Transportation Research Part F: Psychology and Behaviour 93 (2023) 11–22

Contents lists available at ScienceDirect

Transportation Research Part F: Psychology and Behaviour

journal homepage: www.elsevier.com/locate/trf

Too close for comfort: A mixed methods study to understand self-reported tailgating using the theory of planned behaviour

A.N. Stephens [a,*], K.L. Stephan [a], R. Crotty [a], S. O'Hern [a,b], G. Björklund [c]

[a] Monash University Accident Research Centre, Victoria Australia
[b] Transport Research Centre VERNE, Tampere University, Tampere 33014, Finland
[c] Swedish National Road and Transport Research Institute (VTI), Sweden

ARTICLE INFO

Keywords:
Tailgating
Close following
Crash
Driver behaviour
Theory of planned behaviour
Road safety

ABSTRACT

Background: Tailgating (following a lead vehicle too closely) is a key contributor to crashes and injury. While vehicle technology has the potential to reduce the trauma resulting from tailgating, full market penetration of these technologies is some time away. In the meantime, efforts to improve road safety can focus on supporting safer driver behaviour by targeting motivations for this behaviour.

Method: A mixed methods design was used to understand reasons why drivers tailgate and potential countermeasures to reduce this behaviour. Qualitative data from 247 drivers (males = 29 %; mean age = 39.86; SD = 14.39) were sought to understand circumstances when drivers are tailgated and when they report tailgating. In a second study, 736 drivers (males = 41 %; mean age = 37.69; SD = 14.27) responded to questions developed from the qualitative findings to quantify the frequency of tailgating and reasons behind it. The theory of planned behaviour (TPB) was applied to understand whether self-reported intention to tailgate could be predicted by attitudes, perceived social acceptance of the behaviour, perceived behavioural control, and past tailgating behaviour.

Results: Tailgating was a common behaviour. All drivers in the first study had experienced being tailgated by other drivers, while 77% had tailgated other vehicles; albeit 55% reported this was rare. Tailgating was unintentional (due to dense traffic; or lack of knowledge of safe following distance recommendations) or intentional (due to pressure from other drivers, anger or to change others' behaviour). Structural equation modelling showed that TPB constructs of attitude, social norms, perceived behavioural control and past tailgating behaviour predicted intention to tailgate, accounting for 66% of the variance.

Conclusion: TPB is a useful framework for explaining tailgating behaviour, or at least the intention to tailgate, and to develop interventions. These could focus on education of the risks of tailgating, the recommended safe following distances as well as strategies to support drivers maintaining safe following distances across different speed zones.

1. Introduction

Rear end crashes contribute significantly to road trauma. In Australia, rear-end crashes account for up to 40 % of motor-vehicle

* Corresponding author.
E-mail address: Amanda.stephens@monash.edu (A.N. Stephens).

https://doi.org/10.1016/j.trf.2022.12.005
Received 5 September 2022; Received in revised form 2 December 2022; Accepted 14 December 2022
Available online 23 December 2022

crash insurance claims, and up to 2 % of fatal crashes, however they are responsible for 16 % of serious injuries on urban roads and 8 % on rural roads (Beck, 2015). Newstead et al., (2020) found that 67 % of all fatal and serious injuries in Australia and New Zealand resulting from light-passenger vehicle rear end crashes could be mitigated with Autonomous Emergency Braking (AEB) fitted in all light vehicles. However, it may take decades for sufficient market penetration of AEB systems before a decline in injury-crashes is realised. In the meantime, other countermeasures are needed. One of these is to target driver behaviour, in particular, close-following (following a vehicle so closely it would be difficult to stop in an emergency, also referred to as "tailgating") which is a key contributor to rear-end crashes (Xu et al., 2021). First however, it is necessary to understand why drivers may intentionally, or unintentionally, follow other drivers too closely.

One of the most commonly used frameworks to understand and modify behaviour is the theory of planned behaviour (TPB; Ajzen, 1991). TPB suggests that behaviour is a manifestation of behavioural intention (i.e., most behaviour is intentional). This intention is driven by three determinants: *attitude*, *subjective norm* and *perceived behavioural control* (Ajzen, 1991, 2005). By way of example, attitude towards a behaviour is how positively or negatively-one regards that behaviour (e.g., is close following seen as a positive or negative behaviour?). Subjective norm refers to perceived social pressures and includes both a descriptive and an injunctive aspect, i.e., both how commonly the behaviour is seen in other people who are similar to the drivers, and if the drivers feel that significant others approve of them following other cars closely. Behavioural control relates to the level of control or ability one has to undertake the behaviour (e.g., do drivers feel they can control whether they tailgate or not?). If perceived behavioural control is low, this lack of control may have a direct influence on behaviour. By considering all these elements together, TPB takes a holistic view, focusing on multiple elements that influence the *intentions* to engage or not engage in specific behaviours. This enables interventions to improve safe behaviour to focus on improving *attitudes* towards the behaviour, challenging *subjective norms* about the behaviour, and educating about the dangers and risks of undertaking the behaviour.

Past behaviour has also been used as a predictor of intention. This is because past behaviour may become habitual (e.g., the semi-automatic performance of learned behaviour), influencing the intention to engage in certain behaviours (Charng et al., 1988). Ouellette and Wood (1998) suggest that there are two forms in which past behaviour influences intention. One describes the increase in experience and practice due to past behaviour that leads to habitual behaviour and increases the likelihood that the behaviour is triggered by cues and becomes automatic. Secondly, this past behaviour gives the person knowledge that can influence their future behaviour which is a more conscious response and may be mediated by TPB (Norman & Conner, 2006; Ouellette & Wood, 1998). Past behaviour may also have a moderating role, whereby increased frequency of past behaviour increases the strength of the attitude-intention interactions (Norman & Conner, 2006). Thus, it is important to consider past behaviour in the prediction of future behaviour through TPB.

Indeed, TPB has been used to understand a broad range of behaviours and develop interventions. For instance, TPB has been used to understand and combat illegal drug use (Armitage et al., 1999; Mcmillan & Conner, 2003), binge-drinking (Norman et al., 2007; Norman & Conner, 2006) and violence in dating (Lin et al., 2021). These studies have demonstrated the effectiveness of applying TPB and developing appropriate interventions for risky and dangerous behaviours.

TPB has also been applied in driving contexts to address unsafe behaviours such as dangerous over-taking (Forward, 2009), speeding (Elliott et al., 2007; Forward, 2009; Parker et al., 1992; Wallén Warner & Åberg, 2008; Wallén Warner et al., 2009), and drink driving (Li et al., 2016; Parker et al., 1992; Rivis et al., 2011). Forward (2009) analysed the responses from 275 drivers (aged 20–75 years) in Sweden after they had completed a self-report questionnaire including a scenario involving dangerous over-taking. Forward found that attitudes that were more positive towards the behaviour, stronger descriptive norms, and perceived ease of performing the behaviour (i.e., the persons' ability to perform the act) significantly predicted the intention for dangerous over-taking. Subjective norm and perceived behavioural control (i.e., how well the person could control their behaviour and avoid the act) had no effect. When past behaviour was included in the model, the attitudes no longer had any influence on the intention whereas the past behaviour had a strong influence. Likewise, Elliott et al. (2007) had 150 drivers in the UK (aged 17–75 years) complete a self-report questionnaire measuring elements of TPB focussed on intention to speed. The participants subsequently drove in a driving simulator and speed was measured during the drive. Speeding during the simulated drive could be successfully predicted by intention to speed, which in turn was predicted by the reported attitude, subjective norm, and perceived behavioural control. Additionally, Rivis et al. (2011) found that attitudes were an integral TPB element predicting willingness to drink drive among younger male drivers, and Li et al. (2016) found that drivers with a positive attitude towards drink driving were more likely to have done that in the past 30 days.

TPB has also been applied to understand close following behaviour. In a study of 881 drivers aged 17 and older, conducted 30 years ago, Parker et al. (1992) examined TPB in relation to a number of aberrant driving behaviours, including a scenario depicting close following. In a short vignette, drivers were asked to imagine they drove "close up until you are a couple of yards behind the other car". Drivers then responded to questions about why they may be driving that way, what might encourage them not to, and about who may or may not approve of that behaviour. TPB explained 23.4 % of the intention to tailgate. Attitude and subjective norm explained 20 % of the variance and perceived behavioural control explained the additional 3.4 %. Thus, there is evidence to suggest targeting attitudes and subjective norms may reduce close following driving behaviours.

However, the driving environment has changed considerably over the past three decades. More people are driving, leading to more traffic and increased congestion. For example, there has been a 10 % increase in the average number of cars per household from 2003 to 2019 in the UK and a similar stable increase in car ownership in Australia (Dargay et al., 2007). Changes in traffic flow conditions can reduce vehicle headways, creating more opportunities for close following, both intentional and unintentional. For example, congestion can lead to unintentional close following distances at slow speeds. However, close following is one of the behaviours most closely associated with angry and aggressive driving. Irritated drivers sometimes display anger through close following (Sullman, 2015; Stephens, Trawley & Ohtsuka, 2016) and being followed closely also irritates the driver being followed (e.g., Lajunen & Parker,

2001; Björklund, 2008). It is well known that anger or irritation in traffic can lead to aggressive and dangerous behaviours (e.g., Björklund, 2008; Sullman, 2015) which are associated with more serious crash types (Paleti et al., 2010). Finally, attitudes and perceived subjective norm are likely to have changed over the years, while driving culture can differ across countries and may evolve over time.

The aim of the current study was to understand reasons why drivers follow other drivers too closely (both intentionally and unintentionally) and to apply TPB, including past behaviour, to intentions to follow too closely. This study builds on previous research by taking a mixed methods approach to develop appropriate vignettes for drivers and use these to understand motivations for close following. This also represents the first time TPB has been applied to drivers in Australia to understand this aberrant behaviour. This is important given TPB relies on elements of subjective norms, perceived control and attitudes that are likely to be socially specific and differ across different driving cultures.

2. Methods

2.1. Study design

A mixed methods approach was taken using qualitative data to formulate the questions asked in the quantitative component. These approaches are discussed in further detail below.

Data were collected via the Qualtrics online survey platform. Ethical approval was granted from the lead author's University. Participants were recruited via that University's social media pages. Eligibility criteria for both components included being 18 or older and driving in the Australian Capital Territory (ACT). An eligibility check was included at the start of the survey. Participants were asked whether they were aged 18 or older, and if they drove in the ACT. Responses were in yes or no format. Responses of no at this point skipped the participant to the end of the survey. The study was conducted in the ACT due to funding requirements and because tailgating was highlighted in the ACT Road Safety Action Plan (2016–2020) as a behaviour to target. This was because 45 % of reported crashes in the ACT were rear end crashes at the time the Road Safety Plan was developed (Road Safety Action Plan, 2020), highlighting significant problems with this behaviour. A different sample of participants (with the same eligibility criteria) were recruited for each component, although some participants may have completed both. Given the anonymous nature of data collection, it is not possible to know if, or how many, participants completed both surveys. For consistency of responses, participants were provided with the following definition of close following, which for simplicity was referred to as tailgating: "Tailgating is defined as following another driver so closely it would be difficult to stop in an emergency". This definition was adapted from an item in the driver behaviour questionnaire (DBQ; Reason et al., 1990) that asks how frequently one: "drives so close to a vehicle in front that it would be difficult to stop in an emergency".

Qualitative component.

2.1.1. Procedure

The qualitative component served as a scoping study to understand more broadly the experiences of tailgating. This was not designed to explore components of TPB, rather to get a bigger picture of reasons for tailgating and under what conditions drivers found themselves being tailgated, which could be used to develop the quantitative scenarios.

The online qualitative survey was conducted in August 2019. The survey contained two questions seeking information about experiences with tailgating: 1. Can you tell us about a time when you have tailgated (followed another driver too closely) and what circumstances led to this? 2. Can you tell us if you have been tailgated by another driver and under what circumstances? Responses to the two questions were open ended. Results were analysed using NVivo by authors ANS and RC. Key themes underpinning the responses were identified and then responses independently coded into the themes. Initial agreement was high (Interrater reliability 0.81 to 0.85 for the two questions). Discrepancy items were discussed and final coding for those agreed between the two raters.

At the end of each question, participants were also provided with a five-point Likert scale (1 = never to 5 = always) asking how frequently they find themselves being tailgated and also tailgating others. Participants were also asked to provide their gender, age, and what type of licence they have. These demographic questions did not require a response, allowing participants to skip if they preferred. At the completion of the survey, and to avoid connecting identifying details with responses, participants were provided with a separate link to leave their contact details to enter a draw to receive an AUD$50 shopping voucher.

2.1.2. Participants

A total of 247 participants provided responses to one or both open-ended questions and the Likert-style questions. Participants ranged in age from 18 to 74 years (n = 241; M = 39.86; SD = 14.39) and 69 % were female; 29 % male and 2 % were non-binary or preferred not to say. Most of the drivers held a full licence (88 %), with 8 % being on a provisional/probationary licence (which indicates that they are within the first three years of first obtaining their driver license), and 1 % on a learner permit.

2.2. Quantitative component

2.2.1. Procedure

The online survey was conducted in the final quarter of 2019 (before the COVID-19 pandemic). The survey took approximately 15 min to complete. Participants were offered the opportunity to opt into a prize draw for an AUD$ 200 shopping voucher via a separate survey link, to protect anonymity.

2.2.2. Materials

The survey questions were designed from the qualitative findings. The survey was separated into the following sections:

Understanding of recommended following distances and speed preferences. To understand unintentional tailgating, participants were asked what the recommended following distances were between passenger cars on: 1) roads up to and including 80 km/h, 2) roads over 80 km/h and 3) in poor weather. Response categories were in ½ second increments from 1 s to 3 s. An "over 3 s" and a "do not know" response option were also provided.

Participant speed preferences were ascertained by asking what their preferred travel speeds were in speed zones of 40, 50, 60, 70, 80 and 100 km/h. Seven response options were provided (11 km or lower below the speed limit, 6–10 km/h below the speed limit, up to 5 km/h below the speed limit, on the speed limit, up to 5 km/h over the speed limit, 6–10 km/h over the speed limit, over 11 km/h or more over the speed limit).

Understanding reasons for, and responses to, being tailgated. Two sets of questions were included to understand common reasons for tailgating (six items) and responses to being tailgated (eight items; see Table 2). Participants rated the frequency for each (1 = never to 5 = always).

Theory of Planned behaviour: Multiple items for each component of TPB were included to allow for latent analysis. The structure of the generated items was designed from the qualitative findings and previously published studies using TPB to understand driving behaviour.

All items are presented in Table 3.

Intention: was measured with eight items describing scenarios identified in the qualitative study. Respondents were asked "for each scenario, how likely would you be to tailgate?" Responses were on a seven-point scale (1 = very unlikely, 7 = very likely). Intentions were based on Poulter and McKenna (2010; pre-drivers' intentions for safety behaviour) and Sullman et al. (2018; intentions to use a mobile phone while driving).

Attitude: was measured with seven items representing four positive and three negative aspects regarding tailgating. Participants rated each item on a five-point scale (1 = strongly disagree, 5 = strongly agree). Negative items were reverse coded, so that higher values indicated a more positive attitude toward tailgating.

Subjective norm: Nine items were used to measure general social norms for tailgating (both descriptive and injunctive norms). These included reference groups for friends and family (i.e., "my significant other expects me to tailgate": proximal references) and the broader driving culture (i.e., "Drivers who maintain safe following distances are good examples to others": distal social norms). Participants rated each item on a five-point scale (1 = strongly disagree, 5 = strongly agree).

Perceived behavioural control: Five items representing internal control or situation control were provided. Participants rated each item on a five-point scale (1 = strongly disagree, 5 = strongly agree).

Attitude, subjective norm and perceived behavioural control items were based on Paris and Van den Broucke (2008) who measured TPB and speed behaviour. For this reason, these items had a 5-point likert scale, which contrasted the 7-point scale measuring intentions.

Past behaviour: Past tailgating behaviour was measured by the question "In the past 12 months, how often have you intentionally followed someone too closely?" for each of the eight scenarios, based on the qualitative findings. Responses were on a 5-point scale (1 = never to 5 = always).

Demographics and driving. These included, age, gender (male, female, non-binary, other, prefer not to say), annual mileage (categories in increments of 5,000 km per year) and crashes and infringements in the past 12 months. Participants also reported whether they had AEB in their vehicle (yes, no, do not know).

2.2.3. Participants

A total of 1,114 people clicked on the survey and 736 of those completed the survey. Only complete responses were retained for analysis. Of those, 58 % were female, 41 % were male and 1 % were non-binary. Participants ranged in age from 18 to 76 years (M = 37.69; SD = 14.27).

2.2.4. Data handling

Data were analysed using SPSS and AMOS versions 28. Missing data were not imputed and will be reflected in reported sample sizes and degree of freedom values. Several variables were recoded for analysis. Gender was recoded into males, females and non-binary/prefer not to say. However, due to low numbers in the latter group, this group is only included in descriptive analyses. Mileage was recoded into low $\leq$ 10,000 km (13 % of the participants), medium = 10,001 to 20,000 km (42 % of the participants), and high = 20,001 or more kilometres (45 % of the participants). This was based on the Australian Bureau of Statistics reported average driver mileage of 12,700 km per year (ABS, 2018). Preferred speed was recoded into a binary variable "on or under the speed limit in all speed zones" and "over in at least one speed zone". This allowed broad grouping of participants according to speed preferences. Age was also categorised into five groups for comparisons. These were 18–21 (to reflect the probationary licence period); 22–25 (to reflect initial years on full licence); 26–49; 50 to 64; and 65 and older.

Independent t-tests and Mann Whitney U tests were used to compare tailgating behaviour and TPB variables across gender (men, women), age (groups as per above), crash involvement in the previous year (yes, no), infringements in the previous year (yes, no), preferred speed (on or under posted speed limit, over posted speed limit) and AEB in the vehicle (yes, no, unsure). Mann Whitney U tests were used for variables when one of the sub-samples was very small and/or had a skewed distribution. For the independent t-tests, in cases where Levene's test for equality was violated, equal variances not assumed are reported (and reflected in adjusted degree of freedom values). Bonferroni adjustments were made to account for multiple comparisons across the TPB variables (0.05/5 = 0.01).

Effect size interpretations followed Cohen's d (1988) and were considered as small (0.20), moderate (0.50) and large (0.80).

Relationships between the TPB variables were examined using Structural Equation modelling (SEM). A measurement model and a structural model were both fitted. The measurement model examined how well the items loaded onto their respective latent variables. The structural model tested the relationships between the latent constructs as depicted in Fig. 1. The structural model included TPB constructs and past behaviour to understand how well each construct predicts intention to tailgate. Past behaviour accounts for current driving practices or experience /habits for tailgating. Model fit was determined using a number of indices based on Hu and Bentler (1999). This was because a large sample size may lead to a significant p value for model fit and traditionally model fit is determined by a non-significant p-value. Therefore, goodness of fit indices of a comparative fit index (CFI) equal to or>0.90; a Root Mean Square of Approximation (RMSEA) value < 0.06 and 90 % confidence interval around the RMSEA with upper value < 0.06 and a non-significant P-close value (e.g., >0.05) were also used. The Chi-Square (X^2) is also reported as is the X^2/df ratio, which is appropriate at < 5.0.

3. Results

3.1. Qualitative results

3.1.1. Frequency of tailgating

Drivers felt that being tailgated was relatively common with 55 % of the participants saying this happens often and 8 % of the participants reporting always being tailgated (see Table 1). In contrast, the majority of the participants reported never or rarely tailgating (78 %) with 19 % reporting sometimes tailgating and 2 % reporting doing this often. There were no statistically significant differences between males and females, nor between the five age groups in frequency of either being tailgated or tailgating others.

3.1.2. Reasons for tailgating

The main reasons participants reported for tailgating included being angry or in a hurry or because a driver was seen as driving too slow for the conditions or lane position. Amongst respondents, tailgating was seen as a way to change the behaviour of other drivers or to punish other drivers for their behaviour. For example:

"It's like a little nudge to get them to go faster".

"When drivers pull out in front of me, I resent having to brake hard so I will again get closer than I should to send them a message"

Participants also reported perceived pressure from other drivers travelling behind the driver that led them to tailgate slower drivers in front of them. Other reasons given for tailgating included to prevent other drivers from merging into the gap between themselves and the lead vehicle.

"I tire of people constantly cutting in front of me (causing me to slow to leave a suitable gap). If I decrease the gap there is less likelihood of people constantly cutting in."

Drivers also reported unintentional tailgating. This occurred when they were fatigued or distracted, when the car in front braked unexpectedly or harshly, during heavy traffic or when they were trying to merge or overtake.

Several drivers reported that they do not tailgate. Reasons for this included anxiety, the danger posed by tailgating and previous involvement in a crash.

Overall, there were relatively few notable differences in age and gender within the qualitative responses. In terms of reasons why drivers tailgate, a higher percentage of the responses that indicated they avoid tailgating were from females (83 %) and those aged 26

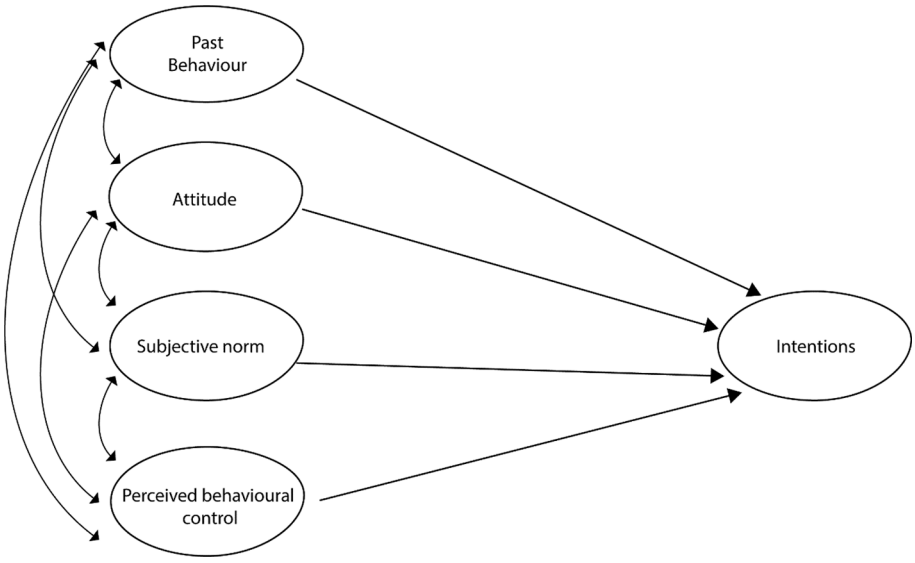

Fig. 1. Relationships between TPB components to predict intentions to tailgate that were tested with Structural Equation Modelling.

Table 1
Respondents' reported frequency of being tailgated and tailgating others.

Response alternative	Being tailgated by others	Tailgating others
Never	0.0 %	23.5 %
Rarely	6.9 %	55.1 %
Sometimes	30.0 %	19.4 %
Often	55.5 %	2.0 %
Always	7.7 %	0.0 %

Table 2
Frequency of tailgating and reasons for tailgating over the past 12 months (means and standard deviations) (N = 736).

Intentional tailgating behaviour in the past 12 months α = 0.87	Range: 1 (never) −5 (always) M (SD)
During the morning or evening commute	1.95 (1.00)
During general driving	1.49 (0.68)
On freeways or highways at 80 km/h or faster	1.45 (0.74)
On single lane roads	1.36 (0.60)
On dual lane roads at 60 km/h	1.35 (0.60)
On dual lane roads at 70 km/h	1.34 (0.60)
In residential streets (50 km/h)	1.26 (0.53)
In school zones (40 km/h)	1.17 (0.49)
Reasons for tailgating	Range: 1 (never) −5 (always) M (SD)
Due to congestion	2.20 (1.14)
Due to pressure from other drivers	1.81 (1.00)
To prevent other drivers from merging in front of you	1.66 (0.91)
To make other drivers go faster	1.62 (1.04)
To make other drivers move out of the way	1.49 (0.90)
When angry about another driver's behaviour (but not to get them to move or speed up)	1.34 (0.70)
Responses to being tailgated	Range: 1 (never) −5 (always) M (SD)
Nothing, I do not change my behaviour	3.15 (1.27)
Be vigilant about my own speed changes	3.11 (1.40)
Move out of the way	2.27 (1.02)
Reduce my speed	1.81 (0.90)
Speed up	1.72 (0.77)
Actively avoid roads known for tailgating	1.37 (0.80)
Retaliate in some way	1.29 (0.67)
Brake suddenly	1.18 (0.49)

to 49 (68 %). Thirty-seven per cent of respondents who said they tailgated as a result of anger and 43 % of respondents who tailgated to punish others were males. This was the highest representation from males across all response categories. Half (50 %) of the respondents who tailgate to punish others were aged 50 to 64 and similarly, 50 % of the respondents who tailgate to prevent other drivers cutting in were also from this age group.

3.1.3. Experiences of being tailgated

Being tailgated was perceived as a common experience. Most of the participants (63 %) felt that they were tailgated often to always. Four key themes emerged relating to circumstances when drivers were tailgated. These were 1) why they believed other drivers tailgate, 2) what types of drivers tailgate frequently, 3) what participants were doing when they were tailgated, and 4) how they responded, either emotionally or physically, to being tailgated.

Generally, participants believed other drivers tailgated due to lack of education about appropriate following distances. For example,

"*There is also a huge misunderstanding around how large a 3 s gap is and how important it is to keep, more important than getting somewhere 1 min faster.*"

A number of drivers also made reference to the types of drivers they felt tailgated more often and in particular, that these drivers tailgated for intimidation or aggression. Likewise, certain drivers, such as learner drivers, felt they were tailgated because of their learner status.

"As a woman I find some male drivers will also aggressively tailgate. I have experienced tailgating even as a learner driver in what I believe to be an attempt of intimidation."

"Being a driving instructor teaching learners I get tailgated on a daily basis."

Overall, circumstances when respondents were tailgated involved situations when they were travelling at the posted speed limit or lower and because it was an appropriate speed for the conditions. This included travelling slower at night when there were no streetlights, or when there was the possibility of wildlife crossing the road (e.g., kangaroos), or when lost and looking for directions.

Weather conditions were also noted as a reason for slower speeds. Some drivers reported that they always travel on the speed limit, while others made a point that they were travelling "just above" the speed limit and were still tailgated. As is to be expected, participants noted that it was the speed differential between themselves and the following car – mostly due to the perception that the other driver desired to drive faster – that led to them being tailgated.

"I am tailgated on main roads and on the parkways and highways, as I've found it is common practice in the ACT to go 10 km/hr faster than the posted speed limit…This tailgating behaviour continued not only as I reached the speed limit of 80(km/h), but as I approached 90 km/hr - the "standard" speed for that road."

There was a notable relationship between speed zone and the types of roads that participants reported tailgating was prevalent on. For example, a number of participants reported being tailgated on roads with higher speed limits. Others mentioned single lane roads being common locations for tailgating, due to the following vehicle being unable to overtake. Therefore, roads where overtaking is restricted, where speed limits change suddenly, or there is a common acceptance of designated lanes for designated speed compliance (e.g., slower vehicles keeping to the left on a multilane highway) appear to be the most common infrastructure for tailgating.

"I get tailgated pretty much every week, often more than once. Circumstances vary from single lane roads with hardly any traffic, to multi-lane roads in rush hour."

Participants reported emotional and behavioural responses to being tailgated. Several participants reported that they move into another lane or pull over to the side of the road when being tailgated, while others had more permanent avoidance behaviours. These involved actively avoiding driving at peak times, or times when they believed tailgating would be more common as well as avoiding certain roads known for having aggressive drivers.

"I find this happens ALL the time. I drive to the speed limit as it is indicated but this doesn't seem to please the majority of drivers. It is

Table 3
Theory of planned behaviour constructs, items and items means and standard deviations (N = 736).

***Intention to tailgate* α = 0.91**	Range: 1 (very unlikely) – 7 (very likely) M (SD)
Driving in the right lane of a double lane road behind a driver who is driving below the speed limit and you cannot overtake	3.51 (2.05)
You are on a road where the speed limit has increased but the driver in front has not adjusted their speed	3.48 (1.86)
When you are under time-pressure and need to get to your destination quickly	3.16 (1.77)
Driving on a single lane road behind a driver who is driving under the speed limit, and you cannot overtake	3.03 (1.78)
When you are on a road where cars often merge in front of you	2.96 (1.71)
When frustrated that a car has just "cut you off" [1]	2.53 (1.69)
Trying to overtake using the right lane and a car in front of you is travelling up to 5 km/h over the speed limit	2.34 (1.49)
Driving at night on a single lane road, behind a driver driving under the speed limit and you cannot overtake	2.21 (1.51)
Attitude toward tailgating α = 0.90	Range: 1 (strongly disagree) −5 (strongly agree) M (SD)
Tailgating is inconvenient for other drivers (reverse coded)	1.96 (0.99)
Tailgating enables you better to help the traffic flow	1.78 (1.00)
Tailgating is stressful (reverse coded)	1.64 (0.82)
Tailgating gives you control over the situation	1.63 (0.78)
Tailgating helps you arrive at your destination more quickly	1.62 (0.81)
Tailgating is exciting	1.47 (0.77)
Tailgating increases the risk of rear end crashes (reverse coded)	1.26 (0.78)
Subjective norm total (including descriptive and injunctive items) α = 0.63	Range: 1 (strongly disagree) −5 (strongly agree) M (SD)
Descriptive norm α = 0.69	
Most drivers in the ACT tailgate	3.76 (1.04)
Drivers who do not tailgate are the exceptions	3.28 (1.08)
Most ACT drivers disapprove of tailgating (reversed)	3.00 (1.04)
Most of my friends and family tailgate	2.65 (0.98)
Injunctive norm α = 0.59	
My partner thinks that I should not tailgate (reversed) – removed	*2.54 (1.15)*
Occasionally tailgating is acceptable	2.29 (1.03)
Most of my friends and acquaintances think that drivers should not tailgate (reversed)	2.14 (0.80)
Drivers who maintain safe following distances are examples for others (reversed)	2.03 (0.87)
People who keep large following distances make fools of themselves	1.84 (0.85)
Perceived behavioural control α = 0.73	Range: 1 (strongly disagree) −5 (strongly agree) M (SD)
I can avoid tailgating, even when being pressured by others (reversed)	3.67 (0.98)
In contemporary traffic, one must adjust to others and can often find themselves tailgating	3.21 (1.10)
I only tailgate when I choose to – removed	*2.92 (1.22)*
Whether or not I tailgate depends on the circumstances, not on me	2.56 (1.16)
I have tried to avoid tailgating but I cannot	2.44 (1.10)

[1] Being "cut off" is when a driver merges in front requiring a responsive action to avoid crash.

intimidating, dangerous and causes me great anxiety. There are certain roads and certain times of day I won't drive now."

As above, there were no notable differences across age and gender for times when drivers got tailgated. One exception was that 72 % of respondents who said this was due to other drivers being distracted or uneducated were males.

3.2. Quantitative results

The quantitative data supported the qualitative findings that tailgating can be intentional or unintentional. In terms of unintentional tailgating, only half of the participants were aware that the recommended following distance is to leave at least three seconds to the vehicle in front for both speed zones<80 km/h (56 %) and for zones of 80 km/h or faster (50 %). This aligns with the qualitative findings that some drivers felt others need more education about the following distance recommendations in some speed zones. However, most of the participants were aware of the recommendation to follow another passenger vehicle at a distance greater than three seconds in poor weather (81 %).

3.2.1. Tailgating behaviour, reasons for and theory of planned behaviour variables

Table 2 shows the self-reported tailgating behaviour in the past year as well as the reasons for it. The most common situation for tailgating was during the morning or evening commute. This is likely to be when traffic densities are higher and is a situation that most participants would experience (i.e., most would commute to and from work or university). In support of this, congestion was identified as the most common reason for tailgating, followed by perceived pressure from other drivers, and to prevent drivers from merging in front. Interestingly, the most common response to being tailgated was to not change behaviour and to continue to drive normally.

Table 4
Past tailgating behaviour, and theory of planned behaviour constructs across different groups (means and standard deviations).

	Past tailgating behaviour M (SD)	Intention to tailgate M (SD)	Attitude M (SD)	Subjective norm (using descriptive norm only) M (SD)	Perceived behavioural control M (SD)
Total (n = 736)[#]	1.42 (0.48)	2.91 (1.34)	1.62 (0.56)	3.17 (0.75)	2.62 (0.79)
Gender (n = 731)					
Men (39.8 %)	1.45 (0.53)	2.94 (1.41)	**1.70 (0.61)**	3.12 (0.80)	2.62 (0.78)
Women (60.2 %)	1.40 (0.46)	2.90 (1.28)	**1.57 (0.52)**	3.20 (0.70)	2.63 (0.80)
	t (729) = 1.51, p =.07, d = 0.11	t (610.05) = 0.40, p =.35, d = 0.03	t (582.29) = 2.94, p =.002, d = 0.23	t (729) = 1.28, p =.20, d = 0.09	t (729) = 0.06, p =.95, d = 0.004
Age group (n = 716)					
18 to 21 (15.0 %)	1.55 (0.60)[a]	3.30 (1.48)[a]	1.72 (0.61)	3.14 (0.73)	2.87 (0.69)[a]
22 to 25 (12.6 %)	1.52 (0.48)[a,c]	3.25 (1.27)[a]	1.70 (0.59)	3.21 (0.64)	2.82 (0.77)[a]
26 to 49 (50.5 %)	1.41 (0.47)[a,b]	2.84 (1.31) [b]	1.58 (0.57)	3.21 (0.75)	2.56 (0.79)[b]
50 to 64 (17.8 %)	1.33 (0.47)[b]	2.67 (1.27) [b,c]	1.62 (0.52)	3.10 (0.81)	2.48 (0.81)[b]
65 and older (4.1 %)	1.24 (0.32)[b,c]	2.24 (1.03)[c]	1.53 (0.49)	3.20 (0.71)	2.47 (0.79)[ab]
	F(4,711) = 5.09, p <.001, η_p^2 = 0.028	F(4,710) = 7.27, p <.001, η_p^2 = 0.039	F(4,711) = 1.98, p =.095, η_p^2 = 0.011	F(4,711) = 0.57, p =.69, η_p^2 = 0.003	F(4,711) = 6.29, p <.001, η_p^2 = 0.034
Crashes (n = 735)					
Yes (9.4 %)	**1.57 (0.59)**	3.26 (1.51)	1.76 (0.65)	**3.37 (0.62)**	2.84 (0.86)
No (90.6 %)	**1.41 (0.48)**	2.87 (1.32)	1.61 (0.53)	**3.15 (0.76)**	2.60 (0.78)
	z = 2.55, p =.01, r = 0.09	z = 2.09, p =.04, r = 0.08	z = 1.78, p =.08, r = 0.07	z = 2.09, p =.01, r = 0.08	z = 2.41, p =.02, r = 0.08
Infringements (n = 732)					
Yes (10.3 %)	1.49 (0.50)	3.17 (1.27)	1.77 (0.60)	3.10 (0.63)	2.71 (0.81)
No (89.7 %)	1.41 (0.47)	2.89 (1.34)	1.61 (0.56)	3.18 (0.76)	2.61 (0.79)
	z = 1.91, p =.06, r = 0.07	z = 1.83, p =.07, r = 0.07	z = 2.33, p =.02, r = 0.09	z = 1.23, p =.21, r = 0.05	z = 0.99, p =.32, r = 0.04
Speed preferences (n = 717)					
On or under the speed limit in all zones (48.1 %)	**1.25 (0.35)**	**2.36 (1.09)**	**1.44 (0.44)**	3.19 (0.78)	**2.44 (0.82)**
Over the speed limit in at least one zone (51.9 %)	**1.59 (0.55)**	**3.45 (1.34)**	**1.80 (0.61)**	3.16 (0.73)	**2.80 (0.73)**
	t (627.72) = 9.63, p < 001, d = 0.71,	t (700.23) = 11.96, p <.001, d = 0.89	t (669.91) = 9.23, p <.001, d = 0.68	t (713) = 0.53, p =.60, d = 0.04	t (689.34) = 6.04, p <.001, d = 0.45
Automatic emergency braking in their vehicle (n = 735)					
Yes (25.2 %)	1.44 (0.54)	2.88 (1.30)	1.60 (0.55)	3.22 (0.75)	2.55 (0.81)
No (52.0 %)	1.44 (0.50)	2.96 (1.37)	1.67 (0.60)	3.14 (0.74)	2.62 (0.79)
Unsure (22.8 %)	1.37 (0.43)	2.82 (1.31)	1.62 (0.56)	3.19 (0.77)	2.70 (0.79)
	F (2,732) = 1.11, p =.33, η_p^2 = 0.003	F (2,731) = 1.21, p =.51, η_p^2 = 0.002	F (2,732) = 2.69, p =.07, η_p^2 = 0.007	F (2,732) = 0.78, p =.46, η_p^2 = 0.002	F (2,732) = 1.51, p =.22, η_p^2 = 0.004

[#] intention has a sample size of 735; Bold = significant difference between group mean scores at $p \leq 0.01$; [a,b,c] = means having the same superscript are not significantly different from each other at $p \leq 0.01$; t = independent *t* test, d = Cohen's d; z = Mann Whitney *U* test; r = Mann Whitney U effect size; F = one-way ANOVA; η_p^2 = partial eta squared.

TPB constructs and items are shown in Table 3. Most commonly, drivers reported intending to tailgate when travelling behind a slower driver in the right-hand lane, which is the inside or overtaking lane in Australia. However, the average score for the participants was<3 out of a possible 7 (very unlikely to very likely), indicating low levels of intention for the behaviour. The situation where drivers were least likely to tailgate was at night when driving on a single lane road. Drivers reported high perceptions that tailgating was socially acceptable, and that they perceived they had control when tailgating. It should be noted that, except for the intention variable, the scale range for the TPB constructs was 1 (strongly disagree) to 5 (strongly agree). Therefore, average scores below 3 (representing neutral) indicate disagreement with the statement.

As can be seen in Table 3, the subjective norm construct showed a low alpha level (i.e., 0.63), slightly less than a desirable 0.70 (a level that indicates good reliability). Therefore, these items were subjected to exploratory factor analyses to understand the best structure for the data. Principal Axis Factoring with direct oblimin rotation showed the item "my partner thinks I should not tailgate" had low commonalities and was removed from the construct. The remaining items fell into two factors (KMO = 0.676; Bartlett's Test of Sphericity < 0.001). The first represented descriptive norm (28 % of variance explained, α = 0.69). The second represented injunctive norm (21 % variance, α = 0.59). Given the low alpha on the total subjective norm and the injunctive factor, the descriptive norm construct was used in the SEM model.

3.2.2. Group differences across tailgating behaviour and theory of planned behaviour constructs

Table 4 shows tailgating behaviour in the previous 12 months and TPB constructs considered across driver characteristics. Note the differing sample sizes to reflect missing responses for some variables. Younger drivers tended to report more intentions to tailgate, with drivers aged 18 to 21 years and 22 to 25 years reporting higher intentions than those aged over 50 years. There were few differences in scores between men and women. Drivers who had been in a crash in the previous 12 months, reported more frequent tailgating over those months compared to those who had not been involved in a crash and also reported higher descriptive norms (i.e., perceived higher acceptance of tailgating from friends and family). Of interest, perceived behavioural control and intention to tailgate were also higher for those who had been involved in a crash compared to those who had not been involved in a crash ($p < .05$). The strongest associations were found between speed preferences and behaviour as well as almost all TPB constructs. Drivers who reported a tendency to drive above the speed limit also reported more frequent tailgating behaviour, more positive attitudes towards tailgating, higher intention to tailgate, and higher perceived behavioural control.

3.2.3. Predicting intention to tailgate using the theory of planned constructs and past behaviour

The measurement model with TPB constructs and past behaviour demonstrated good fit to the data. This was evidenced by the following fit statistics: X^2 (418) = 1033.18, $p < .001$; $X^2/df = 2.47$; CFI = 0.93; RMSEA = 0.047 (90 %CI = 0.043-0.050), P-close = 0.93. Six error pairs were allowed to covary, suggesting redundancy in some items. One pair was from the attitude construct, reverse coded items "tailgating is inconvenient for other drivers" and "tailgating is stressful" (r = 0.39). Four pairs were from the past behaviour variable and were: following too closely "In school zones (40 km/h)" with "In residential streets (50 km/h)" (r = 0.34); "On dual lane roads at 60 km/h" and "On dual lane roads at 70 km/h" (r = 0.52); "On dual lane roads at 70 km/h" with "On freeways or highways at 80 km/h or faster" (r = 0.28); and, "In school zones (40 km/h)" and "In dense traffic during the morning or evening commute" (r = 0.24). This suggests a redundancy is separating dual roads across speed zones to understand tailgating behaviour. One intention pair was also co-varied. This was "Driving on a single lane road behind a driver who is driving under the speed limit, and you cannot overtake" and "Driving at night on a single lane road, behind a driver driving under the speed limit and you cannot overtake" (r

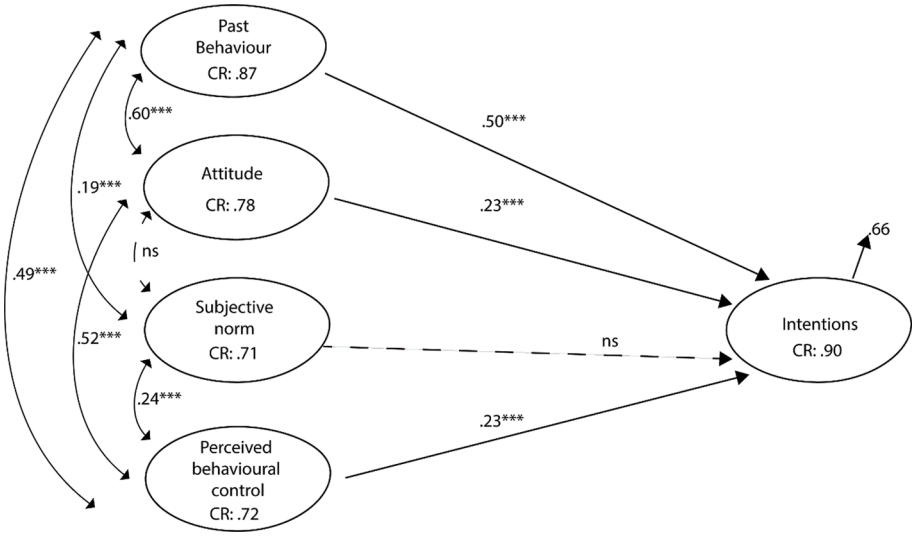

Fig. 2. Results of the SEM testing relationships between theory of planned behaviour constructs to explain intention to tailgate. NB: standardised regression coefficients and correlations between latent constructs, *** p <.001; ns = not significant; CR = composite reliability.

= 0.49).

All standardised regression coefficients were significant in the model and 87 % (27/31) were > 0.50. The lowest loadings were 0.35 for the behaviour item "In school zones (40 km/h)" and 0.36 for the reversed attitude item: "Tailgating increases the risk of rear end crashes". The highest loading was 0.87 for the intention item "You are on a road where the speed limit has increased but the driver in front has not adjusted their speed".

Fig. 2 shows the full model with prediction paths from attitude, subjective norm, perceived behavioural control and past behaviour to intention. The model demonstrated good fit: X^2 (418) = 1033.18, p <.001; X^2/df = 2.47, CFI = 0.93, RMSEA = 0.047 (90 %CI = 0.043-0.050), P-close = 0.93.

Attitudes, subjective norm, perceived behavioural control and past behaviour explained 66 % of the variance in intention to tailgate. Subjective norm did not directly predict intentions. Past behaviour had the strongest relationship with intention to tailgate, with a standardised regression loading of 0.50. Attitudes and perceived behavioural control also related to intentions to tailgate with standardised regression loadings of 0.23. Strong relationships between attitude and perceived behavioural control were also found; while the relationship between attitude and subjective norm was not significant. Past behaviour was also strongly related to attitude towards tailgating and perceived behavioural control.

4. Discussion

The aim of this study was to explore the frequency of and reasons for close following behaviour (e.g., tailgating) and to examine the suitability of TPB in predicting the intention for this behaviour. To address this aim, a mixed methods approach was taken to identify reasons for tailgating, which in turn will support the development of effective interventions. We found that tailgating can be unintentional (i.e., due to dense traffic or lack of knowledge of the following distance recommendations) or intentional. Intention to tailgate can be effectively predicted using constructs from TPB. Our results showed that intention to tailgate may be higher for drivers with more positive attitudes towards tailgating, who feel they cannot control situations conducive to tailgating and who already tailgate. These results provide evidence to support a range of countermeasures to target intentional and unintentional close following.

Education and vehicle technology are likely to provide effective countermeasures for unintentional tailgating (Newstead et al., 2020; Stead et al., 2005). In the current sample, only half of the participants knew the recommendations for following distance. Thus, campaigns could raise awareness of the guidelines and provide strategies to support drivers to maintain safe following distances across a range of speed zones. Vehicle technology, such as headway assist, and autonomous emergency braking will also support safer driving through headway warnings and driver assistance in situations when harsh braking is required, reducing the occurrence of rear-end collisions (Newstead et al., 2020). Adaptive cruise control systems also assist drivers in keeping a safe headway. However, these will also be reliant upon appropriate infrastructure (Peiris et al., 2022).

Intentional tailgating may require a different approach for intervention. Our results show that tailgating was used as, and viewed as, a mechanism to change another driver's behaviour. This behaviour may be hostile (as a result of frustration or anger) or instrumental (to achieve a specific goal and not emotionally reactive; Berkowitz, 2014). Both examples were evident in why drivers tailgate and in the self-reported circumstances under which drivers are tailgated. For example, drivers reported tailgating to encourage slower drivers to speed up, or change lanes, and in response to annoying or frustrating behaviours (which were often also related to speed). Indeed, the quantitative data showed that intentions to tailgate were highest in situations when a lead driver was driving slowly in the overtaking lane. The item that loaded the most strongly in the measurement model was tailgating when the speed limit has increased but the driver in front has not adjusted their speed. This point is further supported by the strong associations found between speed preferences and tailgating behaviour. Drivers who generally preferred to exceed the speed limit reported higher levels of tailgating than those who preferred to drive on or under the speed limit, as well as higher levels of most other predictors for intention to tailgate.

Speed therefore emerged as the main cause of and reason for tailgating. Drivers reported that they followed other drivers too closely when that driver was driving under the speed limit. The qualitative data expanded this point with several drivers noting how far under the limit they were (i.e., 10 or 20 km/h). Tailgating behaviour was most common when drivers were unable to move past the slower lead vehicle, which again fits within standard aggression theories that anger and aggression occur when a goal is blocked, by an obvious perpetrator who is perceived to have been able to avoid that behaviour (Berkowitz, 2014). This last point is noteworthy given that many participants who tailgated also mentioned that the actions of the other driver were wrong or illegitimate for the road situation (i.e., travelling slow in the fast lane; cutting in front in a safe gap).

Following on from this, two interesting and complementary findings emerged when analysing the circumstances under which drivers found themselves being tailgated. Again, speed was the most prevalent theme among the responses. However, drivers reported their speed as either being appropriate for the driving conditions (i.e., slower speeds in wet conditions), in compliance with the posted limit, or "just" over the limit. Therefore, there was a notable discord between the speed discrepancies under which drivers reported tailgating, with the speed discrepancies under which drivers were tailgated. This alludes to three issues: 1) driver may not accurately judge their own speed, or others' speeds, or may judge them differently; 2) There may be "unofficial" speeds on certain roads, particularly highways or freeways; and 3) drivers may rarely consider the reason for another driver's speed choices, assuming or judging these to be "inappropriate" rather than "safe" driving. The latter may represent an attributional bias (e.g., Baxter et al., 1990) whereby drivers attribute their behaviours, both when tailgating and being tailgated, to the circumstances, i.e., an external factor. Yet, they attribute the behaviour of others, both when the others were tailgating and became tailgated by the respondents, to a personal factor, that the other driver did something wrong in some way. Previous qualitative research has found similar tendencies to explain aggressive driving behaviour (Lennon et al., 2011) and suggests further avenues for educational intervention.

For example, perceived social norms about tailgating culture combined with positive attitudes towards tailgating and a lower sense

of control over external factors predicted intentions to tailgate in the future. Thus, efforts to reduce tailgating behaviour – or at least, the intention to execute this behaviour – could focus on challenging existing positive attitudes towards the behaviour and educating drivers about the risks associated with tailgating (i.e., targeting attitudes). Research into drink driving and speeding behaviours in Australia has shown that drivers engage in these behaviours when they do not think they will get caught (i.e., by police), when they have friends and family who also do this, and when they underestimate the inherent risks (Stephens et al., 2016; 2017).

Research from the UK has successfully applied TPB to a campaign to reduce the speeding behaviour of drivers. In a series of advertisements, Stead et al., (2005) targeted attitude by highlighting that speeding can contribute to crashes. Subjective norm was addressed by targeting the discrepancy between drivers' approving view of their speeding behaviour compared to the disapproving and irritation evoked in the passengers. Perceived behavioural control was targeted through emphasis that drivers are in control of their driving (Stead et al., 2005). Evaluations showed a significant reduction in speeding behaviour as a result of the campaign. Given that speed is a key element of tailgating, it is likely that these types of interventions would show similar success in reducing tailgating behaviour for Australian drivers.

4.1. Limitations

The findings of this study rely on self-reported behaviour in a sample of drivers from the Australian Capital Territory (ACT) in Australia. To reduce any potential biases related to self-reporting of "aberrant" behaviours, participants were assured of their anonymity and were able to complete the questionnaire at a time and location convenient for them. This has shown to help reduce any socially desirable responding (Lajunen & Summala, 2003). Further, drivers in the ACT may not be representative of the broader driving culture in Australia or beyond. However, the nature of TPB and its reliance on culturally accepted norms and behaviours, means that it is important to consider specific driving cultures, before generalising to more heterogenous driving groups. Further research could be performed to determine if these findings are replicated in other samples of drivers.

A further potential limitation is the conceptualisation of TPB items. Past behaviour, attitude, subjective norm and perceived behavioural control were measured with a five-point likert scale. This response category differed from the seven-point likert scale to measure intentions. The latter is more consistent with recommendations for measuring TPB (Ajzen, 2019). Further, while the items were based on groupings suggested in previous literature (Paris & van den Broucke, 2008), they may not represent the conventional theory of planned behaviour items within their respective constructs (see Ajzen, 2019). This may explain why the subjective norm factor demonstrated less than ideal reliability with Cronbach's alpha (0.63) below the recommended cut-off of 0.70. However the subjective norm construct has previously shown similar low alpha values (Wallén Warner & Åberg, 2008; Wallén Warner et al., 2009). It may also explain why the relationships found between subjective norm and other constructs were weak to non-significant. Further research could build on the current findings by refining / rewording the items that have been shown to contribute to each factor, with emphasis on how best to capture subjective norm related to tailgating behaviour.

4.2. Conclusions and practical implications

Notwithstanding the limitations above, our results suggest that TPB provides a useful framework for understanding and developing interventions to reduce tailgating behaviour. These could focus on education of the risks of tailgating and the recommended following distances as well as strategies to support drivers maintain these distances across different speed zones.

CRediT authorship contribution statement

A.N. Stephens: Conceptualization, Data curation, Methodology, Formal analysis, Funding acquisition, Project administration, Writing – original draft, Writing – review & editing. **K.L. Stephan:** Conceptualization, Funding acquisition, Writing – original draft, Writing – review & editing. **R. Crotty:** Writing – original draft, Writing – review & editing. **S. O'Hern:** Conceptualization, Funding acquisition, Writing – original draft, Writing – review & editing. **G. Björklund:** Conceptualization, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

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

Data availability

The authors do not have permission to share data.

Acknowledgment

This research was made possible with the support of the NRMA_ACT Road Safety Trust and Monash University Accident Research Centre.

References

https://www.abs.gov.au/statistics/industry/tourism-and-transport/survey-motor-vehicle-use-australia/12-months-ended-30-june-2018.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Ajzen, I. (2005). *Attitudes, Personality and Behaviour*. McGraw-Hill Education (UK).

Ajzen, I., (2019). Constructing a theory of planned behavior questionnaire. Retrieved from https://people.umass.edu/aizen/pdf/tpb.measurement.pdf.

Armitage, C. J., Armitage, C. J., Conner, M., Loach, J., & Willetts, D. (1999). Different Perceptions of Control: Applying an Extended Theory of Planned Behavior to Legal and Illegal Drug Use. *Basic and Applied Social Psychology, 21*(4), 301–316. https://doi.org/10.1207/S15324834BASP2104_4

Baxter, J. S., MacRae, C. N., Manstead, A. S. R., Stradling, S. G., & Parker, D. (1990). Attributional biases and driver behaviour. *Social Behaviour, 5*, 185–192.

Beck, D. (2015). *Greater understanding of rear-end crashes in a Safe System*. Australasian College of Road Safety. https://acrs.org.au/article/greater-understanding-of-rear-end-crashes-in-a-safe-system/.

Berkowitz, L. (2014). *Towards a general theory of anger and emotional aggression: Implications* (p. 6). Perspectives on anger and emotion: Advances in social cognition.

Björklund, G. M. (2008). Driver irritation and aggressive behaviour. *Accident Analysis & Prevention, 40*(3), 1069–1077.

Charng, H.-W., Piliavin, J. A., & Callero, P. L. (1988). Role identity and reasoned action in the prediction of repeated behaviour. *Social Psychology Quarterly, 51*, 3030–3317.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (pp. 20–26). NJ: Lawrence Erlbaum Associates. Hillsdale.

Dargay, J., Gately, D., & Sommer, M. (2007). Vehicle ownership and income growth, worldwide: 1960–2030. *The Energy Journal, 28*(4), 143–171.

Elliott, M. A., Armitage, C. J., & Baughan, C. J. (2007). Using the theory of planned behaviour to predict observed driving behaviour. *British Journal of Social Psychology, 46*(1), 69–90. https://doi.org/10.1348/014466605X90801

Forward, S. E. (2009). The theory of planned behaviour: The role of descriptive norms and past behaviour in the prediction of drivers' intentions to violate. *Transportation Research Part F: Traffic Psychology and Behaviour, 12*(3), 198–207. https://doi.org/10.1016/j.trf.2008.12.002

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1–55.

Lajunen, T., & Parker, D. (2001). Are aggressive people aggressive drivers? A study of the relationship between self-reported general aggressiveness, driver anger and aggressive driving. *Accident Analysis and Prevention, 33*, 243–255.

Lajunen, T., & Summala, H. (2003). Can we trust self-reports of driving? Effects of impression management on driver behaviour questionnaire responses. *Transportation Research Part F: Traffic Psychology and Behaviour, 6*(2), 97–107.

Lennon, A., Watson, B., Arlidge, C., & Fraine, G. (2011). 'You're a bad driver but I just made a mistake': Attribution differences between the 'victims' and 'perpetrators' of scenario-based aggressive driving incidents. *Transportation Research Part F, 14*, 209–221.

Li, Q., He, H., & Hyder, A. A. (2016). 553 The theory of planned behaviour for drinking and driving: An empirical validation using data collected in two Chinese cities from 2010 to 2014. *Injury Prevention, 22*, A199. https://doi.org/10.1136/injuryprev-2016-042156.553

Lin, C.-Y., Tseng, Y.-H., Lin, M.-L., & Hou, W.-L. (2021). Factors Related to Intentions to Commit Dating Violence among Taiwanese University Students: Application of the Extended Theory of Planned Behavior. *International Journal of Environmental Research and Public Health, 18*(4), 1956. https://doi.org/10.3390/ijerph18041956

Mcmillan, B., & Conner, M. (2003). Applying an Extended Version of the Theory of Planned Behavior to Illicit Drug Use Among Students1. *Journal of Applied Social Psychology, 33*(8), 1662–1683. https://doi.org/10.1111/j.1559-1816.2003.tb01968.x

Newstead, S., Budd, L., & Stephens, A. (2020). *The Potential Benefits of Autonomous Emergency Braking Systems in Australia*. 116.

Norman, P., Armitage, C. J., & Quigley, C. (2007). The theory of planned behavior and binge drinking: Assessing the impact of binge drinker prototypes. *Addictive Behaviors, 32*(9), 1753–1768. https://doi.org/10.1016/j.addbeh.2006.12.009

Norman, P., & Conner, M. (2006). The theory of planned behaviour and binge drinking: Assessing the moderating role of past behaviour within the theory of planned behaviour. *British Journal of Health Psychology, 11*(1), 55–70.

Ouellette, J. A., & Wood, W. (1998). Habit and intention in everyday life. *Psychological Bulletin, 124*, 54–74.

Paleti, R., Eluru, N., & Bhat, C. R. (2010). Examining the influence of aggressive driving behavior on driver injury severity in traffic crashes. *Accident Analysis & Prevention, 42*(6), 1839–1854.

Parker, D., Manstead, A. S. R., Stradling, S. G., Reason, J. T., & Baxter, J. S. (1992). Intention to Commit Driving Violations: An Application of the Theory of Planned Behavior. *Journal of Applied Psychology, 77*(1), 94–101.

Paris, H., & Van den Broucke, S. (2008). Measuring cognitive determinants of speeding: An application of the theory of planned behaviour. *Transportation Research Part F: Traffic Psychology and Behaviour, 11*(3), 168–180.

Peiris, S., Newstead, S., Berecki-Gisolf, J., Chen, B., & Fildes, B. (2022). Quantifying the lost safety benefits of ADAS technologies due to inadequate supporting road infrastructure. *Sustainability, 14*(4), 2234.

Poulter, D. R., & McKenna, F. P. (2010). Evaluating the effectiveness of a road safety education intervention for pre-drivers: An application of the theory of planned behaviour. *British Journal of Educational Psychology, 80*(2), 163–181.

Reason, J., Manstead, A., Stradling, S., Baxter, J., & Campbell, K. (1990). Errors and violations on the roads: A real distinction? *Ergonomics, 33*(10–11), 1315–1332.

Rivis, A., Abraham, C., & Snook, S. (2011). Understanding young and older male drivers' willingness to drive while intoxicated: The predictive utility of constructs specified by the theory of planned behaviour and the prototype willingness model. *British Journal of Health Psychology, 16*(2), 445–456.

Road Safety Action Plan (2020). Publication No 15/1571, Retrieved from https://www.cityservices.act.gov.au/_data/assets/pdf_file/0003/1686306/2016-2020_ACT_Road_Safety_Action_Plan_FA.pdf.

Stead, M., Tagg, S., MacKintosh, A. M., & Eadie, D. (2005). Development and evaluation of a mass media Theory of Planned Behaviour intervention to reduce speeding. *Health Education Research, 20*(1), 36–50. https://doi.org/10.1093/her/cyg093

Stephens, A. N., Bishop, C. A., Liu, S., & Fitzharris, M. (2017). Alcohol consumption patterns and attitudes toward drink-drive behaviours and road safety enforcement strategies. *Accident Analysis & Prevention, 98*, 241–251.

Stephens, A. N., Nieuwesteeg, M., Page-Smith, J., & Fitzharris, M. (2017). Self-reported speed compliance and attitudes towards speeding in a representative sample of drivers in Australia. *Accident Analysis & Prevention, 103*, 56–64.

Sullman, M. J. M. (2015). The expression of anger on the road. *Safety Science, 72*, 153–159.

Sullman, M. J. M., Hill, T., & Stephens, A. N. (2018). Predicting intentions to text and call while driving using the theory of planned behaviour. *Transportation Research Part F: Traffic Psychology and Behaviour, 58*, 405–413.

Wallén Warner, H., & Åberg, L. (2008). Drivers' beliefs about exceeding the speed limits. *Transportation Research Part F: Traffic Psychology and Behaviour, 11*(5), 376–389.

Wallén Warner, H., Özkan, T., & Lajunen, T. (2009). Cross-cultural differences in drivers' speed choice. *Accident Analysis and Prevention, 41*(4), 816–819.