the difficulty in police enforcing other distractions, particularly internal and external distractions.

"Yeah, I think I think the cameras in particular, probably the best thing that implemented for I know, that just applies for phones at the moment, but I think just being aware that it could be anywhere you don't know where it is, can help drivers to think twice." (Female, 31)

"I don't think it's reducing the general distraction, because people know that cameras are there to catch me on my mobile phone. Full stop." (Male, 36)

3.3. Theme 3: Perceptions of distracted driving

The third theme included the perceptions of participants regarding distracted driving. Four subthemes were categorised including 1) *definition of distracted driving*, 2) *perceived risk of distractions*, 3) *perceived*

impact of distractions on driving performance, and 4) *the influence of government information, road rules, and enforcement measures on perceptions of distracted driving.*

3.3.1. Definition of distracted driving

Within the first subtheme, participants expressed how they define distracted driving. Many participants stated that they view distracted driving as any activity or anything that takes their attention away from driving. Four participants also expressed that they view distraction more as a visual phenomenon and mentioned that distracted driving is when you are visually distracted.

"I would say my definition of distracted driving is when your attention is taken away from the primary purpose of concentrating on driving safely." (Male, 36)

"In my mind, distracted driving is when you are visually distracted. So not looking at the road because you're looking down or even your mirror or have turned around to yell at your kids in the backseat." (Female, 60)

3.3.2. Perceived risk of distractions

Regarding the second subtheme, respondents indicated that they perceive distractions differently, attributing different levels of risk, including some distractions perceived as not risky. For instance, most of the participants reported that in-vehicle distractions, especially those related to technology and visual distractions, are regarded as the most risky source of distraction. These technological and visual distractions include mobile phones, smartwatches, navigation systems, and visual display units. Among these sources, almost all the participants perceived mobile phones as the most risky source of distraction while driving. Several respondents mentioned both visual and cognitive demands as the primary reasons for perceiving these types of distraction as the most risky, suggesting that mobile phones are intentionally designed to be engaging and require constant attention.

"The most important source of distraction that the general public can always engage with is talking and using phones. Yes, I see them on the roads, and I've had personal experience where drivers haven't been paying attention. They've been too busy talking on their phone and unaware of what's going on, deviating from a lane or whatever it might be." (Male, 65)

"[mobile phones] do a couple of things. I think it has a visual aspect where you take your eyes off the road. But also, it has that cognitive aspect as well, because you get a text or a message or some kind of post or whatever, you look at it." (Male, 43)

"[smartwatches] can be distracting because if someone for example, I'll be sitting in meetings at work on someone's phone or go off because someone sent them an mail. And so, I think well, that's a bit of a distraction. Imagine if you have that When you're driving, you have a smartwatch that goes off because someone's texting you or sending you an mail. That's, that's a big distraction for someone who's driving." (Female, 25)

Many participants mentioned interaction with passengers and especially children in the car as a risky source of distraction. They stated that the interaction with passengers while driving can contribute to different types of distractions including visual, auditory, and cognitive distractions. Further, some respondents also mentioned pets as a risky source of distraction as they can be unpredictable.

"For kids, the little ones, stop them from raising their voice and then keep giving, asking questions and requests and stuff like that. You need to respond immediately, immediately. Yeah. But I think because it takes time for you. You know, I think it takes time, energy, and attention. Because it's annoying. It's annoying, it makes you angry, they cannot understand that you're driving. Yeah, it's not something that you can handle easily." (Female, 46)

"I think [pets] are a big source of distractions. Because they cannot sit still, they move they they're unpredictable." (Female, 54)

Many participants reported that they do not consider all distractions risky. For instance, many participants viewed internal distractions like daydreaming and getting lost in thoughts as common and less risky distractions while driving. They stated that cognitive distractions, when compared to visual distractions, may result in less severe impact on driving performance.

"For in vehicle distractions, it's more of your you're not looking on the road when these things happen. And you're not focusing on what's happening on the road. And if a vehicle approaches you, you don't have enough time to react. Whereas when you're getting lost in thoughts, your eyesight is still on the road. And I think I think your brain will react a bit quicker than if you're not looking at the road when something is approaching you." (Female, 25)

Another example of distractions that participants did not perceive as risky were external distractions. For instance, several participants mentioned that advertisement billboards are not distracting, as they believed there is no severe impact on their driving performance. Few participants also regarded external distractions as an everyday occurrence while driving.

"So interesting to me. I have definitely slowed down to finish reading a sentence that is on a billboard. Yep. To me, it just doesn't seem like a distraction in the same way as something is inside the car." (Female, 31)

3.3.3. Perceived impact of distractions on driving performance

In the third subtheme, participants expressed their views on the perceived impact of different distractions on driving performance. They perceived that all distractions cannot have similar effects on driving performance, believing some distractions have negative outcomes on driving performance, and others limited impacts. The major reason participants gave for this distinction is differences in duration of visual engagement. Several participants viewed using mobile phones, interacting with passengers, using smartwatches, and being affected by rain or glare as distractions that can impact driving performance. On the other hand, drivers stated that eating and drinking, using advanced driving assistant systems, using vehicle controls, and looking at external objects such as advertisement billboards does not significantly affect driving performance.

"I think just from what you see on the road, where a car is like swerving, when you look and drive past that person is on the phone." (Male, 43)

"I haven't experienced any issues while I'm drinking, I think, I mean, because I'm able to keep my eyes on the road. I've never had a situation where I felt like that was distracting." (Male, 42)

3.3.4. Influence of government information, road rules, and enforcement measures on perceptions of distracted driving

In the fourth subtheme, participants commented on the influence of government information, road rules, and enforcement measures on their perceptions of distracted driving. First, most participants expressed that government information and road rules have influenced their understanding of the perceived risk of distractions. For instance, almost half of the respondents stated that they assign greater importance to mobile phone distractions over other sources of distraction because the information provided predominantly emphasises the risks associated with mobile phone use. As a result, some participants mentioned that this focus on mobile phone use has led them to underestimate the risks associated with other sources of distraction. Further, a few participants reported a similar pattern with public education awareness campaigns and the statistics provided by the government authorities.

"Because the focus of Government Information, and also rules is just on mobile phones, drivers think that mobile phones are the most important distractions and other distractions are not as important." (Male, 35)
"It's mostly like we're not being educated about the effects of the other distractions. We are being bombarded with this, this mobile phone situation." (Male, 36)

Further, several participants stated that drivers' perceptions of the risks associated with distractions are inaccurate due to the current information and road rules, as drivers often prioritise avoiding fines rather than prioritising safe driving. Additionally, some respondents believed that the existing grey areas in road rules, have contributed to this perception among drivers regarding sources of distraction.

"I think people have incomplete perceptions about the risks of distracted driving. They are just trying not to be fined, not reducing their phone use or something and it's because of these rules that have some grey areas." (Female, 33)
"I see a lot of people making the distinction between a phone and in vehicle kind of tech, where they're, they're basically doing the same thing. So, I'm answering the message, I'm reading the message on the screen, there is no difference." (Male, 43)

3.4. Theme 4: Distracted driving behaviour

In the fourth theme, participants' views on their distracted driving behaviour are presented. Three subthemes including 1) *engagement with distractions*, 2) *the influence of drivers' perceptions of distractions on safe driving behaviour*, and 3) *the influence of government information, road rules and, enforcement measures on distracted driving behaviour* were identified.

3.4.1. Engagement with distractions

Within the first subtheme, participants stated their views on engagement with different sources of distractions (See Section 3.2 for the results of participants' self-report engagement with 21 sources of distraction). Many participants believed that engagement with distractions is common among drivers, despite knowing the risks. For instance, most respondents mentioned that they frequently use in-vehicle monitor displays and CarPlay for different purposes, such as navigation and music that can distract them while driving. Participants mentioned that they use smartwatches as an alternative to mobile phones to read texts and notifications. A few participants also reported interacting with children in the car, such as passing food or talking to them as a frequent distraction. Almost half of the participants mentioned that getting lost in thoughts is an everyday distraction that they experience. Others reported that other road users' actions and behaviour were also frequent distractions that they experience. Eating and drinking were occasionally mentioned as a frequent source of distraction.

"In my car, I connect display to my phone. So, I guess if I'm playing music or a podcast or a notification comes up, it'll automatically I guess, divert my attention. I mean, I choose whether or not to engage with, but still, it does. Take your eyes off the road for a second." (Female, 25)
"I have a young child and she's very demanding in the car. I usually like passing food, trying to keep her nice and sitting in the car seat. So that's why it's distracting for me." (Female, 33)

3.4.2. Influence of drivers' perceptions of distractions on safe driving behaviour

Within the second subtheme, participants explained the impacts of perceptions of distracted driving on their safe driving behaviour. For instance, several participants mentioned that having the perception that they do not consider all distractions as risky influenced their safe driving behaviour. They noted that drivers may develop a false sense of what constitutes safe driving because some distractions such as mobile phones are presented as the primary criterion for risky distraction, and other distractions have not been perceived in the same way.

"I think definitely people make up those trade-offs in their mind. And I definitely think that people calculate or think they calculate the risks of different things and come up with different answers that this is riskier than this, or whatever. So yeah, people do make a judgment about whether this is safe or whether it's not safe based on their knowledge which comes from the information and rules. And I think again, they would probably think that, you know, using my phones, that's not okay. But singing and dancing and laughing to music is fine," (Male, 43)

3.4.3. Influence of government information, road rules and, enforcement measures on distracted driving behaviour

In the third subtheme, participants' views on the influence of current government practices including information, road rules, and enforcement efforts on their distracted driving behaviour were identified. Participants expressed concerns that the current focus on mobile phones in government practices is influencing their distracted driving behaviour. They consider mobile phones as the primary and most significant distraction, despite regularly engaging with numerous other sources of distraction. Few participants also believed that the focus on mobile phones in enforcement may not effectively reduce distracted driving overall, as drivers may continue to engage with alternative sources of distraction that are less targeted by current enforcement measures. Further, a few respondents believed that the grey areas in road rules have resulted in confusion for drivers that has influenced their behaviour, leading them to engage in legal distractions.

"Unfortunately, the way people think; some people think it's just mobile phones that they are to get. So, I won't use my mobile phone. Forget the other distractions, it's all about the mobile phone." (Male, 36)
"I think that's how a lot of people see it. I'll leave my phone alone because I don't want to get the fine. It's not so much about distracted driving. And in that way, the way that they focus on mobile phone use is not about being distracted. So that problem remains, even if you end up having nobody looking at the phone will still have distracted people. Because there are so many other reasons," (Female, 57)
If I'm like driving, the monitor there, and it's like quite big in the layout. Let me just quickly, like, you know, change the channels a little bit, you know, so, and I'm like, well, it's part of the car and it's not my phone," (Male, 21)

Several participants also highlighted that other drivers hold the belief that if an activity is not explicitly illegal, it must be safe to engage in, leading them to consider themselves safe drivers. Some participants emphasised that this perception is especially noticeable when drivers engage with newer sources of distraction, particularly those related to technology. For instance, numerous participants mentioned the use of smartwatches, visual display units, and monitor screens while driving to be common, with drivers holding the belief that such activities are safe, as they are not explicitly illegal.

"Everyone listened to the rules and did not use their phone while they're driving. It would make them think that there are no other distractions. Therefore, I'm being a safe driver, even though your dog not strapped in. Or you're changing the channel on your radio station. A little bit of a misconception, I think for sure." (Female, 25)
"For eating and drinking or some other distractions, which is newer, like smartwatches, or that screen monitors the big screen monitors, people think that when they are using them, it's totally safe. For example, definitely that if they're looking, they're looking at their smartwatch and the text from others needs more focus. But they think it's quite safe to read your text from your smartwatch." (Male, 65)

4. Discussion

By adopting a robust qualitative approach, this study explored drivers' perceptions of distracted driving and their experiences of engaging with sources of distraction. Further, this study investigated drivers' views about government-provided information and road rules on distracted driving, aiming to understand how these materials have shaped drivers' attitudes towards driving distractions.

The current findings revealed that government information on distracted driving is perceived by participants as incomplete and insufficient in addressing the issue comprehensively, primarily focused on mobile phone use. Consistent with these findings, a critical investigation of government-provided information in Australia revealed that several sources of distraction, particularly internal and external distractions, have been overlooked or received limited attention, with the majority of information focusing on mobile phone use (Rejali et al., 2024b). Participants in the current study also highlighted that government information is not effectively communicated, and they face difficulties in accessing specific information about certain sources of distractions from authoritative sources. In line with this finding, Ferguson and Winn (2023) emphasised the need to enhance the communication of safety information to drivers in Australia in an accessible and comprehensible way to ensure that drivers can readily access and understand the information.

Correspondingly, understanding of current road rules for distracted driving was primarily limited to rules about mobile phones. Previous research found that a lack of awareness about current road rules for mobile phones in Australia can result in increased illegal behaviour (Kaviani et al., 2020). Participants also noted the existence of grey areas regarding distracted driving rules, both in specific distraction-related rules and general rules that can involve distracted driving. For instance, there was some level of confusion regarding legal and illegal distractions in road rules, especially regarding smartwatches and display monitors. In line with these results, Rejali et al. (2024b) reported that rules concerning certain types of distractions in Australia are ambiguous, with general rules such as those related to careless driving or proper control of a vehicle lacking specificity in their definitions. Kaviani et al. (2021) also highlighted the need for clearer and more effectively communicated rules through formal channels.

Participants also perceived road rules and enforcement measures regarding distracted driving to prioritise mobile phone use over other sources of distraction. While previous studies have highlighted the role of hand-held mobile phone bans in reducing mobile phone use while driving and potentially enhancing drivers' behaviour in both the short and long term (Benedetti et al., 2023; McCartt et al., 2010), some studies showed contradictory results, suggesting that the outcomes on road crashes may not be as positive as previously assumed (Olsson et al., 2020). For instance, Reagan et al. (2023) found mixed results regarding the association between strengthened mobile phone rules and rear-end crash rates. This discrepancy can be related to the challenges encountered by police in enforcement, the availability of technology that enables the sharing of enforcement locations, and drivers' efforts to conceal their behaviour (Truelove et al., 2023a; Truelove et al., 2023b). Despite the implementation of mobile phone detection cameras to reduce driver distraction in some Australian States, there is limited evidence on the extent to which this approach has been successful in reducing road crashes. Further research is needed to identify effective enforcement strategies for reducing mobile phone use while driving and whether prioritising enforcement of other forms of distraction improves overall outcomes.

Participants attributed different levels of risk to various sources of distraction and did not regard all distractions as the same or as risky. Visual distractions and in-vehicle distractions, particularly those associated with technology and especially mobile phone use, were viewed as more important than other types of distraction. In line with these findings, Oviedo-Trespalacios et al. (2019a) found that in-vehicle information systems have the potential to create risks to drivers, as many drivers have reported frequently engaging in visual-manual interactions with these systems. On the other hand, drivers perceived that some sources of distraction, including internal distraction, such as daydreaming, and external distractions, such as looking at advertisement billboards, do not impact driving performance compared to in-vehicle distractions. While past literature has highlighted the prevalence of in-vehicle distractions and technology-related distractions in road crashes (Qin et al., 2019), research has also emphasised the significant role that both external and internal distractions have on driving performance and safety. For external distractions, Oviedo-Trespalacios et al. (2019b) stated that roadside advertising signs can impose additional demands on the driving task by disrupting drivers' eye movement patterns and that some devices, such as electronic billboards, increase crash risk. Similarly, Hinton et al. (2022) reported that roadside advertising signs can lead to prolonged attentional engagement for drivers, potentially risking safe driving performance. In terms of internal distractions, similar results have emerged. For example, Beanland et al. (2013) found that internal distractions such as feeling stressed or nervous, experiencing pain, and getting lost in thoughts can play a role in distracted driving crashes. Further, Chan and Singhal (2015) reported that negative emotional content, which can be considered an internal distraction, impairs driving performance. Consistently, Vaezipour et al. (2022) reported that drivers experiencing chronic pain, an internal distraction, showed higher mental and physical workload while driving, potentially impacting driving performance.

The results of this study showed that government information, road rules and enforcement measures have influenced participants' perceptions of distracted driving. For instance, participants viewed mobile phone use as the most important source of distraction in terms of risk and impacts on driving due to its dominant focus in government materials. While past studies confirm the negative impacts of mobile phones on driving performance (Oviedo-Trespalacios et al., 2016) and subsequent road crashes (Guo and Lu, 2022), this perception regarding other distractions is concerning in several ways. First, many sources of distraction can increase crash risk to a level almost similar to that of mobile phones (Beanland et al., 2013; Dingus et al., 2016). Second, the effects of many distraction sources on driving behaviour and resulting road crashes have not been thoroughly explored in the literature (Hinton et al., 2022). Third, not all types of mobile phone use pose the same level of risk. For example, typing can significantly impair eye movements, stimulus detection, reaction time, and lane positioning, whereas reading has a lower impact on these variables (Caird et al., 2014). Providing comprehensive information on the risks of diverse distractions may overcome this misconception.

Findings also revealed that participants commonly engage with various sources of distraction; however, they perceive themselves as safe drivers, stemming from a lack of complete knowledge about distractions or even underestimation of distraction sources. Drivers are considering specific distractions such as mobile phone use as more important, including due to this emphasis in government-provided information, road rules, and enforcement. This perception appears to influence drivers' willingness to engage in alternative sources of distraction, such as smartwatches and in-vehicle monitor displays without knowing the potential risks (Oviedo-Trespalacios et al., 2019a). This lack of knowledge appears linked to the limited attention of Australian State governments in providing information and safety guidelines for drivers about their risks and developing comprehensive road rules that cover different aspects of the issue (Rejali et al., 2024b). Brodeur et al. (2021) found that smartwatches can be even more distracting than mobile phones while driving. They can reduce drivers' attention and ability to react quickly, with the smaller display making messages and notifications more difficult to read compared to when reading on mobile phones (Caird et al., 2014). Interactions with passengers can also increase crash risk, with drivers willing to engage with this source of distraction despite knowing the risks (Oviedo-Trespalacios et al., 2022). A meta-analysis

concluded that passenger interaction contributes to 3.55 % of all crashes across all age groups (Theofilatos et al., 2018). However, according to Charlton (2009), when engaging with passengers, drivers can regulate their conversations with passengers by selective disengagement, which has been found to be important for maintaining driving performance. These findings highlight the importance of providing comprehensive information and road rules to prevent confusion among drivers regarding the risks of distractions and encourage safe behaviour.

5. Policy implications

The findings of this study showed that government information on distracted driving is believed to be incomplete, especially in addressing different sources of distraction, with a notable emphasis on mobile phones. This study suggests more comprehensive inclusion of prevalent types of in-vehicle, external, and internal distractions, especially those related to technology, is required in current information sources. It is worth noting that while providing additional details may not necessarily improve education outcomes, concentrating on known areas of distracted driving could be effective.

The focus on mobile phones in government information, road rules, and enforcement measures was found to influence drivers' perceptions and behaviour toward distractions. Specifically, this influence leads to heightened concern about mobile phone use, even though other distractions may present similar risk profiles. Therefore, additionally, there should be a shift from device-specific or task-specific issues to a deeper understanding of proper vehicle control among drivers. Risk from emerging and ever-changing technological devices demands more proactive policies. Providing more information through public educational awareness campaigns and programs on various sources of distraction, clarifications of road rules and transparent enforcement may change the belief that engaging with distractions besides mobile phones is acceptable.

Based on the results, drivers are encountering difficulties in accessing sufficient authoritative information and rules about distracted driving. Current information and rules are not regularly communicated nor easily comprehensible for drivers. It is suggested that policymakers consider the level of readability of the information and rules on distracted driving to prevent any misunderstanding regarding these materials. Research tools such as readability indexes can be used to guide this effort, as has been demonstrated in previous research involving car manuals (Oviedo-Trespalacios et al., 2021). Further, the findings revealed that participants have limited knowledge about government information on distracted driving and related road rules due to the limited channels of communication from governments. To address this issue, providing information to high-risk groups like young drivers through specific channels relevant to them, such as social media, may assist with ensuring that the intended audience receives the necessary information.

The results also showed that respondents consider current road rules on distracted with some level of ambiguity and grey areas. This confusion includes both distracted driving rules (such as mobile phone use) and general rules that involve distraction (such as careless driving). Providing more detailed definitions and additional examples within road rules showing real scenarios involving distractions, along with safety guidelines for managing various sources of distraction while driving, could enhance clarity and understanding of the rules among drivers. Further, focusing on what constitutes distraction and incorporating this information in drivers' learning materials could provide clarity from the early stages of driving.

6. Limitations and future research

There exist some limitations that need to be acknowledged. First, this research was conducted in Queensland, Australia, and participants were required to hold a Queensland driver's licence. This specificity may limit the generalisability of the findings; however, it is important to note that such generalisation was not the primary objective of this qualitative study. Rather all views reported have importance, regardless of prevalence, such that the study findings provide insights with implications that can be useful for policymakers to consider worldwide, relative to their local situation. Future research could replicate the study in different jurisdictions, and translation of the key themes and subthemes into survey items for standardised response could allow evaluations of the extent of similarities and differences. Given the discrepancies in distraction-related information and legislation across different jurisdictions and countries, future studies are encouraged to use this methodology to assess perceptions of distracted driving and understand how these materials influence drivers' views. Additionally, future studies employing such quantitative methods could aim to assess prevalence of drivers' perceptions of government information and road rules on a larger scale informed by the current findings, with open-ended responses to identify any other themes not captured in the current sample. Another key issue missing in the present study is the need for further consideration of special high-risk populations, particularly young drivers, who are over-represented in crash data and may require specific information tailored to their unique characteristics (Oviedo-Trespalacios and Scott-Parker, 2018). Additionally, the type of vehicle that any driver operates is an independent and important factor to consider, as certain vehicle features may either exacerbate or mitigate distractions, necessitating targeted guidance and policies.

7. Conclusion

This study aimed to explore how drivers perceive and experience distractions and investigate the influence of current government information and road rules on shaping drivers' perceptions and behaviour towards driving distraction. By adopting a qualitative approach, the results showed that government information on distracted driving should cover all types of driver distractions, including new technologies, internal and external distractions. The results also showed that current road rules and enforcement measures were perceived to be focused on mobile phone use and failed to cover distractions completely. As a result, there is demonstrated confusion regarding legal and illegal distractions and relative perceived risks. This in turn is associated with inaccurate perceptions about being a safe driver, with drivers willing to engage in distracting behaviours and exploit road rule loopholes without fully understanding the risks. This study provides practical implications for policymakers worldwide to improve current information and road rules on distracted driving. There is a clear need for action to enhance the policies and educational materials, as well as research to support these initiatives.

CRediT authorship contribution statement

Sina Rejali: Writing – review & editing, Writing – original draft, Validation, Software, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Natalie Watson-Brown:** Writing – review & editing, Validation, Supervision, Methodology, Investigation, Data curation, Conceptualization. **Sherrie-Anne Kaye:** Writing – review & editing, Validation, Supervision, Methodology, Investigation, Data curation, Conceptualization. **Teresa Senserrick:** Writing – review & editing, Validation, Supervision, Investigation, Conceptualization. **Oscar Oviedo-Trespalacios:** Writing – review & editing, Validation, Supervision, Methodology, Investigation, Conceptualization.

Declaration of competing interest

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

Data availability

The authors do not have permission to share data.

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Appendix

Table A1
Participants' frequency of engagement with sources of distraction ($n = 35$).

Source of distraction		Proportion of responses (%)				
	Mean (SD)	Never	Occasionally	Sometimes	Often	Always
Talking, texting, or using a hand-held or hands-free mobile phone	**2.25 (1.09)**	31.4	28.6	22.9	17.1	0.0
Attending to, having conversations, interference by, or reacting to passengers	**3.02 (0.85)**	5.7	14.3	54.3	22.9	2.9
Adjusting vehicle audio system, radio, or personal music entertainment	**3.34 (1.10)**	5.7	17.1	28.6	34.3	14.3
Searching for food, eating, drinking, or smoking	**1.85 (0.77)**	37.1	40.0	22.9	0.0	0.0
Looking at or using display monitors, navigation system, or visual display units	**3.34 (1.32)**	11.4	17.1	20.0	28.6	22.9
Engaging with advanced driving assistance systems (ADAS)	**1.74 (0.98)**	51.4	31.4	11.4	2.9	2.9
Attending to or interference by animal, insect, or pets	**1.40 (0.55)**	62.9	34.3	2.9	0.0	0.0
Using personal hygiene accessories or grooming	**1.28 (0.45)**	71.4	28.6	0.0	0.0	0.0
Looking for, reaching, or tiding up an object	**2.00 (0.68)**	20.0	62.9	14.3	2.9	0.0
Sexual activities	**1.00 (0.00)**	100.0	0.0	0.0	0.0	0.0
Reading, writing, or looking at books, magazines, etc.	**1.02 (0.16)**	97.1	2.9	0.0	0.0	0.0
Manipulating vehicle controls and devices (mirrors, heater, AC, lights, seat belt, windows, etc.)	**3.17 (0.95)**	0.0	28.6	34.3	28.6	8.6
Looking at external objects or incidents on the road	**3.17 (0.82)**	0.0	17.1	57.1	17.1	8.6
Other road users' acts and behaviour	**3.45 (0.85)**	0.0	11.4	42.9	34.3	11.4
Looking at or interference by animals on the road	**2.51 (0.91)**	11.4	42.9	28.6	17.1	0.0
Affected by weather condition (e.g., rain) or glare	**2.94 (0.76)**	0.0	31.4	42.9	25.7	0.0
Affected by road conditions (lane, width, layout, etc.)	**2.80 (0.83)**	0.0	42.9	37.1	17.1	2.9
Daydreaming, getting lost in thoughts	**2.94 (1.05)**	5.7	28.6	42.9	11.4	11.4
Medical or emotional impairment (feeling stressed, nervous, pain, etc.)	**1.85 (1.00)**	48.6	25.7	17.1	8.6	0.0
Singing, dancing, or reacting to music	**2.22 (1.03)**	22.9	48.6	14.3	11.4	2.9
Body reactions (coughing, sneezing, itching, etc.)	**2.14 (0.60)**	8.6	71.4	17.1	2.9	0.0

Note: The range of means is from 1 to 5.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.aap.2024.107770.

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