Getting people out of 1- and 2-star cars

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Abbreviations and acronyms

ABS	anti-lock braking system
ACC	adaptive cruise control
AEB	automatic emergency braking
ANCAP	Australasian New Car Assessment Program
BSM	blind spot monitoring
DSI	death and serious injury
ESC	electronic stability control
Euro NCAP	European New Car Assessment Programme
IIHS	Insurance Institute for Highway Safety
JNCAP	Japan New Car Assessment Program
LKA	lane keeping assist
MORI	Market and Opinion Research International
NCAP	New Car Assessment Programme
SARAC	Safety Rating Advisory Committee
SUV	sports utility vehicle
UCSR	Used Car Safety Rating
VSRR	Vehicle Safety Risk Rating
WOF	Warrant of Fitness

Contents

Executive summary

Road safety has improved considerably in New Zealand and other developed countries over the past 30 years and the New Zealand vehicle fleet will naturally become safer as the safety requirements for both new vehicles and imported used vehicles become more stringent. However, many of the cars that are currently on our roads have low star safety ratings and provide insufficient protection to the vehicle's occupants in a crash. This presents an opportunity to investigate methods for improving the safety of the New Zealand vehicle fleet by reducing the number of less safe cars on our roads.

The purpose of this research, which was conducted from March 2021 to March 2022, was to inform measures that could reduce the demand for cars that currently have only 1 or 2 stars. The research directly supports the New Zealand Government's 'Road to Zero' Action Plan, which aims to reduce the number of crashes involving death and serious injury. The research consisted of a literature review, a survey of current car owners and potential car purchasers, and interviews with both car dealers and representatives of motor vehicle trade/importer associations.

Used Car Safety Ratings (UCSRs) relate to the real-world crashes sustained by vehicles. New Car Assessment Programme (NCAP) ratings are derived from laboratory tests of new vehicles' crashworthiness, supplemented by information on any crash avoidance features they have. Our review of the published and grey literature on this subject, combined with New Zealand's vehicle sales and registration data, identified that the age of the vehicle fleet in in this country means that UCSRs are more important here than in countries with a higher fleet turnover. We found that the total UCSRs that covered aggressivity as well as crashworthiness were more aligned with the Safe System approach of Waka Kotahi NZ Transport Agency than the other systems, but were less appealing to car buyers. The factors that our respondents considered important in vehicle-purchasing decisions varied. Buyers of used cars (the target group for campaigns aiming to reduce the use of cars with lower safety ratings) appeared to value safety considerably less than the buyers of new cars. The latter group seemed to consider factors such as price and the purpose of the vehicle first, and then consider safety within those parameters.

Using the Motor Vehicle Registration Database, our car owner's survey was distributed to a random selection of people who owned a car with 1 or 2 stars (Group 1) and a smaller comparison group of people who owned a car with 3 to 5 stars (Group 2). The sample analyses involved 12,364 owners of cars with 1 or 2 stars and 1,387 owners of cars with 3 to 5 stars. A third group, potential car purchasers (N = 1,020), were recruited through Dynata, a market research company. Together, the surveys found the following:

- Owners of cars with only 1 or 2 stars (Group 1) were more likely than those who owned cars with 3 to 5 stars (Group 2) to be young, female and earn less than $50,000 per year.
- When asked about their top three priorities when selecting a vehicle, cost of purchase was the highest-ranking factor across all three groups, consistent with the findings of the literature review.
- Respondents in Group 1 were less likely than those in Group 2 to prioritise vehicle safety rating or safety features when selecting a vehicle, and were less likely to trust vehicle safety ratings.
- The biggest influencers in the vehicle-purchasing decision for those in Group 1 were friends and family.
- Most of the Group 1 respondents (86%) did not know their vehicle's true star safety rating (including those who were unsure about it and a significant group who incorrectly believed they already had a safer vehicle).
- When respondents did understand their vehicle's safety rating, the majority (95%) intended to buy a safer vehicle next time, and were likely to be influenced by facts about vehicle safety and to scrap their car, rather than sell it on, when they upgraded.

Six semi-structured phone interviews were conducted with both car dealers and representatives of motor vehicle trade/importer associations. These interviewees did not believe safety was a strong factor in customers' purchasing decisions, nor in their own decisions about vehicles they were buying to sell on. Safety ratings were not seen as essential contributors to vehicle safety, and while all those interviewed were aware of safety ratings, they had divergent views on their usefulness. They also mentioned having a personal lack of trust in the safety-rating system and customers lacking understanding of the safety ratings. These interviewees felt that the safety of the light vehicle fleet would improve naturally through more new cars entering the fleet, rather than requiring targeted efforts to remove 1- and 2-star cars from the fleet.

Overall, this research found that to increase the demand for safer cars, the critical elements would be to increase public awareness of a vehicle's star safety rating at the purchase point and to educate the current owners of cars with 1 or 2 stars at appropriate points such as getting a Warrant of Fitness and vehicle registration. In addition, an effort should be made to direct vehicle purchasers to reputable, up-to-date sources of information, and to encourage their informal advisors (friends and family) to do the same.

This research led to the following recommendations for Waka Kotahi:

Improving the current Waka Kotahi vehicle safety-rating system:

1. Provide messaging that is evidence based and consistent over time, such as making sure people understand why the star safety rating of a particular vehicle can decline over time, and explaining the need for safety ratings.
2. Ensure that when an initial star rating is given to a vehicle, that rating does not increase over time. It is better to delay the allocation of a star rating than to provide one prematurely and later have to adjust it upwards.
3. Avoid the occurrence of large changes in a vehicle's star rating at the stage of switching from NCAP ratings to the UCSR system.
4. Create a mechanism that can capture any anomalies in vehicle ratings (eg unusually large changes in rating) before they are added to the Rightcar website.
5. Investigate the possibility of adjusting historical ANCAP ratings to estimate how a vehicle would score under the latest ANCAP rating system.
6. Provide more education to dealers on how they should be using the Rightcar website.

Shifting people out of vehicles that are less safe:

1. Provide information to car owners on their vehicle's current safety rating at touch points such as when getting a Warrant of Fitness, when servicing the vehicle and at vehicle registration.
2. Run campaigns to encourage people to check their own car's current safety rating – it might not be what they think it is.
3. Run interventions to shift car purchasers' preferred information sources away from informal sources (eg family and friends) and towards factual sources (eg rightcar.govt.nz).
4. Socialise vehicle safety information through awareness campaigns (eg TV, radio, social media) and at point of purchase, emphasising the crash avoidance and crash protection features that purchasers should search for.
5. On the Rightcar website, highlight the priority vehicle safety features to look for when these are listed for a particular model, and provide links to explanations of what each feature offers.
6. On the Rightcar website, provide information on the crash avoidance and crash protection features of older vehicles.

7. Promote a shift to using public transport where possible, because of its greater safety.
8. Monitor motorcycle usage closely to detect any move towards increased motorcycle use as a result of car safety campaigns, and promptly make appropriate changes to advertising if this occurs.
9. Through the Rightcar website, provide access to information about JNCAP ratings so that an owner of a vehicle without ANCAP testing can learn about the safety of their imported used car.
10. Target interventions towards those who are more likely to be driving a less safe car (ie female, age < 30, household income < $50,000).
11. Consider introducing an incentive scheme (similar to the Clean Car Discount) to help shift people from a less safe car to safer car.

Abstract

Despite road safety improving considerably over the last 30 years, and continuing to improve as the safety requirements for both new and imported vehicle become more stringent, the New Zealand light vehicle fleet currently has a high proportion of cars that are safety rated with only 1 or 2 stars. These cars provide less protection to vehicle occupants in a crash than vehicles with higher star safety ratings. This research aimed to understand who is buying 1- and 2-star cars and what motivates them, to inform measures to reduce the demand for less safe cars. The study, which was conducted from March 2021 to March 2022, consisted of a literature review that informed an online survey of owners of cars with 1 or 2 stars (12,364), owners of cars with 3 to 5 stars (1,387) and potential car purchasers (1,020), as well as interviews with three car dealers and three representatives of motor vehicle trade/importer associations.

The research found that the respondents who owned a car with only 1 or 2 stars were likely to be young, female and earning less than $50,000 per year. When selecting a vehicle, they were less likely than the owners of vehicles with a higher safety rating to prioritise vehicle safety ratings or features. However, 86% of the respondents with a car with 1 or 2 stars either did not know their safety rating or incorrectly believed they had a safer vehicle. The minority who did know they had a less safe vehicle intended to purchase a safer vehicle next time – therefore, interventions to encourage this would be effective. It is recommended that efforts should be made to increase car owners' awareness of the safety rating of their current vehicle, combined with messaging about star ratings that is evidence based and consistent over time.

1 Introduction

Road safety has improved considerably in New Zealand and other developed countries over the past 30 years, assisted by the development of safer vehicles, import restrictions that are more stringent, and advanced safety features. These days, new and used vehicles that are imported into New Zealand are safer than they were in the past. However, compared to other countries, New Zealand has an old vehicle fleet and the turnover of the national fleet is very slow.

There are two safety-rating systems for vehicles in Australasia, namely the Australasian New Car Assessment Program (ANCAP) and the Used Car Safety Ratings (UCSRs). They both display the safety of a particular vehicle in terms of its star rating (from 0 to 5 stars). The UCSRs are computed from real-world crashes of older vehicles, while the ANCAP ratings are derived from laboratory tests and the vehicle's known technology benefits. While both systems generally give fewer stars to vehicles that are less safe and more to vehicles that are safer, they do not correlate perfectly, for various reasons. Given the older age of the vehicle fleet in New Zealand, the UCSR system was considered more relevant for this study.

According to Ministry of Transport (2020) figures, around half of the New Zealand light vehicle fleet is made up of cars that have 1 or 2 stars – approximately 1.6 million vehicles. In a crash, these vehicles give less protection to the driver than vehicles with higher star safety ratings. The safety of the New Zealand vehicle fleet could be improved by reducing the number of low-rated cars on the road.

The purpose of this research, which was conducted from March 2021 to March 2022, was to develop measures that would reduce the demand for 1- and 2-star cars, thereby reducing their use and improving road safety in New Zealand.[1] The research directly supports the New Zealand Government's 'Road to Zero' Action Plan, which aims to reduce the number of crashes involving death and serious injury (DSI).

The research had six objectives, as follows:

1. Identify, through the literature and published data, who is buying cars that are less safe, how safety influences people's decisions in buying a car, and effective options and interventions to reduce the demand for cars that are less safe.
2. Identify what car owners and potential car purchasers associate with a car being safe (eg safety features, safety ratings, age of vehicle) or any other features that customers look for that relate to vehicle safety.
3. Determine the demographic characteristics of those who purchase cars that are less safe and why they are making these purchasing decisions.
4. Determine whether buyers of 1- and 2-star cars and 3- to 5-star cars have different priorities in their purchasing decisions.
5. Investigate the opportunity to influence purchasers of 1- and 2-star cars to select a safer car.
6. Recommend the interventions that are likely to have the highest success rate and the relative size of their influence on current and potential 1- and 2-star car owners.

[1] This report focuses on the light vehicle fleet, including passenger cars, SUVs and light commercial vehicles up to 3.5 tonne gross vehicle mass (MA, MB and MC category vehicles). 'Cars' is used throughout to indicate this; 'vehicles' is used when discussing the whole vehicle fleet (including motorbikes, heavy goods vehicles).

The research addressed these objectives through a literature review, surveys of car owners and potential car purchasers, and interviews with car dealers and representatives of motor vehicle trade/importer associations. This report is organised as follows:

- Chapter 2 is a literature review of published and 'grey'[2] literature on this topic up to May 2021 and provides the current knowledge to begin to address the research objectives.
- Chapter 3 presents information about the surveys we conducted.
- Chapter 4 contains the results of industry interviews with used-car dealers and associations representing vehicle trade and importing within New Zealand, providing further information from an industry perspective.
- Chapter 5 provides overall recommendations and potential actions for Waka Kotahi NZ Transport Agency to consider to encourage people out of 1- and 2-star cars.

[2] Grey literature includes many different types and formats of information published outside of the scientific field, such as reports or presentations produced by government agencies, academics, business and industries that are not controlled by commercial publishers (Schopfel, 2010).

2 Literature review

While improvements in vehicles' crashworthiness and crash avoidance features, and their reduced 'aggressivity' (ie the serious-injury risk that they can pose to drivers of other vehicles with which they collide) have made a significant contribution to road safety in this country, there is a general consensus that further gains could be made by reducing the number of vehicles in the national fleet that have low safety ratings. This section reviews the literature regarding vehicle safety, and the New Zealand vehicle fleet in particular, with a focus on:

- the degree to which safety is prioritised in people's car-purchasing decisions
- the opportunity to reduce the demand for vehicles that are less safe
- interventions that have been effective in lowering the demand for vehicles that are less safe
- examining the vehicle sales and registration data to determine the number and types of vehicles sold in New Zealand and in which geographical regions.

As the new-car market in New Zealand is dominated by safer vehicles, the information gleaned about private new-car buyers in this literature review is mainly of relevance here as far as it may also apply to used-car buyers. In addition, cars that are bought by fleet owners are generally new, and then they 'trickle down' to the used-car market when the fleet is replaced. If fleet owners are encouraged to buy vehicles with top-of-the-range safety features, this will lead to the national fleet gradually becoming safer.

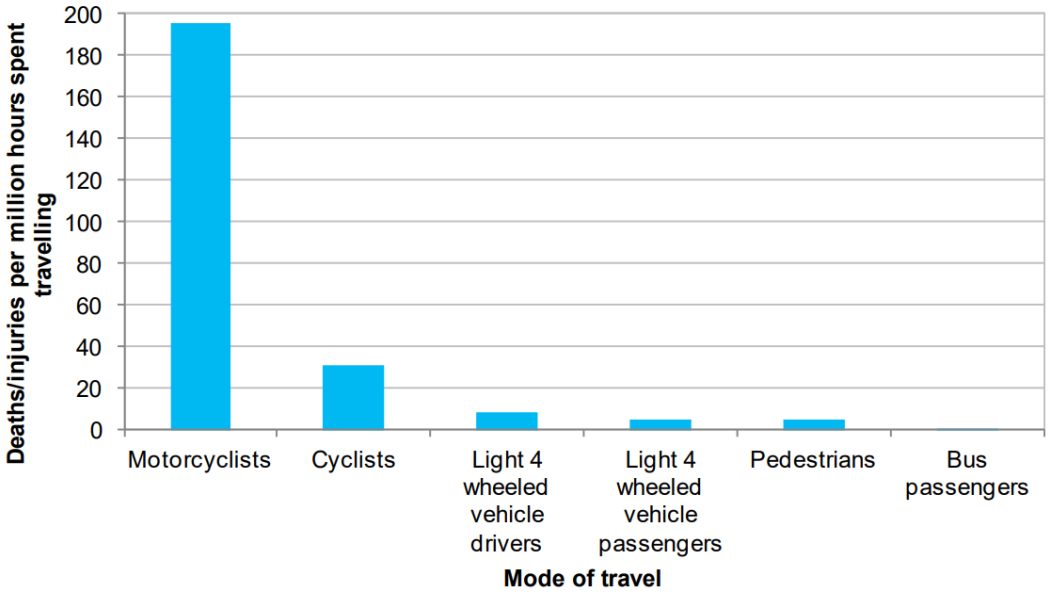
Getting people out of cars that are less safe is a complex issue. Incremental gains in this area can be made by a variety of mechanisms, which can be selected according to the way they are likely to affect different groups of people, as detailed below:

- *Single-vehicle people/families who cannot afford a safer vehicle* – There will always be people who cannot afford to buy safer vehicle. It may be possible to encourage these people to reduce their amount of travel in their vehicle and/or confine this travel to safer parts of the network (eg urban areas) and times of day when traffic volumes are lower and there is less risk of multi-vehicle crashes.
- *People/families requiring two or more cars who cannot afford all of them to be safer vehicles* – If a person/family requires two vehicles, but can only afford one safer vehicle, they could be encouraged to use the less safe vehicle only when absolutely necessary and to confine its use, as much as possible, to safer parts of the network. This may already be happening to some extent – data from the Ministry of Transport's annual New Zealand Household Travel Survey and the Waka Kotahi Motor Vehicle Register show that the number of vehicle kilometres travelled drops markedly as vehicles age.
- *People buying a car intended for teenage use* – The cars available in the lower price ranges have varying levels of safety. Consumer information can assist a cash-limited buyer (eg a teenager new to car use) to choose the safer option.
- *People with access to public transport – All* people who have reasonable access to public transport could be encouraged to use it as much as possible. As public transport is demonstrably safer than car travel (Frith et al., 2015), reducing exposure to risk by using public transport where feasible is a preferred option, regardless of the star ratings of people's cars. People who own a car that is less safe could be encouraged to use public transport even more often.

When aiming to reduce the population's exposure to the risks of travelling in cars with low safety ratings, it is important not to shift them into using modes that are even less safe, such as motorcycles. This is particularly likely if a buyer perceives that a safer car is out of reach financially. As motorcycles are demonstrably less

safe than any car available in New Zealand (see Figure 2.1) by several orders of magnitude, this response should be discouraged.

Figure 2.1 Deaths or injuries in motor vehicle crashes per million hours spent travelling (reprinted from Ministry of Transport, 2015, p. 6)



For people with limited resources, the only affordable move may be from a 1-star car to a 2-star car. This is a move in the right direction and should be encouraged.

2.1 Vehicle-purchasing decisions

Understanding the way consumers perceive vehicle safety features and vehicle safety technologies can help to facilitate better-targeted communications about these issues. To consider vehicle safety in the purchasing process, consumers need to fully understand the value that these safety features and technologies offer regarding crash avoidance and crash performance. This section outlines what the literature reveals in this area. Much of the literature relates to new-car buyers (or car buyers in general, which probably means mainly new-car buyers) because much of the market research is aimed primarily at these buyers. However, this information is still useful in this context because the decision-making process is the same for all car buyers, although the reasons for purchase may differ.

2.1.1 Literature primarily related to new-car buyers

Ferguson and Williams (1996) believed that purchasers of light vehicles were inclined to prioritise the cost of the vehicle and its fuel economy in their purchasing decisions.

Paine (2002) reported on an analysis of the attitudes of car purchasers regarding safety and the degree to which car dealers promoted these features, with the following key findings:

- There was a lack of awareness of vehicle safety and the significant differences in crashworthiness among vehicles, possibly associated with the perception that all vehicles were ‘safe’.
- The extra protection that some safety features could be expected to produce were not understood, and there was little guidance for consumers regarding these safety benefits.

- Impediments to ordering vehicles with non-standard safety features were price, long delivery times and pressure from salespeople.

In 2005, the European New Car Assessment Programme (Euro NCAP), having realised that price and vehicle fit with the user's requirements were primary choice criteria, conducted a survey in European Union member countries to seek further clarification on this topic (Market and Opinion Research International [MORI], 2005). Subjects were asked to identify key purchasing factors after price and function. Vehicle safety ranked the highest. MORI also found that participants typically associated safety with vehicle safety technology (eg anti-lock braking system [ABS], airbags) over holistic safety performance as measured by an overall crashworthiness rating. There did not seem to be any gender difference in the level of safety prioritisation, although gender may have been a factor in terms of vehicle price and type.

Koppel et al. (2005) discussed the results of a review carried out by the European Union Safety Rating Advisory Committee (SARAC). The review reported overall that there was limited empirical understanding of the role of safety in consumer vehicle-purchasing choice, and the setting of priorities within the decision-making process could involve complex interactions among multiple factors. Consumers routinely reported making trade-offs between factors such as price, size and safety. The review found knowledge gaps related to consumer understanding of specific safety features, their functions as related to passenger and pedestrian safety, and buyers' willingness to pay for additional safety features. Following their review, SARAC then conducted a study in Sweden and Spain of the role of safety in purchasing a new vehicle, rather than a second-hand one. The rationale was to compare Sweden (with a relatively high road safety performance) with Spain (with a relatively low road safety performance). This study is described in Koppel et al. (2008), who found the Swedish participants ranked safety-related factors over factors such as price and reliability more often than the Spanish participants. The authors suggested that this could have been related to the need for the generally less affluent Spanish participants to balance affordability against vehicle safety. Consumers from both countries were sensitive to vehicle price. The research attempted to identify the relative importance of specific vehicle features to better understand what trade-offs customers were making when purchasing a vehicle. Consistent with previous results such as MORI (2005), the participants mentioned safety features such as ABS, airbags and electronic stability control (ESC) as being more important than other features, and they valued specific technologies over holistic ratings, such as the NCAP ratings.

Johansson-Stenman and Martinsson (2006) examined the importance of vehicle characteristics in the new-vehicle-purchasing decisions of 1,300 people of driving age in Sweden. More respondents (85%) rated safety as being 'very important' in their purchasing decision than any other attribute, with the next factors being reliability and then fuel consumption. In a related survey of car dealers, 54% of the respondents rated safety as being very important *after* fuel consumption and reliability.

In the US, Progressive Group of Insurance Companies (2006) reported on an online survey of new-car shoppers who visited the website NADAguides.com. Safety was outranked by the vehicle purchase price, vehicle make and/or vehicle model. Overall factors that were most often ranked 'most important' were overall purchase price (46%), make and model (31%), safety features (7%) and performance (7%). Women ranked safety third, while men placed greater priority on performance. Twenty percent of the men and 15% of the women who responded said they spent no time at all considering safety features. Older drivers (aged 50 to 64) were nearly twice as likely as younger drivers (aged 18 to 24) to spend no time at all weighing safety features (21% versus 11%).

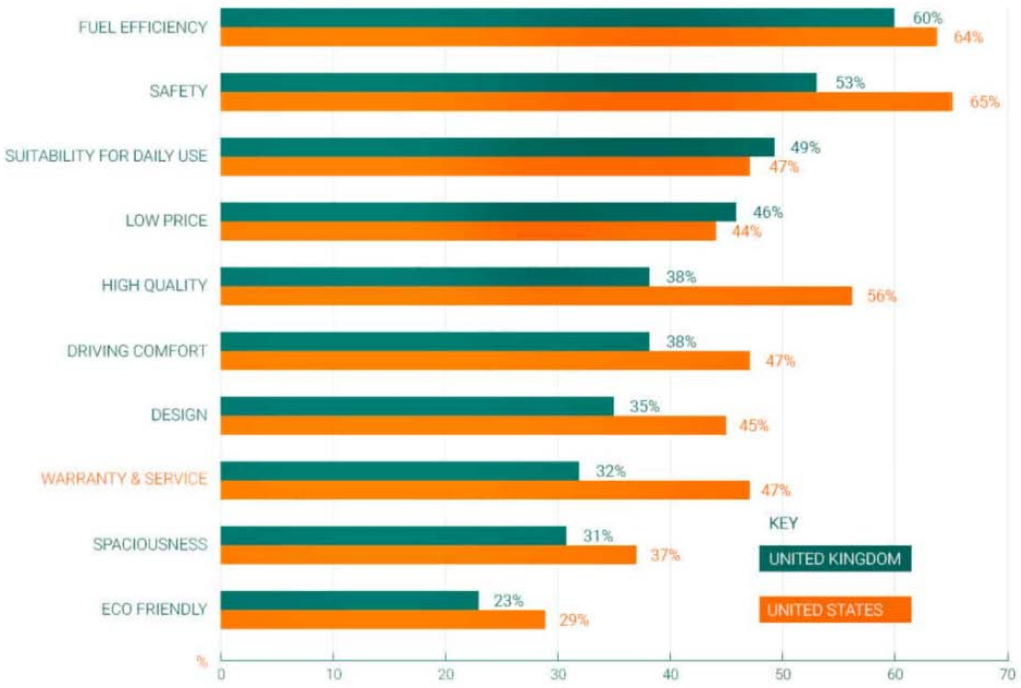
Canstar Blue New Zealand surveys New Zealand new-car buyers' insights annually. In 2020, 27% of their respondents considered safety the most important consideration (see Table 2.1), which was lower than in other countries (see the figures later in this section).

Table 2.1 Percentage of respondents who ranked certain new-car features as most important (reprinted from Canstar Blue New Zealand, n.d.)

Safety features	27%
Fuel efficiency	26%
Price	16%
Speed and performance	9%
Brand	8%
Appearance	7%
Environmental footprint	4%

In late 2017/early 2018, market and consumer data provider Statista carried out a Global Consumer Survey regarding the characteristics of new cars that are especially important to purchasers. The US part involved 2,017 internet users aged 18 to 64 years, but the number of British participants is unknown. The responses for the UK and US are shown in Figure 2.2 (OSV, 2019).

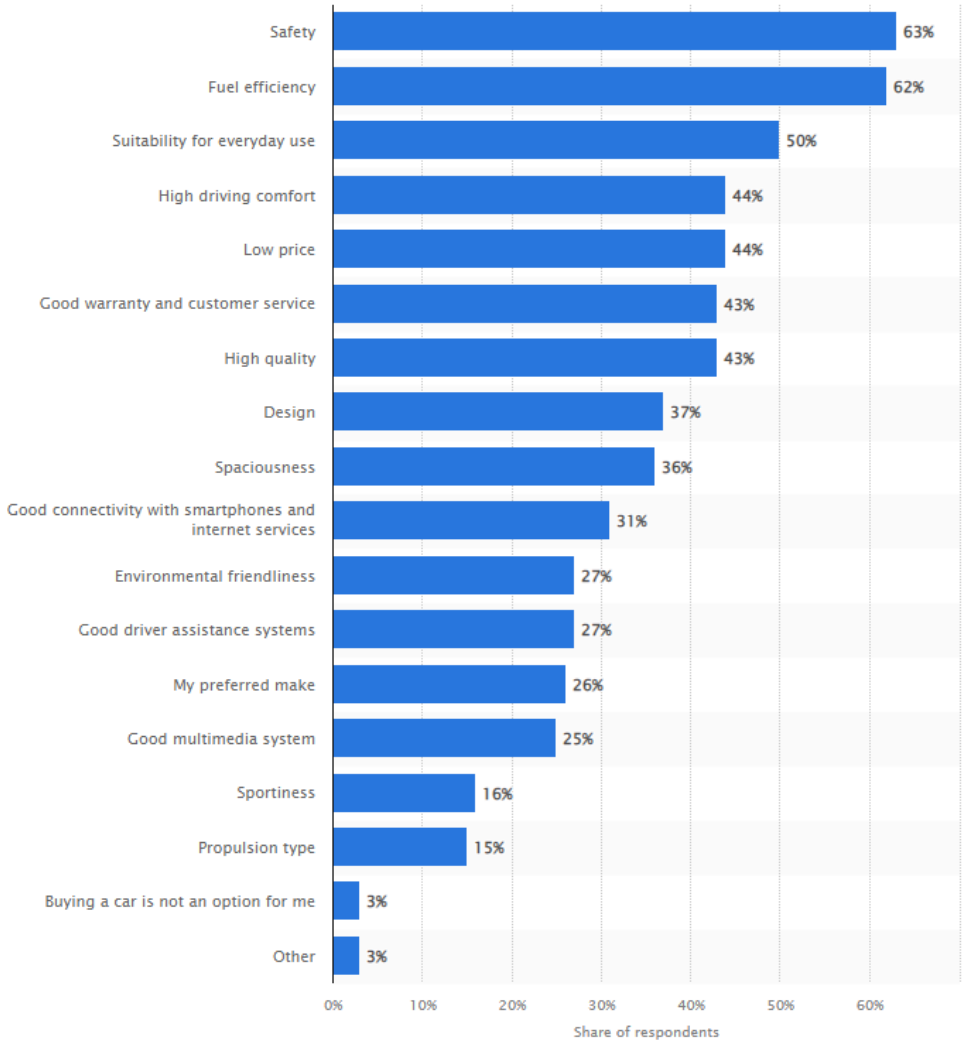
Figure 2.2 Factors rated as especially important when buying a new car in the UK and US (reprinted from OSV, 2019)



In both markets, safety and fuel economy were rivals for top ranking, but safety was afforded a higher priority by US consumers than by UK consumers.

The results from a similar Statistica survey in Australia (7 May–22 June 2020, with 1,049 respondents) may be indicative of New Zealand priorities (see Figure 2.3).

Figure 2.3 Factors rated as especially important when buying a new car in Australia (reprinted from Statista, 2022)



Again, safety and fuel efficiency were the highest priorities.

2.1.2 Literature with a wider buyer coverage

In a US Insurance Institute for Highway Safety (IIHS) report, McCartt and Wells (2010) surveyed 928 drivers nationwide to identify the important factors in selecting a vehicle and assess awareness of vehicle crash tests and vehicle safety ratings. Safety was the second most important reported factor (86%), after quality/reliability. More than 75% of respondents reported seeing safety ratings or information about vehicle crash tests and 67% thought such information was useful when considering what vehicle to own. Around 30% could name a safety ratings provider and 14% knew their vehicle's safety rating.

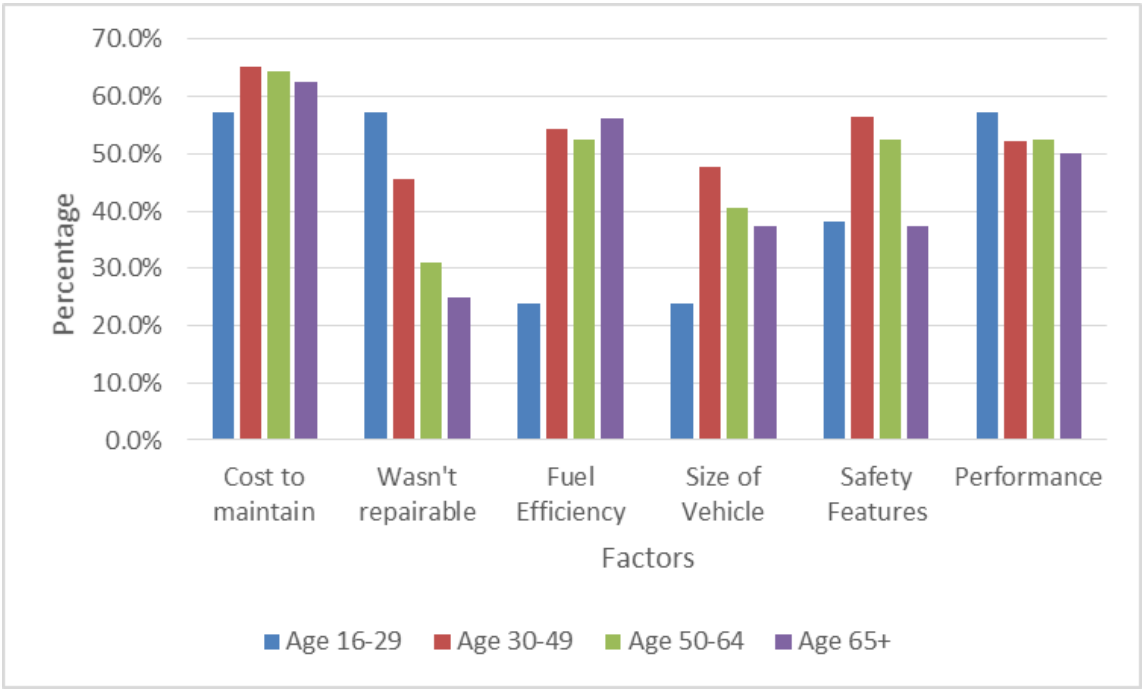
Research in Canada by Vrkljan and Anaby (2011) found that purchasers of light vehicles (wheelbase of 2.54 m or less) were more likely to focus on the cost of the vehicle in their purchasing decision. An Australian survey of 2,013 people from Victoria, New South Wales and Queensland (1,009 before vehicle purchase, 1,004 after vehicle purchase) examined purchasing behaviours and priorities across the vehicle-purchasing process (Clark et al., 2012). As only 64 participants were in both groups, the survey was not able to gain information on the actual vehicle purchased. Overall, the factors rated most important both pre and post

purchase were reliability and price. Concern about crash involvement and ANCAP ratings were other significant factors. The survey found that females, people aged 50 years or older, those who were more concerned about crashing, and those who sourced ANCAP information were more likely to place high priority on secondary safety features in their vehicle purchase.

Keall and Newstead (2011, p. 688) suggested that low-income earners were often constrained by not only the purchasing price of the vehicle but also its running costs, leading to a tendency to purchase light second-hand cars, which usually have poor crash performance. Lower-cost vehicles tend to be older and smaller. They recommended giving the public the option to 'Compare the crashworthiness of vehicles grouped into similar-aged models or even similar-priced vehicles according to the market averages for second-hand vehicles'.

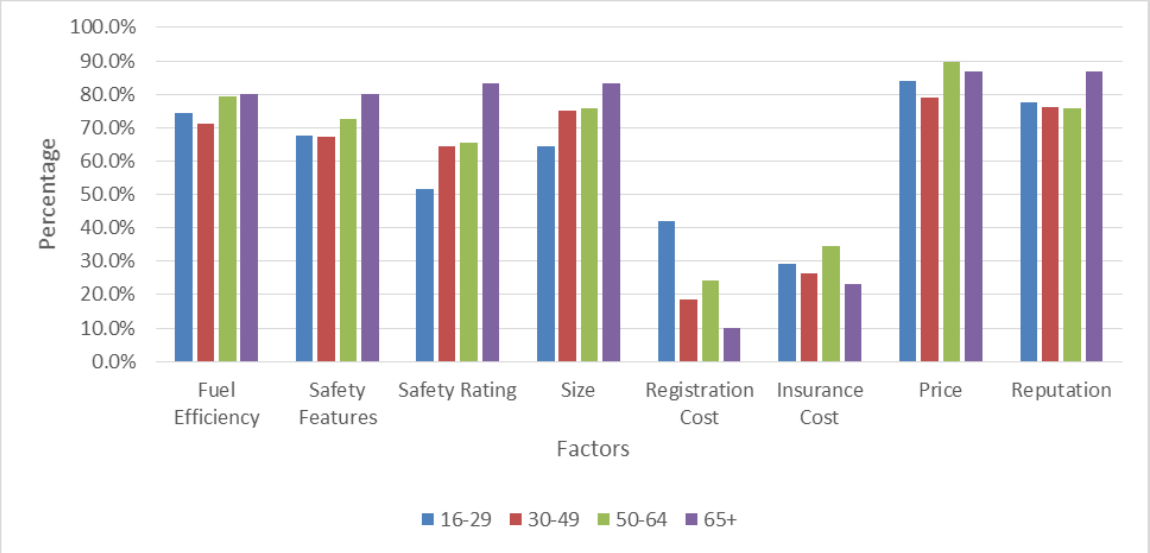
A 2014 convenience sample of 191 New Zealanders was gathered by the Ministry of Transport, asking questions related to vehicle purchase, and this was supplied directly to WSP. Figure 2.4 shows the reasons people gave for deciding to replace their vehicles.

Figure 2.4 Reasons for replacing vehicles, disaggregated by age (reprinted from information supplied by Ministry of Transport, pers. comm., 2015)



The most important issues for young people were maintenance cost and the related 'not repairable', as well as dissatisfaction with performance. Those aged between 30 and 64 years were less concerned about repairability. Those aged 65+ were most concerned about maintenance cost, fuel efficiency and performance. More than 35% of all respondents mentioned safety (see Figure 2.5).

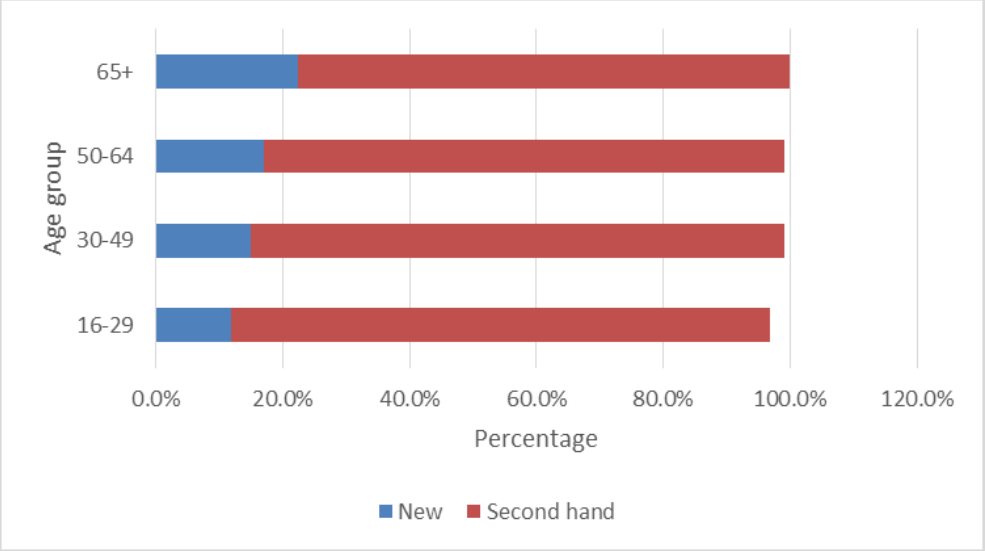
Figure 2.5 Vehicle factors rated as important, by age group (reprinted from information supplied by Ministry of Transport, pers. comm., 2015)



Overall, safety was not a primary consideration for all drivers when considering purchasing a vehicle, being surpassed by fuel efficiency, price and reputation, and scoring a similar rating to size. It was in fourth place for the age groups 16 to 29 years and 65+. As with other surveys, safety *features* rated higher than safety *ratings*.

The new/used status of vehicles bought by respondents was examined, by age group (see Figure 2.6). Second-hand vehicles were the most prevalent for all the age groups, with 83.7% of the sample indicating their vehicle was bought second-hand. The purchase of new vehicles increased with respondent age.

Figure 2.6 Percentage of vehicles bought new or second-hand, by age of buyer (reprinted from information supplied by Ministry of Transport, pers. comm., 2015)



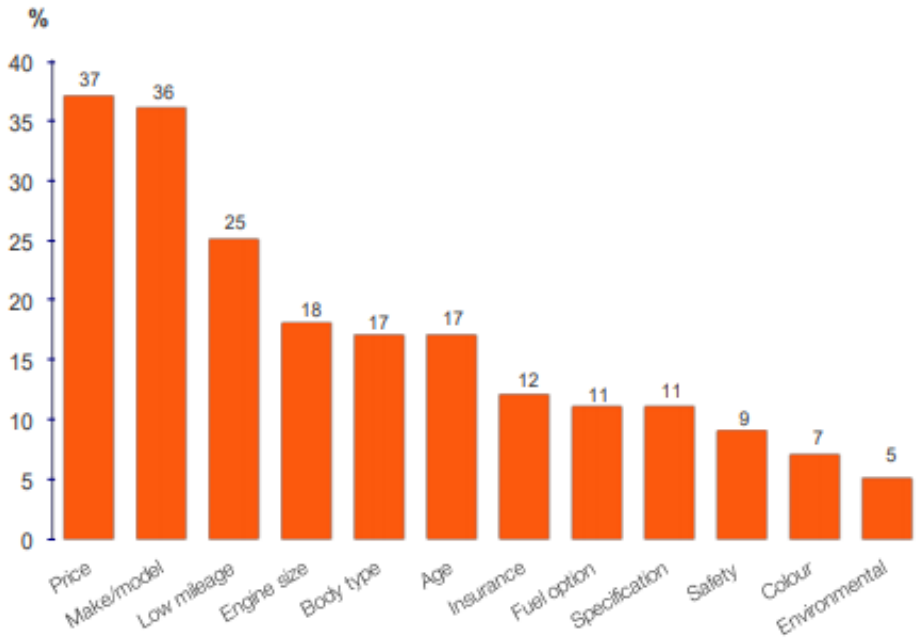
In 2011, the New Zealand AA Research Foundation conducted a survey of 2,499 members' eco-driving behaviour (King, 2011), in which participants were asked which qualities they valued in their current car and

those they would value in any new car they might purchase. Of this group, 37.4% valued safety in their current car, giving this fourth place after price, reliability and economy. In terms of new vehicles, 42.9% valued safety, again below price, reliability and economy.

2.1.3 Literature specific to used-car buying

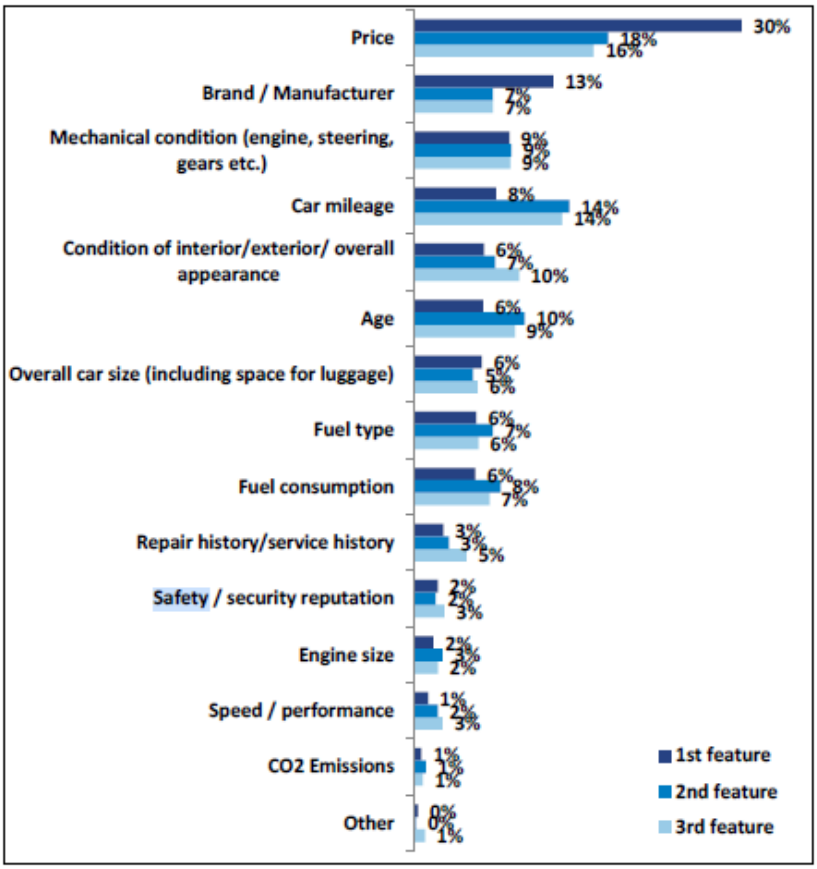
Buying decisions regarding cars that are less safe generally involve used-car buyers. A 2014 report for British Car Auctions (University of Buckingham, 2014) on the British used-car market featured a chart (see Figure 2.7) of the critical factors that survey respondents mentioned for choosing their used car. The results made it clear that the priorities of used-car buyers were different from those of new-car buyers, with 'safety' near the bottom, along with 'colour' and 'environmental', and 'price' in the top position.

Figure 2.7 Critical factors in choosing a used car in the UK (reprinted from University of Buckingham, 2014, p. 25)



The results of a European Commission survey of used-car buyers (European Commission, 2015) were broadly similar regarding the relative importance of safety (see Figure 2.8); price, brand/manufacturer and mileage were most important, with safety coming near the bottom of the list. Interestingly, this was quite different to the findings regarding purchasers of new cars (see Section 2.1.1), who gave a high rating to safety.

Figure 2.8 Factors affecting the purchase decisions of used-car buyers (reprinted from European Commission, 2015, p. 149)



A survey of 1,000 UK car owners aged 17 to 24 years was conducted by Markettiers on behalf of Co-op Insurance (Co-op, 2017). These respondents, 76% of whom owned a used car, ranked the factors they used in their car-buying decisions as follows:

1. price 75%
2. cost of insurance 63%
3. cheap to run 43%
4. age of vehicle 39%
5. colour 31%
6. how safe it is 31%
7. if it is a well-known brand 24%
8. interior of vehicle 13%
9. how eco-friendly it is 12%
10. parts are easy to find 11%.

Eleven percent said they had asked questions about safety when they were making their purchase. This percentage is higher than in the other groups surveyed on used-car purchase, possibly affected by the number of new-car owners in the survey and perhaps bias related to the sponsor being an insurance

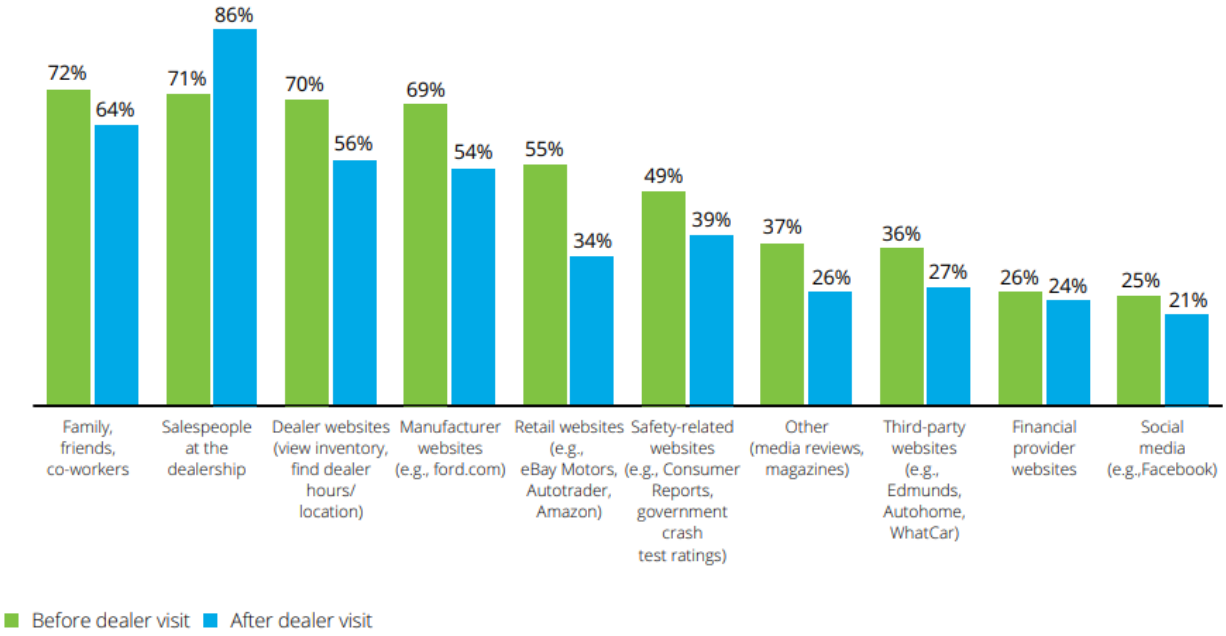
company. (It was not clear whether the respondents were Co-op Insurance policy holders or if some other sampling frame was used.)

2.1.4 Safety information prior to and during vehicle purchase relative to other inputs

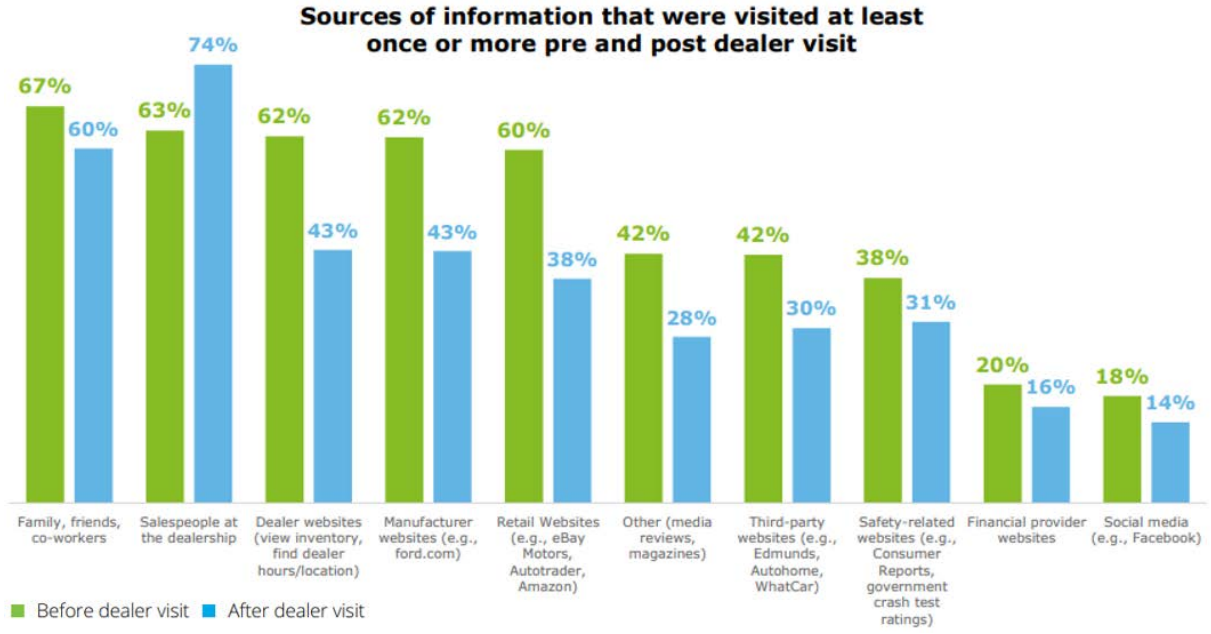
Use of information sources before and during vehicle purchase varied internationally; information was available for Canada (Deloitte, 2018b) and Germany (Deloitte, 2018a) from the 2018 Deloite Global Automotive Consumer Studies (see Figure 2.9 and Figure 2.10).

Figure 2.9 Information sources for vehicle purchasers in Canada (reprinted from Deloitte, 2018b, p. 6) and Germany (reprinted from Deloitte, 2018a, p. 18)

Canada



Germany

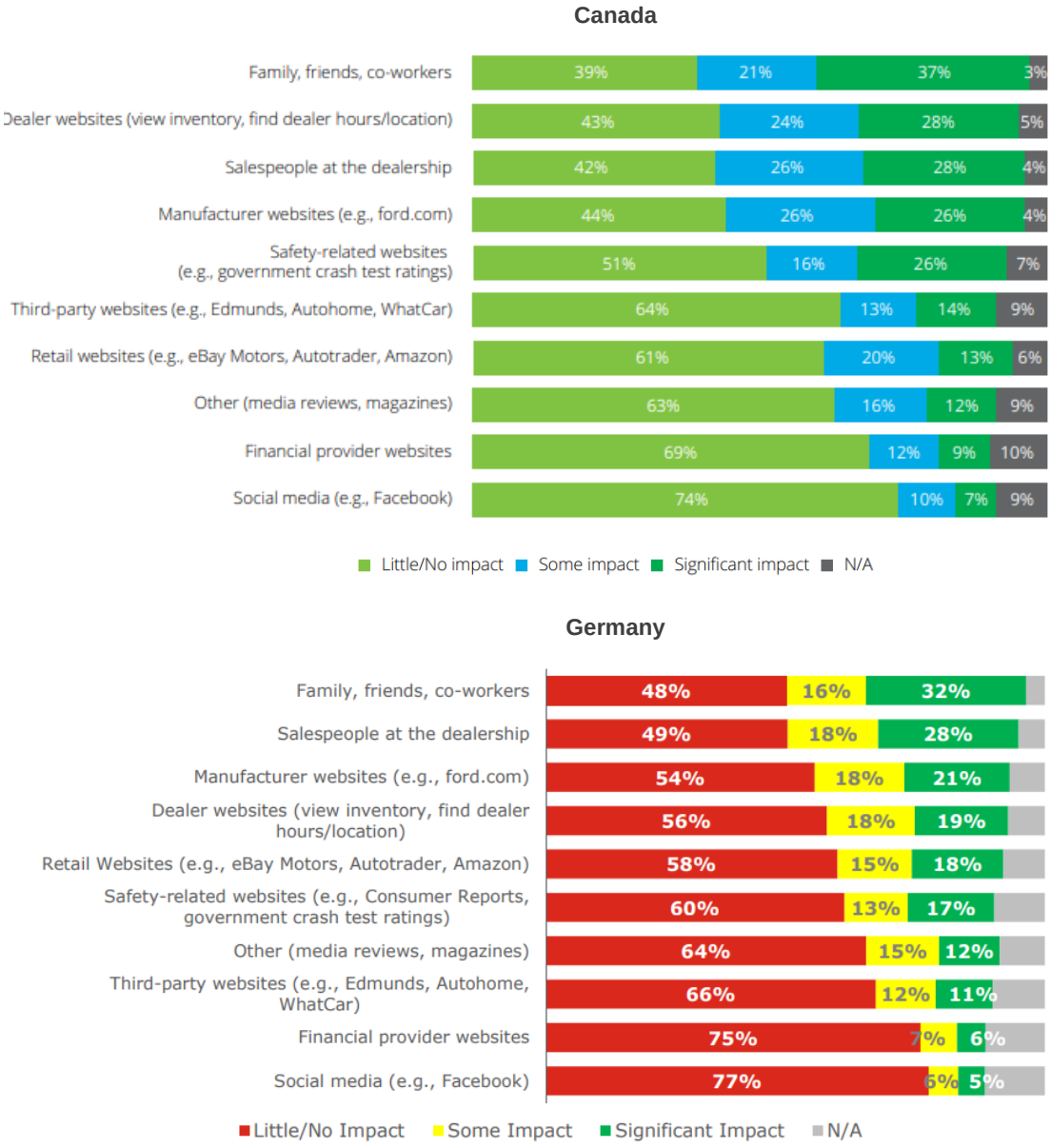


These figures show that Canadians were using safety-related websites more than Germans. Generally, people were influenced both before and after visiting a dealership by factors other than ‘safety-related websites’, particularly ‘family, friends, co-workers’, ‘salespeople at the dealership’ and ‘dealer websites’.

Regarding the impact of various sources of information on their purchasing decisions (see Figure 2.10), 42% of Canadians and 30% of Germans said ‘safety-related websites’ had some or a significant impact. The

greatest influences for both nationalities were ‘family, friends co-workers’, followed by ‘dealer websites’ and ‘manufacturer websites’.

Figure 2.10 Impact of information sources on vehicle purchasers in Canada (reprinted from Deloitte, 2018b, p. 7) and Germany (reprinted from Deloitte, 2018a, p. 19)



It would not be surprising if a similar pattern exists in New Zealand. Therefore, efforts to increase the safety of the vehicle fleet need to have a wide community reach.

2.1.4.1 Vehicle purchasing in New Zealand

Vehicle Purchasing Journey (Waka Kotahi, 2017) is an unpublished report that examined some of the metrics related to the place of safety in car buying. The report did not distinguish between used and new

vehicles in these purchases. The people involved in the study were presented with safety information along with lists of vehicle features. The report concluded:

> *The majority of people aren't considering vehicle safety when they're determining what they really want and need in a vehicle. It's not that people are actively disregarding safety, it just isn't a prominent factor that shapes their search.* (p. 19)

It found that the respondents tended to be more interested in safety features (eg airbags) than safety ratings, which they saw as an indication that safety features would be present:

> *If they have a 5-star rating I know they have front, side, curtain and rear airbags. Essentially, the more stars, the safer you are in a collision.* (p. 20)

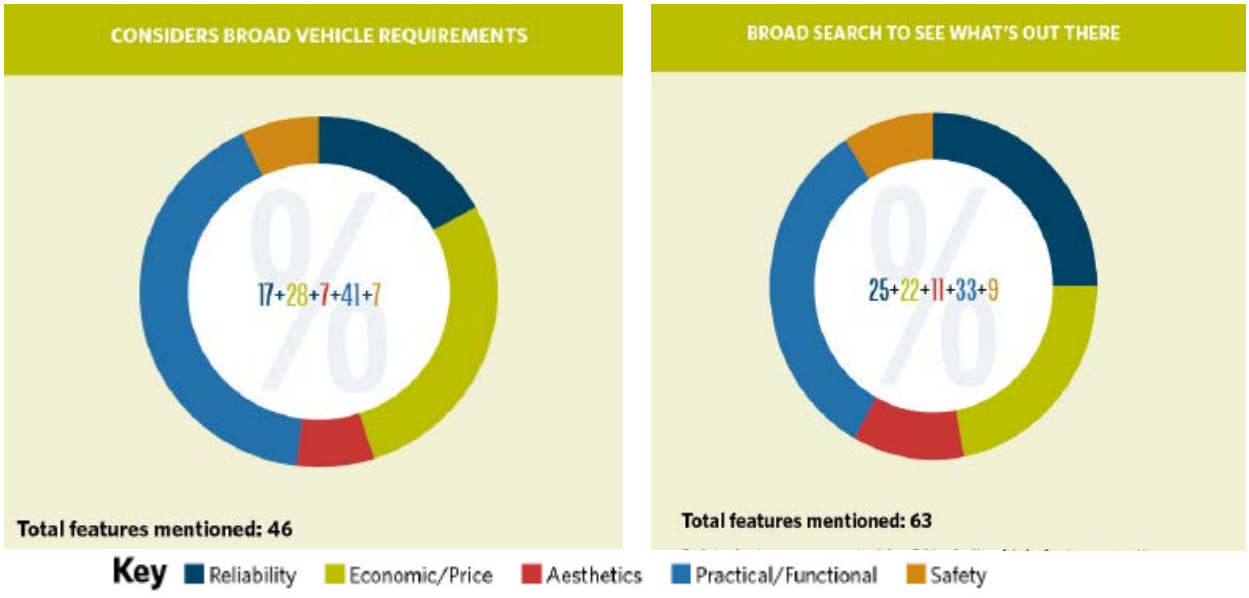
Generally, the respondents did not think much about how a car would perform in a serious crash, an experience they thought was unlikely:

> *I currently drive a car that according to ANCAP should be almost illegal. I take it with a grain of salt.* (p. 20)

> *The ratings measure how well a car will fare if a car rolls or is crushed from above – but that seems quite excessive, how often are you going to be crushed. So really, it's airbags and the ABS brakes that I think are important.* (p. 20)

The report contained two infographics that were relevant to this study: one showing features mentioned in relation to broad vehicle requirements and one showing features mentioned in relation to exploring the vehicles that were available for purchase (see Figure 2.11).

Figure 2.11 Mentions of features when considering broad vehicle requirements and when exploring what was available for purchase (reprinted from Waka Kotahi, 2017, p. 19)



In the broad vehicle requirements, safety features comprised 7% of the features mentioned, with two-thirds of them being general and the rest related to airbags. In the 'what's out there' category, 9% of all features mentioned were related to safety, with two-thirds of them again being general. The rest related to reversing cameras and Bluetooth technology.

In 2017, Research Now surveyed 525 car buyers covering new vehicles (*n* = 238), used vehicles (*n* = 160) and undecided buyers (*n* = 127). Its sample included prospective buyers and those who had bought a vehicle in the last 12 months (StopPress, 2017). The 'purchase journey' model used was sequential and information was captured from participants at different stages of the journey, described as:

- recognising need (*n* = 112)
- researching options (*n* = 157)
- refining a shortlist (*n* = 145)
- making the purchase (*n* = 111).

Figure 2.12 shows the sources used at the information-gathering stage.

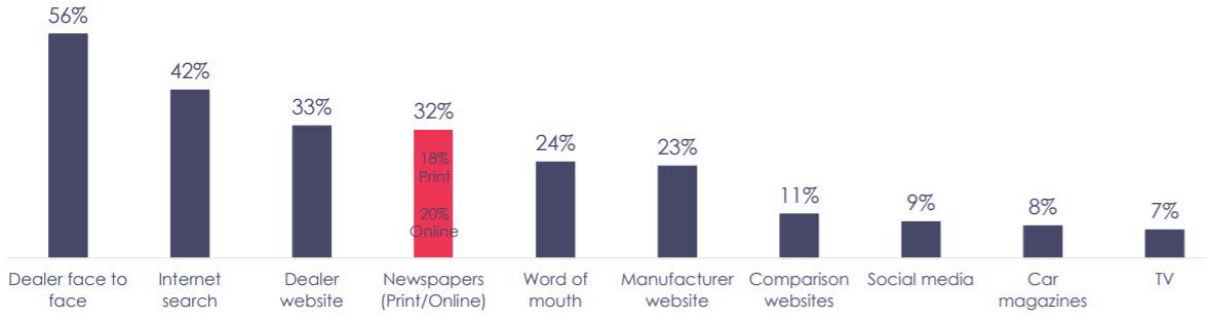
Figure 2.12 Sources used at the information-gathering stage (reprinted from StopPress, 2017)

At the shortlist stage, the weighting changed (see Figure 2.13), with 'newspapers' and 'word of mouth' declining and 'dealer face to face' and 'manufacturer website' increasing.

Figure 2.13 Sources used at the shortlist stage (reprinted from StopPress, 2017)

When finally making a purchase, the weighting for 'dealer face to face' increased significantly (see Figure 2.14).

Figure 2.14 Sources used at the purchase stage (reprinted from StopPress, 2017)



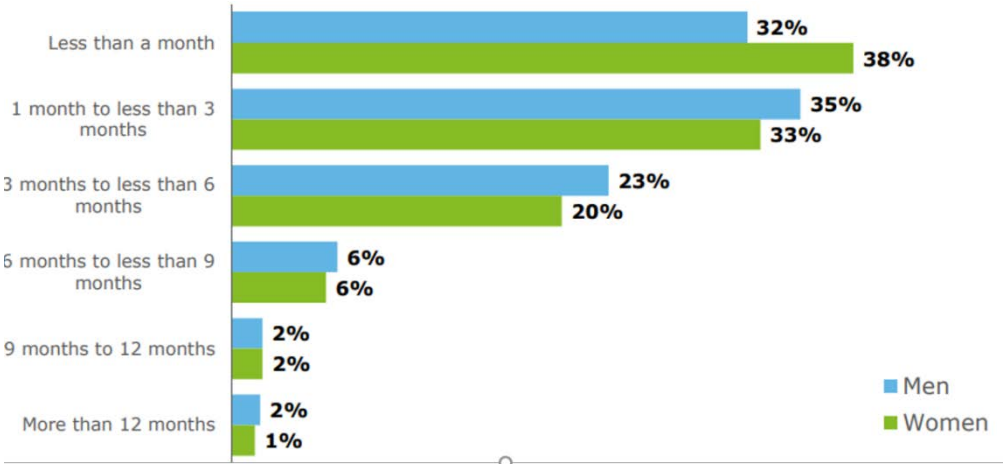
This information provides guidance on where safety information should be placed to influence buyers during their vehicle-purchasing journeys.

2.1.5 Vehicle purchasing related to gender and age

2.1.5.1 Gender

Some research has examined gender differences in the vehicle-purchasing process. According to the 2018 Deloite Global Automotive survey (see Figure 2.15), men spend longer than women on researching a vehicle purchase, meaning that women are possibly less thorough than men, or they are more decisive.

Figure 2.15 Duration of research before deciding to acquire current vehicle (men vs women) (Deloite, 2018a, p. 15)



The figure shows that around 70% of respondents took less than two months to research their vehicle-purchasing options, which offers little time for interventions to change their mindset. Therefore, it would be better if they had a safety-conscious mindset prior to their purchasing journey.

In 2004, *Good Housekeeping* magazine and J. D. Power and Associates published their 'What Women Want' Automotive Satisfaction Study (Helperin, 2009). This was a survey of 40,000 US female respondents who had bought or leased a new vehicle. The respondents rated eight different-sized categories of vehicles (eg mid-size, full-size) according to their interior condition, exterior condition, durability, quietness and safety. Safety was the primary determinant of these women's views. When the responses were disaggregated by vehicle type, the only car types for which safety did not come first were minivans (where quietness was top) and entry-level sports utility vehicles (SUVs, where exterior appearance was top). Women valued safety

more than men did (77.8% vs 65.3%, respectively). The results of this survey differed from other surveys of the whole population, indicating that influencing car buying through women could be a good strategy.

A survey conducted by Vrkljan and Anaby (2011) found that female respondents were more likely to prioritise safety than males across all age groups. While safety became a higher priority for male respondents as their age increased, it did not change significantly for females. The researchers found that men were often left with the final purchasing decision, which could mean that the women's preferences for vehicles with a higher safety standard were not borne out.

2.1.5.2 Adolescent drivers and their parents

Many international studies have found that youths have a higher crash risk than adult drivers (Keall & Newstead, 2013). Evidence provided by Koppel et al. (2007) showed that novice drivers underestimate their crash risk and are also less inclined to prioritise vehicle safety generally. In New Zealand, adolescent drivers are still exposed to a relatively high crash risk despite measures such as the graduated licensing system (Brookland & Begg, 2011). Brookland and Begg's 2011 study found that the majority of adolescents were driving the family vehicles. When choosing a vehicle for their adolescent to drive, the parents rated accessibility, manoeuvrability, small vehicle size and vehicle engine size as important factors. They believed that older, lighter vehicles with small engines were safer for young drivers when they entered the most dangerous stage of being a novice driver – driving unsupervised with inferior crash protection – because they offered less opportunity to speed, with the attendant risks of higher crash severities. They found that parents played the biggest role in the purchasing process for teenagers, both as advisors and potentially offering financial resources. Therefore, information targeted to parents, informing and educating them about vehicle safety ratings, features and technologies, could improve the safety of the vehicles that adolescents drive.

In the US, Eichelberger et al. (2014) reported on a household telephone survey of parents/guardians of teenagers who held either an intermediate or full driving licence. The authors concluded that many teenagers were driving vehicles low on safety features like ESC, which could be especially beneficial for teenage drivers, and vehicle types or sizes that were not ideal for novice drivers. They thought that parents and teenage drivers would benefit from consumer information about optimal vehicle choices for teenagers.

Keall and Newstead (2013) reported that vehicles with poor crashworthiness were often provided to teenagers. They argued that adolescents could learn to prioritise safety in their vehicle-purchasing decisions by observing the emphasis placed on vehicle safety by their parents/guardians. However, the flow of information can move in both directions, as teenagers can have notable input into family vehicle-buying decisions, even for vehicles bought mainly for the use of their parents. In a June 2015 survey, YouGov found the results depicted in Table 2.2 regarding US teens' influence on household decisions about which vehicle to purchase or lease.

Table 2.2 Percentage of parents of 12–17-year-old children (adolescents) who were influenced by their children in the stated way (reprinted from Marketing Charts, n.d.)

	Child picks what is purchased	Child and I or another adult in the household pick what is purchased	Child shares his/her opinions and these opinions influence what is purchased	Child's likes and dislikes are already known and these influence what is purchased	Child has no influence over purchases in this category
Which vehicle to purchase or lease	4%	17%	16%	7%	55%

That is, in 44% of cases, children (adolescents) had some influence on the purchase.

2.1.5.3 Older drivers

In any crash, older drivers and vehicle occupants are at greater risk of injury than younger people because of their greater fragility (Koppel et al., 2013; Baldock et al., 2016). Although vehicle safety is obviously very important to the well-being of older people, they do not necessarily make it a priority in their purchasing decisions.

Vrkljan and Anaby (2011) identified that older drivers rated vehicle mileage, safety and reliability as important factors when purchasing a vehicle. This was consistent with research by Koppel et al. (2013), which found that older drivers were more likely to list braking systems, airbags and driver behaviour as important factors in making a vehicle safe.

An earlier study by Koppel et al. (2007) had found that the older participants in their study tended to overestimate their crash risk, leading them to prioritise safety more than the other driver age groups they evaluated. However, this finding contradicted research reported by Zhan and Vrkljan (2011), MORI (2005) and Progressive Group of Insurance Companies (2006), possibly because of the specific samples that Koppel et al. used.

Zhan and Vrkljan's (2011) study investigated the importance of vehicle safety features for Canadian older drivers (aged 70–90 years, *N* = 27) and their influence in the purchasing process. They concluded that although they knew their driving ability could decline with age, these older drivers were less concerned about vehicle safety features, believing that such features could not compensate for poor driving. In addition, they said they doubted the accuracy of crash simulation data as the crashes involved did not reflect real-world conditions. While these drivers considered vehicles with seatbelts, airbags, power steering and reliable braking to be safe, they viewed features that remove control from the driver negatively. These days, such features would include automatic braking, self-parking, adaptive cruise control (ACC), automatic windscreen wipers, lane-keeping assistance, ESC and assistive braking. Zhan and Vrkljan's study identified vehicle price and economy as the key factors involved in the decision-making process for these older drivers, as well as vehicle accessibility, driving position adjustability and adequate visibility to see outside the vehicle when driving (cars with poor visibility were considered unsafe).

Koppel et al. (2013) examined the importance of vehicle safety to older consumers in the vehicle-purchasing process by analysing the online survey responses of 102 older people (≥ 65 years) from the Australian states of Victoria, New South Wales and Queensland who had recently purchased a new or used vehicle. Over half (57.9%) of the vehicles had been purchased new. The participants considered a list of vehicle factors such as price, design and ANCAP rating. Half of them considered a safety-related feature to be the most important, particularly ABS (35%) and airbags (22%). Eleven percent of them selected the driver's behaviour or skill as being important. One-third of them believed that all new vehicles were safe and almost half rated their own vehicle as safer than average. A logistic regression model predicted that the importance of safety-related features was influenced by several variables, including a respondent's belief that they could protect themselves and their family from a crash, their traffic infringement history, and whether they had children.

After reviewing several studies, Eby and Molnar (2012) concluded:

> *Collectively, findings from studies on vehicle-purchasing decisions suggest that while safety is clearly important to vehicle buyers, other considerations come into play and often take precedence. In addition, there is some evidence suggesting that older adults may lack knowledge about how some safety features work and may misunderstand their effectiveness in protecting vehicle occupants.* (p. 41)

A telephone survey by Monash University in Australia (Oxley et al., 2019) provided recent information on the buying patterns of 501 older (65–92 years) Western Australian residents. The participants were licensed

drivers aged 65 years or more who drove at least once a week. As 42.1% of them had purchased used vehicles, there was clearly an opportunity to increase the safety of the next used-car purchase for those who did not intend to retain their vehicle for life (51.9%).

The participants rated the factors that had influenced the purchase of their current vehicle (see Table 2.3). The top ratings were given to reliability and the reputation of the make and model. Two-thirds of participants considered safety a priority.

Table 2.3 Priorities assigned to various vehicle-purchasing factors by older motorists (adapted from Oxley et al., 2019, p. 2)

Factor	High (%)	Medium (%)	Low (%)	Don't remember (%)
Reliability	87.4	8.6	3.0	1.0
Reputation of make/model	72.3	15.6	11.4	0.8
Safety (Star) ratings / other safety reports	66.7	18.0	13.8	1.6
Vehicle size	65.3	27.3	7.0	0.4
Vehicle type	64.1	25.9	9.4	0.6
Performance (incl power & handling)	62.9	26.9	9.6	0.6
Comfort	57.1	32.9	9.0	1.0
Fuel economy	52.3	35.7	11.0	1.0
Make/model	51.5	25.9	21.0	1.6
Country of manufacturer	24.0	25.7	48.7	1.6
Warranty and service plans	47.1	26.5	25.3	1.0
Purchase price	44.7	41.9	11.4	2.0
Running costs	43.9	40.7	14.4	1.0
Style / look / colour	38.1	32.5	28.7	0.6
Re-sale value	17.6	33.3	47.5	1.6

Participants were also asked about their awareness of various safety features and how much extra they would consider paying to have them. They were most aware of lane departure warning (LDW, 51.1%) and least aware of rear cross-traffic warning (9.4%) and right-turn assist (8.8%). The most common technologies already fitted to their vehicles were ESC (19.6%), ACC (12.6%) and automatic emergency braking (AEB, 18.2%). They were also asked about the technologies that would be a priority for a new-vehicle purchase. The highest responses were for blind spot monitoring (BSM, 70.4%), ACC (64.3%), AEB (60%) and lane change warnings (60.7%).

To the question of how much extra they would be prepared to pay for a vehicle with added safety technologies, 27.1 % said they would pay an extra $5,000, 18.4% said $5,000 to $10,000, and 10% said over $10,000, while 35.7% said they would not pay any extra.

2.1.6 Business vehicle purchase decisions

Purchasers of commercial vehicles can be divided into buyers from small businesses and those from organisations that have a fleet of vehicles. As little is known about the preferences of buyers from small businesses, we focused on fleet purchasers. As well as buying new vehicles, fleet managers may choose to lease new vehicles for a few years and then return them to the leasing operator, who sells them on to the second-hand market, where they provide an important source of second-hand vehicles. Most of the recently

purchased vehicles in car fleets are of 5-star NCAP standard (65% of new vehicles in 2020, according to Waka Kotahi, 2021a), because fewer non-5-star vehicles are available. Influencing fleet buyers to buy the top-of-the-range 5-star vehicles can increase the overall safety of the used vehicles in the market after the fleet vehicles are sold on.

2.1.7 Summary

The existing studies show a lot of variability in the factors considered important in vehicle-purchasing decisions. In general, buyers of new vehicles rated safety higher than buyers of used cars. Women and younger people appeared to value safety more than men and older people (older buyers could lack sufficient technical knowledge about safety features).

Buyers of new vehicles seemed to consider aspects such as price and the purpose of the vehicle first, and then consider safety within those parameters. People's perceptions of safety tended to relate to specific safety features rather than overall crash worthiness. Parents mostly determined teenage access to vehicles and at the time of this research, the vehicles available to teenagers tended to be relatively substandard.

Currently, New Zealand buyers of new cars purchase mainly NCAP 5-star vehicles because that is what dealers mostly provide. Some of them buy vehicles that have 5 stars from other NCAPs, such as Euro NCAP and Japan NCAP (JNCAP). As organisations and individuals import vehicles with high safety ratings into New Zealand, the safety of the overall national fleet improves when these vehicles are sold into the second-hand market.

Messaging to promote safety in vehicles needs to be aimed at not only buyers but also friends and family who have an influence on purchasing decisions, as well as online sources of information and car dealers.

2.2 Vehicle safety information in New Zealand

The information available in New Zealand regarding vehicle safety comes in the form of car assessment programmes, which are promoted by road safety advocacy organisations to encourage people to make safer car choices. The programmes can be divided into two groups: predictive and retrospective. The programmes promoted by Waka Kotahi are ANCAP (for vehicles less than seven years old and sold new in New Zealand) and UCSR (for used vehicles). Where UCSRs are not available for a vehicle, Vehicle Safety Risk Ratings (VSRRs) can be used.[3] These are based on the UCSRs of similar vehicles of the same year of manufacture of the vehicle in question. The UCSR system is retrospective and the ANCAP is predictive. Star ratings based on UCSRs have recently been supplemented with star ratings based on a total secondary safety index for some car models.

2.2.1 Predictive programmes

Predictive programmes such as NCAP assess a vehicle's safety performance independent of data from its use on roads. The assessments are based on crash tests of individual models conducted under controlled conditions, as well as tests of specific components crucial to crash performance and inspections of car interiors. They can also include tests of accessories such as child seats and assessments of the presence (or absence) of crash avoidance technologies. They include tests of the impact of the car on both occupants and pedestrians. All NCAPs are affiliated to Global NCAP and their details are available on the Global NCAP

[3] The Accident Compensation Corporation (ACC) originally used this system to establish ACC levies for specific vehicles, based on their risk.

website.[4] At the time of this research, the proportion of new vehicles with a 5-star NCAP rating was 65% for the calendar year ending December 2020 (Waka Kotahi, 2021a).

NCAPs provide safety ratings, on a 5-star scale, for each vehicle they test. In the past they rated only crashworthiness, but now they also consider the ability of the vehicle to avoid or mitigate a crash and to minimise the injuries of pedestrians with whom it comes into contact. In addition, JNCAP now rates the fire safety of electric vehicles post-crash.

NCAPs primarily focus on influencing manufacturers to provide safer vehicles by providing consumers and government road safety agencies with information on the safety characteristics of vehicles, to inform new-car buyers who, in turn, can also pressure manufacturers (Newstead et al., 2006). Of the nine such programmes around the world, the most relevant to New Zealand are ANCAP (Australia), Euro NCAP (Europe) and JNCAP (Japan). New Zealand does not have its own NCAP but is affiliated to ANCAP.

Comprehensive documentation of the crash test data from both Euro NCAP and JNCAP are available in English on the internet. Consideration could be given to promoting these sites on the Waka Kotahi website to supplement the ANCAP results. Buyers of used imports, particularly, would gain valuable safety insights from JNCAP that are not available elsewhere, to inform their purchase decisions. An excellent summary of JNCAP information is available at https://www.nasva.go.jp/mamoru/en/assessment_car/crackup_test.html.

While the approaches of Euro NCAP and JNCAP differ from ANCAP in some ways, their information provides sound input for car buyers. As advocacy organisations, all the NCAPs tend to increase their requirements over time. For example, ANCAP now scores a vehicle without ESC with no more than 2 stars, no matter how well it performs in the crash test.

To achieve a particular star rating, ANCAP now requires a vehicle to obtain a pass mark in the following four areas:

- Adult Occupant Protection (AOP)
- Child Occupant Protection (COP)
- Vulnerable Road User Protection (VRU)
- Safety Assist (SA) (ie technologies that prevent crashes or reduce their severity by deploying prior to the crash occurring).

The ANCAP website[5] explains the evolution of its ratings over the years and how to interpret the safety of vehicles from certain years, via the vehicle's 'datestamp' (see Figure 2.16), which details the assessment criteria used.

[4] http://www.globalncap.org/

[5] www.ancap.com.au

Figure 2.16 The progression of safety represented by 5-star ANCAP scores over time (reprinted from ANCAP, n.d.-b)

Research skills can be required to discover the ANCAP tests that were used to rate a vehicle some years earlier, in order to make an objective assessment of the vehicle's current level of safety relative to that of newer cars. Buyers of older used cars (aged more than seven years) could find it easier to consult the UCSRs.

As noted earlier, NCAP testing involves laboratory crash tests, rather than real crashes, which leads some researchers to question its connection with real-world situations. A study by Lie and Tingvall (2002) noted that vehicles with different star safety ratings did not seem to present any significant differences in injury risk in real-world minor-injury crashes. However, in terms of serious and fatal injuries, they found that cars with 3 or 4 stars were more than 30% safer than 2-star cars or cars without a Euro NCAP score (this correlation was an overall figure and did not necessarily apply to individual models). They did not consider aggressivity (including pedestrian protection), child occupant protection or 5-star vehicles (which were scarce at the time). The Lie and Tingvall study also found that in a car-to-car collision, the people in a larger, heavier vehicle were safer, with a 7% lower risk of injury. This is because in a collision, the vehicle's kinetic energy is related to mass by velocity-squared. Thus, those in the smaller vehicle would experience a more severe crash than those in the heavier vehicle. This finding was corroborated by Nolan (2013) in a presentation at a National Highway Traffic Safety Administration Mass-Size Safety Symposium.

Newstead et al. (2006) found that while high NCAP test results related to safer vehicles, there could be large variation between models and the association between NCAP side-impact crash results and crash outcomes was much more clear-cut than those between frontal-impact results and crash outcomes. This is not surprising because the mechanism of the NCAP side-impact test (ie being rammed in the side, using mobile impact barriers to test the vehicle's side structure) is more realistic than that of the frontal-impact test. The frontal-impact test involves the vehicle crashing front on into a fixed barrier, with 40% overlap (representing the oncoming car horizontally overlapping 40% of the front of the other vehicle), to test the vehicle's frontal structure and restraint systems. Newstead et al. recommended that the continually changing safety criteria of NCAPs should be evaluated to ensure that the association with real-world crash outcomes continued.

An IIHS (n.d.) analysis of 14 years of their crash data showed that drivers of vehicles that were rated 'good' in the moderate overlap test were 46% less likely to die in a frontal crash than drivers of vehicles rated 'poor'.[6] Given equivalent frontal ratings, the data showed that the occupants of the heavier of two vehicles were usually better protected in real-world crashes.

[6] The IIHS has four ratings levels: 'good', 'acceptable', 'marginal' and 'poor'.

2.2.2 Retrospective programmes

2.2.2.1 Crashworthiness ratings for used cars

Retrospective programmes generally involve statistical analyses of historical real-world crash data, aiming to assist with the decision-making of buyers of used cars, which comprise a large part of the New Zealand car sales market. The ratings are based on the performance of vehicles in real crashes in protecting people, with data on injury frequency and severity to car occupants[7] in individual model cars drawn from police crash statistics and/or insurance injury claim data. These types of ratings can be found in several countries, including Australia, New Zealand, Finland, Sweden and the UK.

While the objective of all country's systems is similar, they can vary markedly in methodology, such as the types of crashes included in the analyses, whether seat belt usage is accounted for, how the effects of exposure are controlled and whether or not the rating also considers the effects of crashes on other road users outside the vehicle. Methodologies from a number of sources are discussed in Cameron et al. (2001). The more these potentially confounding factors are controlled, the better the rating system.

In Australia and New Zealand, the crashworthiness ratings are based on Monash University work that examines the crash performance of vehicles in the Australian and New Zealand vehicle fleets, using modelling to produce safety ratings for the fleet as a whole and for individual vehicle models. For New Zealand, a database of police-reported injury crashes is used, while in Australia, the criteria vary according to specific jurisdictions, with tow-away crashes being the main criterion (Newstead et al., 2021).

The ratings used in New Zealand and Australia are as follows:

- **Overall safety rating:**
  This measures the level of protection from serious or fatal injury afforded by the car in the event of a crash, for all the crash participants (driver, occupants of other vehicles, pedestrians, cyclists and motorcyclists). This is based on the Monash University primary safety rating. This is the primary safety measure used on the Waka Kotahi Rightcar website for vehicles (without an ANCAP rating) that are seven years old or less and all used imports.
- **Driver safety rating:**
  This measures the level of protection from serious or fatal injury offered by the vehicle to its driver in the event of a crash. This is based on the Monash University crashworthiness rating. This is the secondary safety measure used on the Rightcar website for vehicles (without an ANCAP rating) that are seven years old or less and all used imports.
- **Other road user rating:**
  This relates to how well the vehicle protects other road users, outside the vehicle, from serious or fatal injury if they are struck by the vehicle. It is based on the Monash University aggressivity rating. This is the tertiary safety measure used on the Rightcar website for vehicles without an ANCAP rating.

These ratings are different from NCAP ratings, which include the use of test dummies in both front seats (driver and passenger) and often child dummies in the rear, as well as allowances for crash avoidance features. Explanations of these star ratings are available on the Rightcar website.[8]

UCSRs can differ markedly from ratings derived from NCAP crash testing, as they contain an element of how the people who choose a specific vehicle tend to drive – the factors cannot be totally excluded from the analysis. There are also time differences between crash modelling and UCSRs are several years behind

[7] The New Zealand and Australian used-car assessment schemes relate only to driver protection.

[8] https://rightcar.govt.nz/

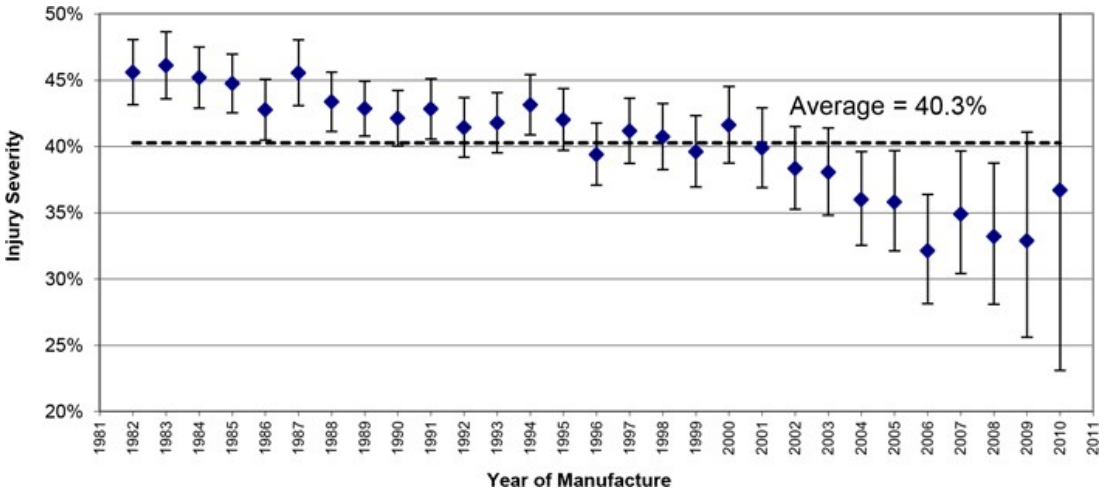
NCAP ratings because of the time required to gather the real-world crash data. Another difference is that wearing of seatbelts is not considered, even though is an important factor in serious crashes – according to Hirsch et al. (2017), non-seatbelt wearing accounted for around 30% of overall vehicle-occupant road deaths in 2015 and 2016.

Not all vehicles have an NCAP rating, so for some vehicles the only rating is a UCSR. For vehicles with an NCAP rating, buyers are encouraged to use it until a UCSR becomes available, at which time the UCSR should be used. Waka Kotahi now uses NCAP ratings for vehicles up to seven years old (where available) and then switches to using UCSRs. This allows greater confidence in the real-world UCSR and overcomes the issue of changes in NCAP test protocols making the old modelled ratings less useful.

2.2.2.2 Aggressivity ratings

Aggressivity ratings measure the serious-injury risk that vehicles pose to other road users with which they collide, including occupants of other motor vehicles, pedestrians and cyclists. The development of aggressivity ratings has been outlined in Cameron et al. (1999) for Australia and Huttula et al. (1997) for Finland. Monash University has provided used-car aggressivity ratings for the Australian and New Zealand vehicle fleets (Newstead et al., 2012). Aggressivity ratings can be disaggregated to consider vehicle aggressivity in terms of different types of victims. Figure 2.17, from Keall et al. (2014), shows the way the average pedestrian injury severity ratings of vehicles in the Australasian fleet changed between 1982 and 2010. Pedestrian injury severity is defined as the probability of fatal or serious injury occurring in the event of an incident. The authors estimated that the reduction shown in this graph for the 2011 fleet, compared to the 2003 fleet, represented an -annual fatal and serious injury saving of at least 14 in New Zealand and 75 in Australia.

Figure 2.17 Pedestrian injury severity rating by year of manufacture (1982–2010) with 95% confidence intervals (Keall et al., 2014, p. 8)



2.2.2.3 Total secondary safety index

To produce an overall index that covered both crashworthiness and aggressivity, Monash University developed a ‘total secondary safety index’ (Newstead et al., 2007), which combines into a single integrated measure the crashworthiness and aggressivity performance of a vehicle, weighted by the relative importance of each component in real-world crashes. This index estimates the risk of death or serious injury to drivers of light vehicles and unprotected road users in the full range of crash types involving light passenger vehicles. As in the crashworthiness ratings, vehicle passengers are not considered; however, it is the best attempt to

date to gain an overview of how types of vehicles and crashes contribute to overall death and injury on the road.

At the time of beginning this research, the method of calculating this index meant that results could only be obtained by broad market group of vehicle and not for individual makes and models of vehicle, and confidence limits could not be obtained. Newstead et al. (2019) emphasised the importance of developing an index that did not have these drawbacks. Some progress towards this goal has been made and ratings are now available for some car models on the Rightcar website.[9]

2.2.2.4 Primary safety ratings

Primary safety ratings capture the impact of advanced vehicle-control systems that reduce either the likelihood of a crash occurring or its severity. These include ESC, ABS, LDW and forward crash mitigation. They are produced by Monash University and updated regularly along with their other ratings. In the New Zealand star ratings, they are noted as 'best safety picks'.

2.2.2.5 How the consumer information star ratings are compiled

Newstead, Watson, Keall et al. (2021) described the way the consumer information five-category star ratings were then being compiled from the UCSRs, with vehicles classified in relation to a 'best performance benchmark', which was a percentile of the best-rating vehicles (ie lowest) in the sample. Values ranging from 6% to 11% were being used to define the benchmark in order to distribute vehicles evenly over the five categories – this could result in the same car being given a different star rating in different years, even if its relativity to the whole market had not changed. The classification categories were then defined by bands related to the distance of the lower confidence limit of each vehicle's rating from the benchmark.

They defined the five categories as follows:

- 5 stars – equal to the benchmark
- 4 stars – worse than the benchmark
- 3 stars – at least 30% worse than the benchmark
- 2 stars – at least 60% worse than the benchmark
- 1 star – at least 90% worse than the benchmark.

The 30% gradients were used to distribute vehicles roughly equally across the five categories so that at any given time, around 20% of the fleet was in each category. This means that in any given year, around 40% of the fleet were vehicles with 1 or 2 stars, and this proportion did not change from year to year. The worst 40% of vehicles in any one year were defined as being inadequate.

The inherent problem in this system was that vehicles with more crashes had tighter confidence limits, resulting in a higher rating. To remove this problem, the system was amended to use the point estimates (estimates of means plus confidence limits) of the crashworthiness ratings, without a specific benchmark. This change could lead to confusing one-off changes in star ratings for some popular vehicles between 2020 and 2021. According to Newstead, Watson, Keall et al. (2021), vehicles were classified according to where their rating lay across five equal quintiles based on vehicles manufactured from the year 2000 onwards, and then the rating values defining the boundary between each quintile was recorded and used to classify earlier

[9] During this research, Newstead, Watson, Keall et al. (2021) released an updated report on the vehicle safety ratings estimation that is applied to vehicles on the Rightcar website. Where possible, our report has been updated to reflect this latest research.

vehicles. The percentage probabilities of serious or fatal driver injury in a crash were 2.55%, 3.10%, 3.73% and 4.39%, respectively representing the twentieth, fortieth, sixtieth and eightieth percentiles.

This implied that for post-1999 vehicles involved in a crash:

- the driver of a 5-star vehicle had a 0% to 2.55% chance of fatal or serious injury
- the driver of a 4-star vehicle had a 2.55% to 3.10% chance of fatal or serious injury
- the driver of a 3-star vehicle had a 3.10% to 3.73% chance of fatal or serious injury
- the driver of a 2-star vehicle had a 3.73% to 4.39% chance of fatal or serious injury
- the driver of a 1-star vehicle had a more than 4.39% chance of fatal or serious injury.

Again, this meant that 40% of post-1999 vehicles were rated as inadequate 1- or 2-star vehicles. In 2020, 18.5% of the New Zealand vehicle fleet were pre-2000 vehicles (Ministry of Transport, 2020). Assuming this percentage still holds and that all pre-2000 vehicles have 1 or 2 stars, and that the Monash quintiles apply to the New Zealand fleet, the fleet for 2021 can be calculated as follows:

Fleet percentage of 1- or 2-star vehicles = 18.5+ (100 −18.5)*0.4 = 51.1% (approximately 50%)

Pre-2000 vehicles + (NZ fleet post-2000 vehicles) *Monash percentage of inadequate vehicles

This percentage will vary in the future, according to the percentage of pre-2000 vehicles in the fleet, until such time as Monash make changes to the way they calculate star ratings.

2.2.2.6 Possible unintended consequences of using retrospective ratings

Until very recently, UCSRs measured just one aspect of vehicle safety: the probability of serious or fatal injury to a driver if a ‘tow-away’ (or in the case of New Zealand, police-reported) crash occurred. They did not account for aggressivity and primary safety, which left the rating system open to the possible problems discussed in the next sections.

Size of vehicle

In the UCSR system, smaller vehicles are rated lower than larger vehicles, partly because of the greater negative effects on them of collisions with larger vehicles. This does not occur in the ANCAP ratings, which are separated into size classes. This is in part due to the larger, more aggressive vehicles in the fleet that may collide with them. This could bias the market in UCSR-rated cars towards larger, more aggressive, generally more polluting vehicles, with attendant safety and environmental consequences.

While the UCSRs are not related to size, the current national fleet has a higher proportion of 5-star larger cars, which means the overall total secondary safety index (ie the serious-injury rate per 100 road users involved), as presented by Newstead, Watson, Keall et al. (2021), indicates that smaller vehicles have a higher percentage of crashes involving DSI (see Table 2.4). Arguably, this may reinforce the perception that larger vehicles are safer.

Table 2.4 Estimated total secondary safety index by market grouping (Newstead, Watson, Keall et al., 2021, p. 58)

Market Group	Injury risk (%)	Injury severity (%)	Total Secondary Safety Index*	Overall rank order	Lower 95% Confidence limit	Upper 95% Confidence limit	Width of Confidence interval
Overall average	**17.60**	**22.88**	**4.03**				
Small SUV	18.74	22.18	4.16	7	4.01	4.31	0.30
Medium SUV	16.43	21.80	3.58	1	3.48	3.69	0.21
Large SUV	16.03	24.61	3.95	3	3.83	4.07	0.23
Commercial - ute	17.18	24.16	4.15	6	4.04	4.27	0.23
Commercial - van	18.67	23.30	4.35	9	4.21	4.50	0.29
Large	17.56	23.15	4.07	5	3.96	4.17	0.21
Medium	17.66	22.29	3.94	2	3.83	4.04	0.21
People mover	18.14	23.20	4.21	8	4.06	4.37	0.31
Small	18.25	22.23	4.06	4	3.95	4.16	0.21
Light	19.21	22.91	4.40	10	4.28	4.52	0.24

* Serious injury rate per 100 road users involved

Ratings changes over time and disparity with NCAP ratings

As noted earlier, used vehicles are evenly distributed across the five bands of the safety ratings in the UCSR system. This means that as safer vehicles are added to the national fleet over time, individual vehicles that have already been rated in the UCSR are moved to lower safety bands. This can be confusing for a person who bought a 3-star vehicle in one year, on the basis that it afforded adequate protection, and then finds in a year or two that it is down to 1 or 2 stars. This is an inherent weakness of the system from the communications point of view, as is the quite common disparity between the historic NCAP rating of a vehicle and its used car safety rating. Waka Kotahi is aware of this confusing aspect of the ratings and has incorporated an explanatory video into its Rightcar website.

Additionally, as more crash avoidance systems are incorporated into the NCAP testing, disparities between historical NCAP ratings and UCSRs for the same vehicle may become greater.

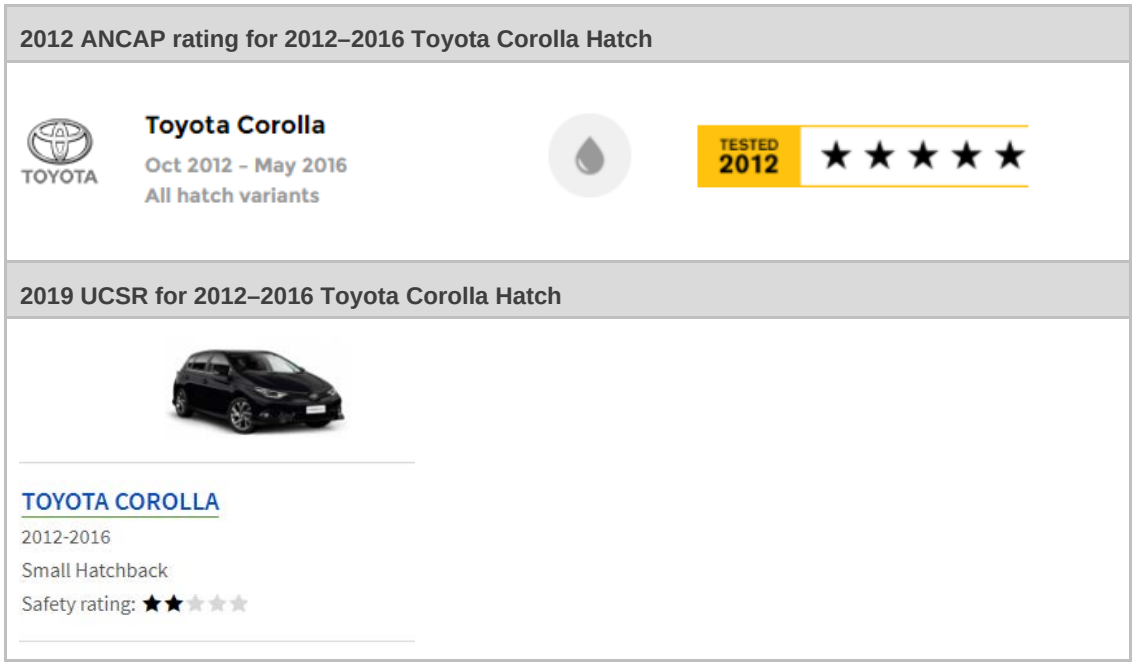
Possible false positives and false negatives

At present, some cars in the fleet have no safety ratings and assessments of them can only be imputed from the safety ratings of cars of a similar age and type (VSRRs). This system can give certain models star ratings that they do not merit by underrating some cars and overrating others. This could result in some buyers making assumptions about the safety of their car based on the potentially inaccurate VSRR.

Anomalies in the ratings

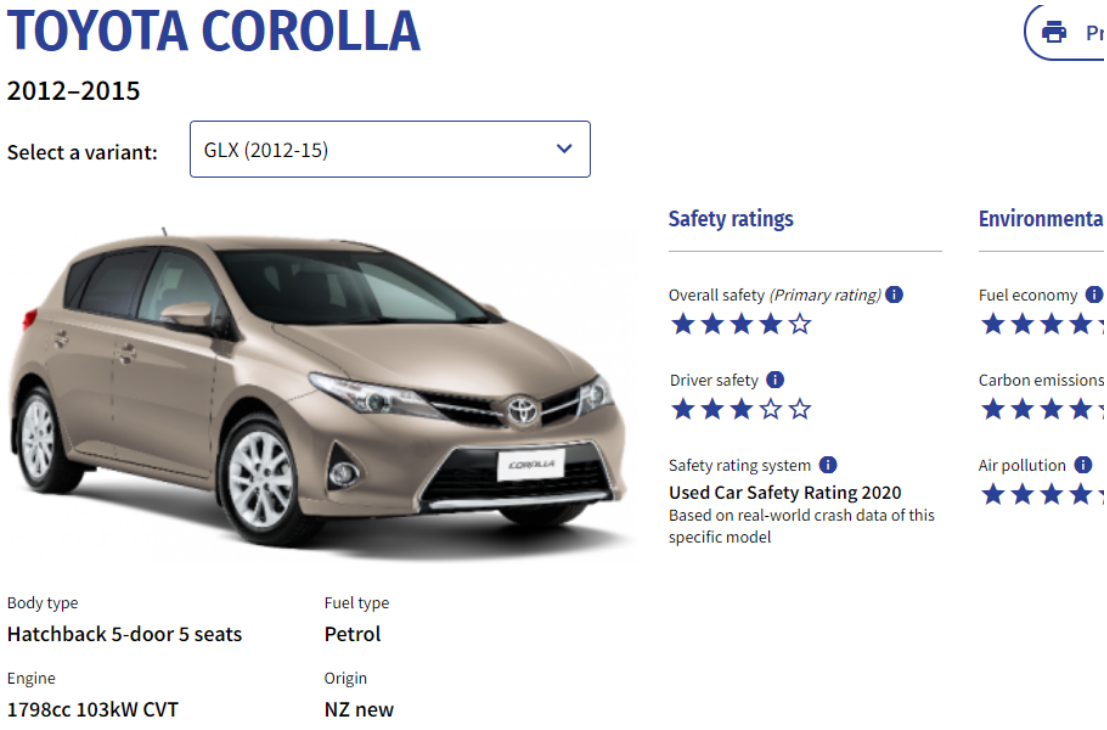
Several apparently anomalous UCSRs have been highlighted in media reports, some of them involving UCSRs that were much lower than the ANCAP ratings for the same vehicle at the time of the vehicle's manufacture. It is confusing to potential buyers if they are told that, for instance, a Toyota Corolla Saloon with a 2014 ANCAP 5-star rating has a 2-star UCSR (see Figure 2.18).

Figure 2.18 Anomaly between ANCAP rating and UCSR for 2012–2016 Toyota Corolla Hatch (reprinted from ANCAP, n.d.-a)



This anomaly has now been corrected on the Rightcar website, as shown in Figure 2.19.

Figure 2.19 Updated rating for 2012–2015 Toyota Corolla Hatch (reprinted from Waka Kotahi, n.d.)



Another anomaly can occur in retrospective systems when an older, less safe model of a vehicle is assigned a better UCSR than a newer, safer model of the same vehicle (see the example in Figure 2.20).

Figure 2.20 UCSRs of Mazda 626 1998–2002 and its 1992–1997 predecessor over time (based on data in Newstead, Watson, Keall et al., 2021)

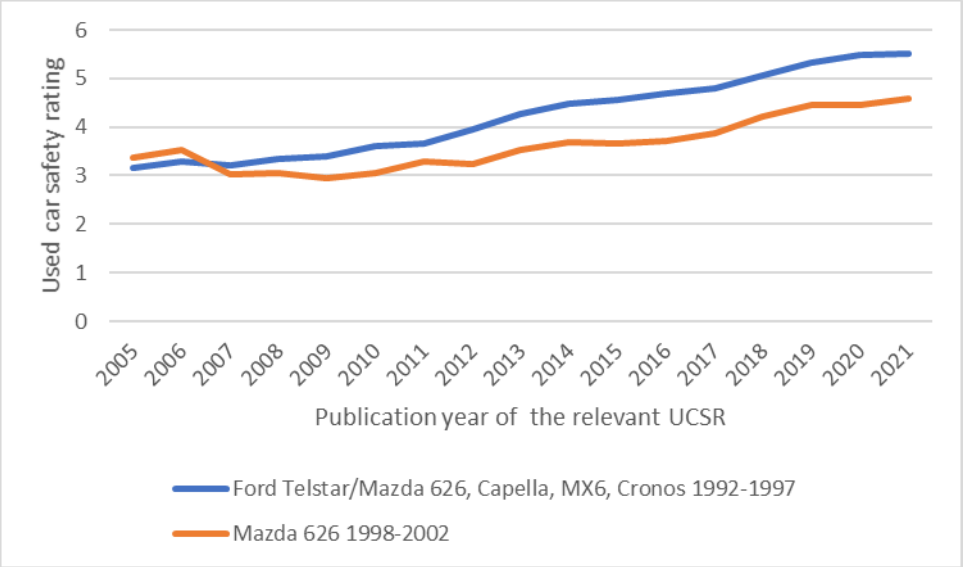


Figure 2.20 illustrates the UCSRs of the Mazda 626, 1998–2002 and its 1992–1997 predecessor[10] over time (data taken from successive editions of the annual Monash publication *Vehicle Safety Ratings Estimated from Police-Reported Crash Data*). In 2005 and 2006, the newer, safer model had a worse rating than the older, less safe model. In subsequent years, the safer model overtook the less safe model, with the difference increasing steadily over time. This type of anomaly is potentially confusing to both owners and buyers. The increasing difference between the estimates over time is also puzzling, suggesting that results may be published when the sample sizes are inadequate, so that results that are more valid occur over time as the sample sizes increase. This historical issue has since been remedied, as Monash has improved their rating methodology and sample size (S. Newstead, Monash University Accident Research Centre, pers. comm., 10 May 2022).

2.2.3 Hybrid ratings systems

The Swedish Insurance Company Folksam assesses the safety of vehicles based on the results of real-world crashes, Euro NCAP rating and the availability of safety features. Folksam (2019) described its process for labelling vehicles as a 'Good choice', as follows:

> *A vehicle must have a safety score of Green+ (5) based on real accidents or five stars from Euro NCAP, approved whiplash protection, ESC as standard, and AEB for another car and for a pedestrian as option or as standard. If the results from real accidents and those from Euro NCAP are contradictory, the results from real accidents are of more significance.*

New Zealand's assessment system is a hybrid, as it uses ANCAP ratings until a vehicle is seven years old, at which time it switches to crash-based criteria.

[10] This was marketed under various brands.

2.2.4 Summary

This part of the literature review revealed that information about new- and used-car ratings is readily available in New Zealand. At the time of this research, the proportion of new vehicles with a 5-star NCAP rating was 65% in 2020 (Waka Kotahi, 2021a).

While the current UCSRs and VSRRs are now becoming more used, there are problems related to apparent anomalies at the level of individual vehicle models and the lack of allowance for crash avoidance features or adjustment for crashes in which lack of seatbelt wearing, rather than the car's characteristics, may have been the main injury generator. These anomalies should be minimised, as they have attracted publicity and could reduce public confidence in the advice, leading to buyers making vehicle choices that are not optimal.

A better picture of the desirability of a used vehicle from the safety viewpoint would be a rating that considers crashworthiness, aggressivity and primary safety, giving buyers a well-rounded overall view of the vehicle. While recent changes on the Rightcar website have included such ratings, it is not clear whether this concept is simple enough for most vehicle buyers to understand. This could be the subject of future research.

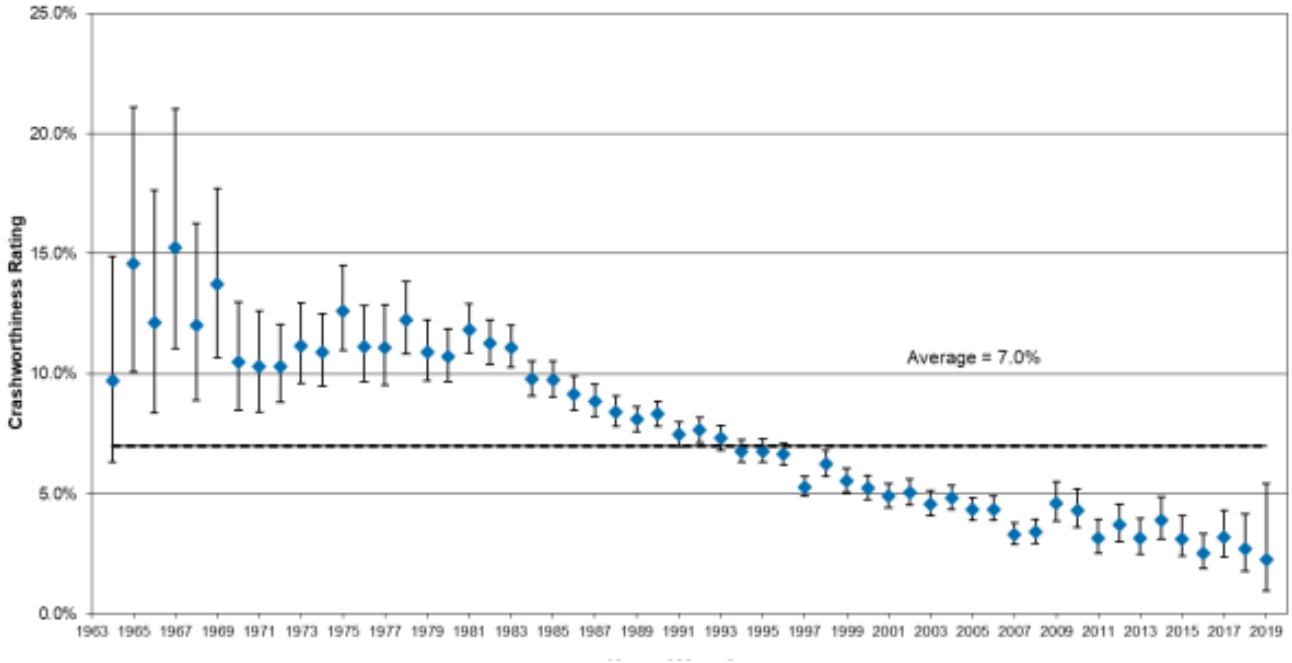
Older ANCAP results and the results from the NCAPs of other countries that supply vehicles to New Zealand are available in New Zealand. JNCAP and Euro NCAP have English-language websites where buyers can look at their results, match their vehicle's specifications to the tested vehicles, and make their own judgements about the features that these NCAPs test, or tested in the past. Adopting this approach here would provide a better level of information to more buyers than the present approach, which only recommends referring to ANCAP and the UCSRs and VSRRs. Where European vehicles match the Australian models, ANCAP uses the Euro NCAP ratings.

2.3 Safety of the New Zealand light passenger vehicle fleet

2.3.1 Crashworthiness

Figure 2.21 shows the average crashworthiness rating of the New Zealand light passenger vehicle fleet by year of manufacture for all vehicle crashes. The crashworthiness rating corresponds roughly to the percentage chance of a driver being seriously injured in a crash, meaning that an improvement in crashworthiness leads to a *lower* star safety rating (but it does not allow for crash avoidance measures such as ESC. It shows that the 5% level, meaning the drivers of these vehicles had less than a 5% chance of being killed or seriously injured in a crash, was reached around 2001, with a flattening of the curve to 2.5% occurring after 2016.

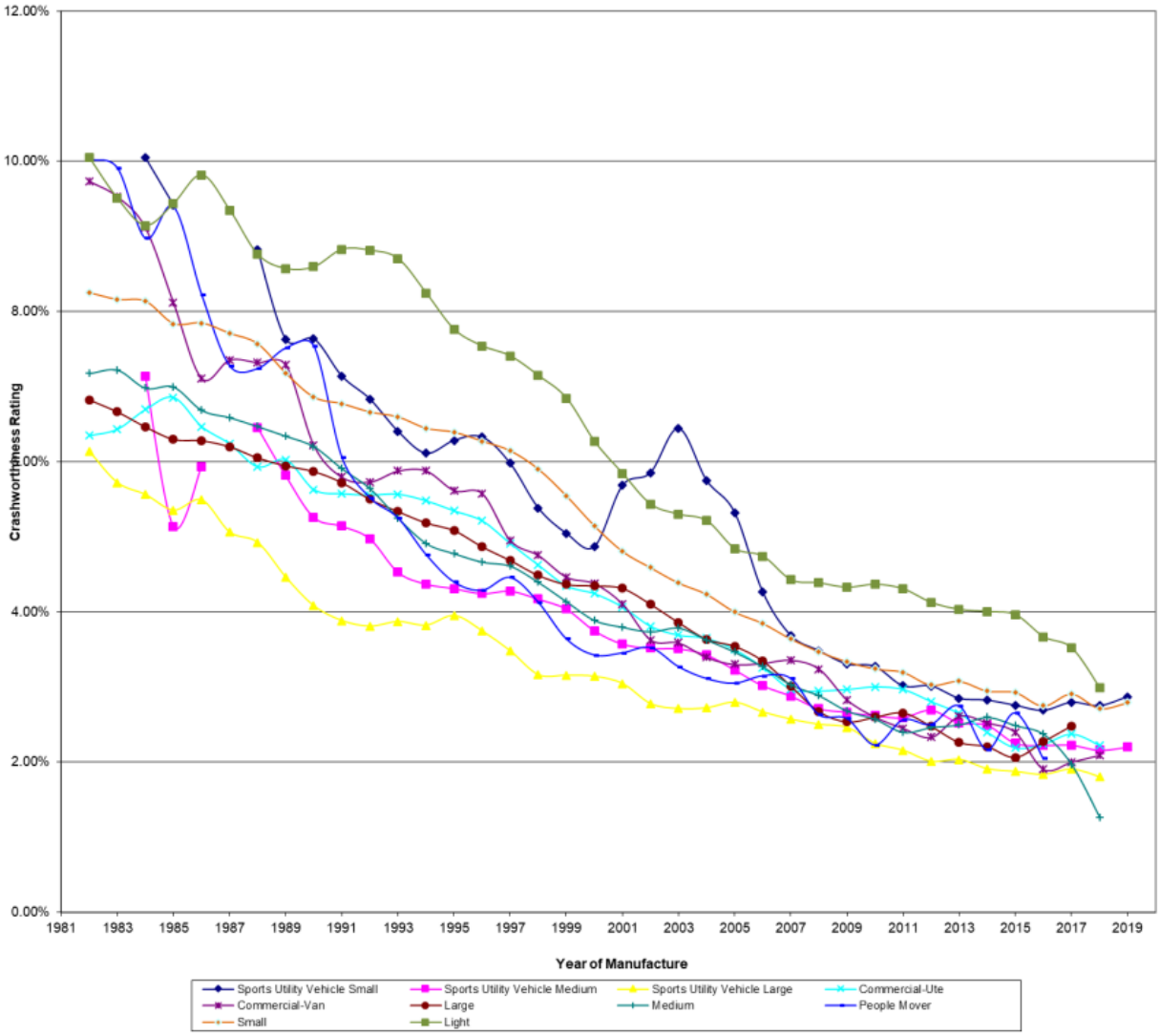
Figure 2.21 Average crashworthiness ratings[a] of the New Zealand light vehicle fleet by year of manufacture (with 95% confidence limits) (reprinted from Newstead, Watson, Cameron et al., 2021, p. 15)



[a] The crashworthiness ratings indicate a driver's percentage chance of being killed or seriously injured in a crash.

Figure 2.22 shows the figures for Australia, disaggregated by vehicle type.

Figure 2.22 Average crashworthiness ratings[a] of the Australian light vehicle fleet by year of manufacture, disaggregated by vehicle type (reprinted from Newstead, Watson, Keall et al., 2021, p. 68)



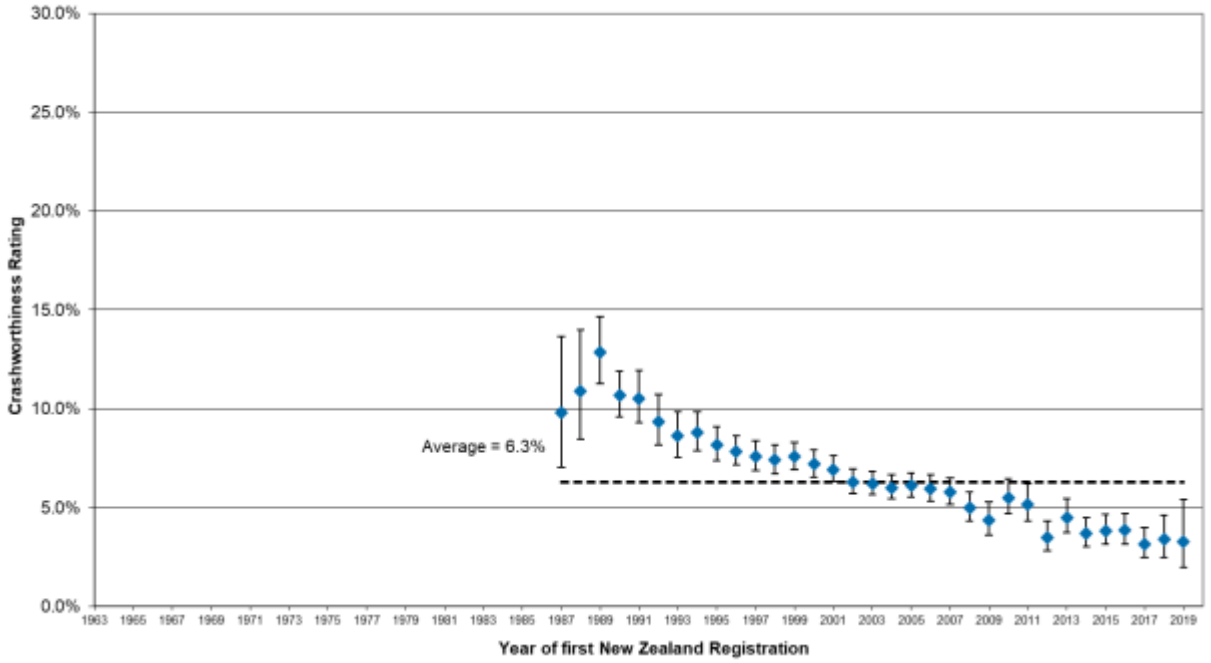
[a] The crashworthiness ratings indicate a driver's percentage chance of being killed or seriously injured in a crash.

This figure shows the same levelling out of safety at around 2.5%, which indicates that in both countries, light vehicles with a similar year of manufacture have a similar level of safety in terms of injury to the driver in a crash. As the New Zealand fleet is somewhat older than Australia's, this means that New Zealand's overall light vehicle fleet is less safe than Australia's.

The figure also shows that larger vehicles, which are typically more aggressive, tend to be more crashworthy than smaller ones, as explained earlier in this document. This presents a conundrum, because if efforts to help people to buy vehicles that are more crashworthy shift them into bigger vehicles, this creates a greater risk for the people they may collide with. The figure also shows recent apparent decreases in the crashworthiness of small and medium SUVs and other vehicles classified as 'small'. The cause and significance of this change is not clear.

Figure 2.23 shows the crashworthiness of imported used cars by year of first registration in New Zealand, starting in 1987. It is different from Figure 2.21 in that it is based on serious driver injuries in two-vehicle injury crashes, rather than serious or fatal driver injuries in all injury crashes.

Figure 2.23 Crashworthiness ratings[a] of used imports by year of first New Zealand registration, with 95% confidence limits (reprinted from Newstead, Watson, Cameron et al., 2021, p. 22)



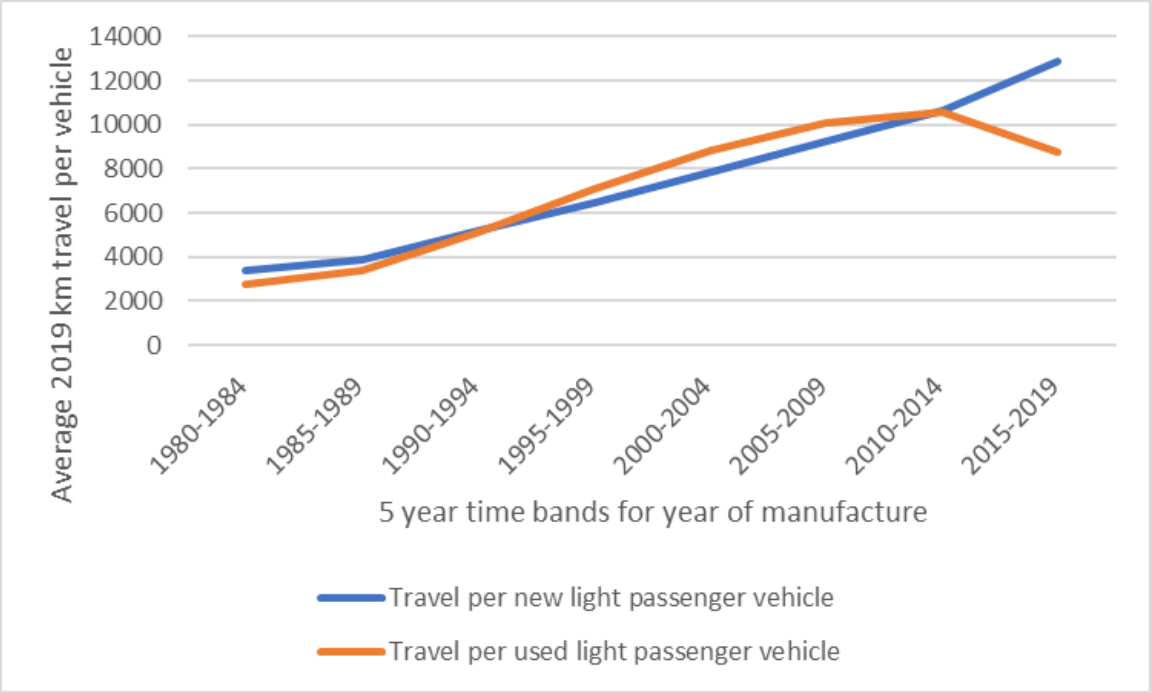
[a] The crashworthiness ratings indicate a driver's percentage chance of being killed or seriously injured in a crash.

Comparing this figure with Figure 2.21, and looking at the years since 2010, in both cases the average crashworthiness rating of used imports has dropped well below the 5% mark over time, meaning the drivers of these used imports had less than a 5% chance of being killed or seriously injured in a crash. The graphs seem to indicate that the gap between the 'all vehicles' group and used imports is becoming quite small, which is heartening, but true comparison is problematic because of the difference in the basis of the two graphs.

2.3.2 Distance driven, by light passenger vehicle age

Figure 2.24 shows how the 2019 annual distance driven by new and used vehicles in the New Zealand light passenger vehicle fleet varied with the age of the vehicle, dropping from 10,000 km/vehicle for vehicles built earlier than 2004 to less than 6,000 km/vehicle for 1990s vehicles.

Figure 2.24 Kilometres travelled in 2019 per light passenger vehicle in New Zealand, by year of manufacture (reprinted from information supplied by Ministry of Transport, pers. comm., 2015)



This reduction in distance travelled is positive for road safety, as it reduces the population's exposure to crash risk from the use of less safe older vehicles. This trend is confirmed by increases in the scrappage rate for older vehicles; by 2019, 183,059 light vehicles were being scrapped, at an average age of 19 years (Ministry of Transport, 2020).

2.3.3 Geographical distribution of New Zealand cars, by safety rating

UCSRs can differ markedly from ratings derived from NCAP crash testing because the models used are unable to totally exclude driver factors. The model on which the New Zealand ratings are based takes into account driver age and sex, but no other driver characteristics. As noted earlier, not all vehicles in New Zealand have had a risk rating directly calculated by Monash University researchers. These vehicles are assigned a safety risk rating (VSRR) based on the crashworthiness ratings of vehicles of similar age and class.

Waka Kotahi has a database of vehicles in the New Zealand fleet that includes their registration details as well as their calculated or assigned risk ratings. This was used to generate the following information about vehicle distribution across New Zealand (an approximate guide only, as the vehicles might not be used in the regions in which they were registered). As vehicle risk ratings change over time, the following statistics present a snapshot of the situation in New Zealand at a single point in time.

Figure 2.25 shows the numbers of light passenger vehicles, by region and safety rating, indicating that at the time of this research, a higher proportion of 1- and 2-star cars were located in southern areas, sometimes (eg in the Nelson region) by a considerable margin.

Figure 2.25 New Zealand light passenger fleet 2019, by UCSRs, by region (adapted from Waka Kotahi, 2021a)

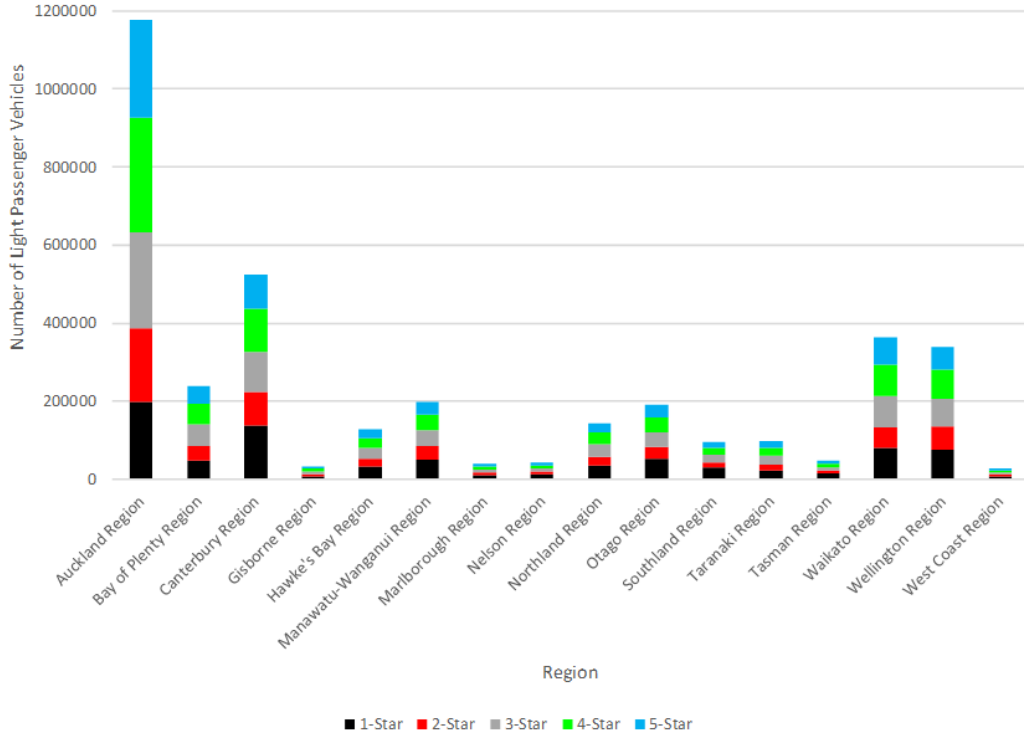
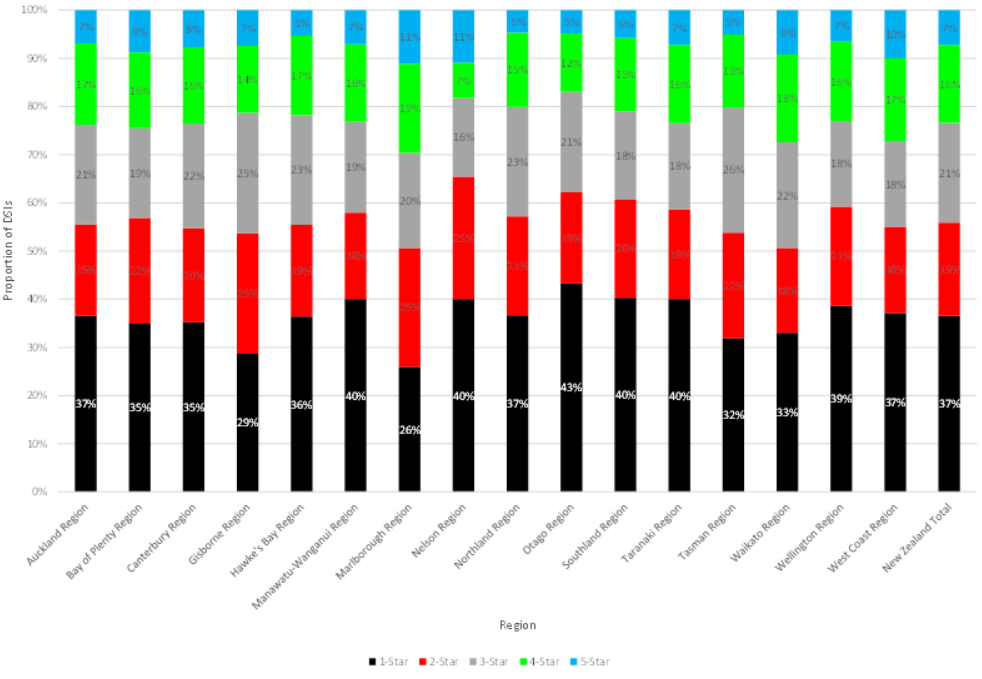


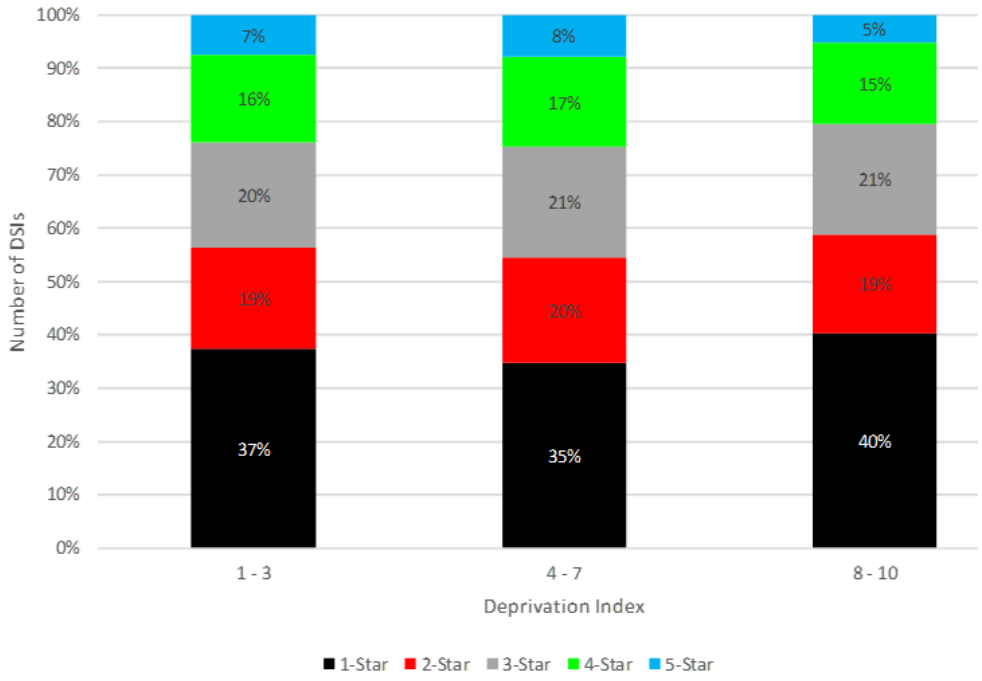
Figure 2.26 shows the proportion of crashes involving DSI, by vehicle rating and region. It shows that these were always equal to or over 50% for 1- and 2-star cars, in some cases (eg Nelson region) by a considerable margin. Of course, factors such as regional vehicle speed profiles and type of road infrastructure could have affected this information as well.

Figure 2.26 Light passenger fleet 2019 percentage of crashes involving DSI, by UCSRs, by region (adapted from Waka Kotahi, 2021a)



It could be expected that crashes involving DSI in 1- and 2-star vehicles might have been linked significantly to poverty. However, Figure 2.27 shows that the link was not significant.

Figure 2.27 Crashes involving DSI 2015–2019, by New Zealand Index of Deprivation, by UCSR (adapted from Waka Kotahi, 2021a)



2.3.4 Summary

By international standards, the New Zealand vehicle fleet is relatively old. This may be mitigated to some extent by the relatively high quality of used imported vehicles from Japan, owing to the maintenance standards required in that country and the border requirements of Waka Kotahi. In addition, older vehicles in New Zealand travel fewer kilometres than younger vehicles, thus reducing the exposure to risk for their occupants and those into whom they might crash.

The age of the fleet here means that UCSRs/total safety ratings are more important than NCAP ratings, compared with countries that have a higher fleet turnover.

Vehicles with lower UCSRs are unevenly distributed throughout the country, with a bias towards the South Island. Therefore, a one-size-fits-all approach may not be the best way to promote the use of safer cars.

2.4 Conclusion

2.4.1 Summary of main points from the literature review

- Rating information for both new and used vehicles is readily available in New Zealand. At the time of this research, the proportion of new vehicles in New Zealand with a 5-star NCAP rating had grown to 65%.
- UCSRs, total UCSRs, older NCAP test results, and results from the NCAPs of countries outside Australia are less well known; increasing the availability of this information could be beneficial.

- Total safety ratings that cover aggressivity as well as crashworthiness are more aligned with the Safe System approach of Waka Kotahi than the other systems, and they are now included on the Rightcar website for some models. This is a very positive development.
- By international standards, the New Zealand vehicle fleet is relatively old, which makes UCSRs and total safety ratings more important here than NCAP ratings, compared with countries that have a higher fleet turnover.
- The factors considered important in vehicle-purchasing decisions vary. Buyers of used cars (the target group for campaigns aiming to reduce the use of cars with lower safety ratings) appear to value safety considerably less than buyers of new cars.
- In general, vehicle buyers seem to consider aspects such as price and the purpose of the vehicle first, and then consider safety within those parameters.
- When making their vehicle-purchasing decisions, women seem to value vehicle safety more than men, and older people are less inclined to value vehicle safety, possibly because some of them lack technical knowledge regarding safety technologies.
- Active safety features tend to be regarded more highly than overall vehicle crashworthiness.
- Parents are major determinants of teenage access to vehicles, and the vehicles that are available to teenagers tend to be substandard.
- As vehicle buyers are influenced by online information, friends and family, and car dealers, safety information needs to have a wide community reach to ensure a shift away from 1- and 2-star vehicles.
- As anomalies in UCSRs can be confusing, they should be minimised.

2.4.2 Possible areas for Waka Kotahi action

Currently, our new-vehicle market is dominated by NCAP 5-star vehicles. This is likely to continue because of existing advocacy programmes from the government, the AA, the competitive market forces among vehicle sellers, and the activities of NCAPs in the countries from which we import new vehicles. This indicates that the most effective place to focus efforts to reduce the use of less safe vehicles in New Zealand is the second-hand market.

Until now, second-hand vehicle safety has not been promoted as vigorously as new-vehicle safety. The following actions could address this issue:

- Provide better access to JNCAP results for imported second-hand Japanese vehicles for which there is no ANCAP rating available, and for any new import that has only JNCAP testing (while keeping in mind the life span of NCAP ratings).
- Improved publicity for, and access to, the safety ratings of new and used vehicles, including overseas NCAP ratings.
- Undertake further rigorous checking of the information to be published on the Rightcar website, to avoid confusing anomalies.
- Consider replacing the UCSR with the total secondary safety index developed by Monash University, as has now been done for some models on the Rightcar website.
- Give more prominence to vehicle safety features on the Rightcar website, as buyers tend to value this information more highly than safety ratings.
- Provide more guidance to vehicle purchasers on the best safety buys in a range of price brackets.

3 Online surveys of car owners and potential car purchasers

3.1 Method

The following three groups were surveyed to address the objectives of this research:

- Group 1 – owners of cars with 1 or 2 stars
- Group 2 – owners of cars with 3 to 5 stars
- Group 3 – potential car purchasers – people who hold learners or restricted driver licences, or who are intending to learn to drive and possibly buy a car.

The online surveys aimed to provide key insights into:

- the baseline demographic data of each group, such as socio-economic status, age, gender, location (Objective 3)
- the decision-making process and priority factors when purchasing a vehicle (Objectives 2, 3 and 4)
- knowledge of vehicle safety ratings/features (Objective 2)
- what the respondents believed contributed to vehicle safety (Objective 2)
- the interventions that could be used to encourage a shift to choosing a safer vehicle (Objective 5).

3.1.1 Sample

3.1.1.1 New Zealand car selection survey

Owners of 1- and 2-star cars and 3- to 5-star cars (Groups 1 and 2) were randomly sampled from the Waka Kotahi Motor Vehicle Register database. Waka Kotahi conducted a data integration exercise to match vehicle registration to star rating for owners with email addresses. Vehicles manufactured before 1990 were removed from the sample. This led to the following selection base:

- For Group 1:
  - 593,103 vehicles met the criteria
  - 100,125 owners were randomly selected and emailed to complete the survey
  - 46% of those emailed opened the survey and 15% of them (*n* = 14,879) responded.
- For Group 2:
  - 902,446 vehicles met the criteria
  - 8,772 owners were randomly selected and emailed to complete the survey
  - 54% of those emailed opened the survey and 18% of them (*n* = 1,592) responded.

A large sample was selected for Group 1, as this was the group to target for change. The smaller Group 2 was selected to determine the differences between the two groups.

Surveys were distributed by email through the Waka Kotahi communications team in September 2021.

3.1.1.2 Potential car purchaser's survey

The recruitment and administration for this survey was managed by Dynata, a New Zealand market research company with over 300,000 active survey panel members. Dynata sent batches of surveys to their pool of participants to achieve 1,000 completed responses from people who:

- did not have a licence but intended to learn to drive
- had a learner or restricted licence but did not own a car.

3.1.2 Survey design

All of the surveys followed the following design principles:

- The first questions gathered baseline information on transport mode choices and vehicles.
- The next questions related to the information sources used when purchasing (based on the 2018 Deloite Global Automotive Consumer Study) and the respondents' top three priorities, as per the European Commission's survey of used-car buyers (European Commission, 2015). Potential purchasers were asked these questions only if they intended to purchase a vehicle in the next 12 months.
- A range of scenario-based questions then asked the owners of cars with 1 or 2 stars how they would dispose of their current car when they upgraded, and why. For 50% of the participants, these questions were presented before some safety-specific questions and for the other 50%, after the safety-specific questions, to determine whether the presentation of additional information influenced their choices.
- All participants were then asked, *'For your next vehicle, which style would you be more likely to choose, if these were your only options available?'.* Four vehicle types were offered (hatchback < $5,000; ute < $10,000, hatchback > $15,000 and SUV > $20,000). Vehicles were selected from actual vehicle listings on online auction sites with star ratings from rightcar.govt.nz. Each vehicle option included their star ratings for safety, fuel economy and carbon emissions. Price and mileage were limited to ±5% and ±10% respectively, to limit variation, and the vehicle images were generic, to remove the influence of brand and colour. In the survey of potential car purchasers (Group 3), this question was modified for respondents who said they did not intend to purchase a car for financial reasons to say, '*You've received $5,000 from a prize draw and have decided to buy a car'* and they were then presented with the hatchback < $5,000 option.
- To assess whether their perceptions of safety related to *safety features* rather than overall crash worthiness (*safety ratings*), the respondents were presented with one of the three conditions shown in Table 3.1.

Table 3.1 Conditions for each vehicle

Condition	Vehicle 1	Vehicle 2	Vehicle 3
Condition 1	• Lowest safety rating • Fewest safety features	• Medium safety rating • Some safety features	• High safety rating • Most safety features
Condition 2	• Lowest safety rating • Most safety features	• Medium safety rating • Some safety features	• High safety rating • Fewest safety features
Condition 3	• Lowest safety rating • No safety features	• Medium safety rating • No safety features	• High safety rating • No safety features

- Two questions about the safety of public transport relative to that of private vehicles aimed to identify whether information provision in this area would make people consider changing their transport choices.

Similarly, a question on star rating and crash statistics aimed to identify whether information provision in this area would make people change to choosing a safer car.

- Near the end of the survey, questions were asked about the participants' knowledge of the safety ratings of their vehicles and possible future vehicles, as well as the importance of safety features and vehicle safety in different driving conditions. This positioning aimed to avoid creating a positive response bias towards vehicle safety, which could have occurred if they had been located earlier in the survey. Participants were also asked what would motivate them to move out of a less safe car.
- The last questions in the surveys gathered demographic information such as age, gender, ethnicity and location.

The survey for Groups 1 and 2 was designed to take 10 to 15 minutes; the survey for Group 3 was designed to take 7 to 10 minutes. An example of the Car Owner's Survey can be seen in Appendix A and the Potential Purchaser's Survey is in Appendix B.

3.1.3 Analysis

The survey results were exported into Microsoft Excel and SPSS for analysis. The results are presented as descriptive statistics with chi-square goodness-of-fit tests applied for variables of interest for all factors with categorical data. Binary logistic regressions[11] were also used to determine significant variables related to group type for 1) owners of 1- and 2-star cars, and 2) those who incorrectly believed they had a safer car. In this context, a key benefit of regression analyses was to determine which variables had the greatest impact on purchasing behaviour and the respondent's belief about their vehicle's safety.

3.1.4 Participants

A total of 17,491 participants responded across the three surveys. Two filtering questions in the surveys of car owners were used to confirm that those respondents mainly drove the vehicle they had specified (rather than another household vehicle) and they had been the purchaser of the vehicle. Here, this sample is referred to as the 'Vehicle selected sample' (see Table 3.2).

Table 3.2 Participant numbers by survey type, with full initial sample and vehicle selected sample

Sample group	Full sample		Vehicle selected sample	
	n	%	*n*	%
Group 1 (owners of cars with 1 or 2 stars)	14,879	85.1	12,364	83.7
Group 2 (owners of cars with 3–5 stars)	1,592	9.1	1,387	9.4
Group 3 (potential car purchasers)	1,020	5.8	1,020	6.9
Total	**17,491**	**100.0**	**14,771**	**100.0**

3.2 Survey results

3.2.1 Forms of transport and vehicle selection

Ninety-eight percent of the respondents to the New Zealand car selection survey stated that they used their own car for transport and were therefore included in further analyses. In both groups of car owners, the next

[11] See Hair et al. (1995) for more details on regression analyses.

most common modes of transport were walking (37%, 34%) and other household car (31%, 32%). The potential car purchasers reported that they mostly used public transport (54%), followed by walking (51%) and other household car (38%) (see Table 3.3).

Table 3.3 Participant numbers by survey group and forms of transport used

What forms of transport do you use?	Group 1 (*n*)	Group 1 (%)	Group 2 (*n*)	Group 2 (%)	Group 3 (*n*)	Group 3 (%)
My car	**14,521**	**98**	**1,562**	**98**	**n/a**	**n/a**
Other household car	4,596	31	507	32	387	38
Car pool/ride-share	511	3	37	2	183	18
Taxi/Uber	1,942	13	209	13	326	32
Public transport	2,490	17	233	15	555	54
Cycling/E-bike	2,416	16	309	19	178	17
Motorcycle	1,132	8	124	8	126	12
Work vehicle	2,269	15	261	16	92	9
Walking	5,496	37	544	34	525	51
Electric scooter or skateboard	353	2	48	3	90	9

The majority of people in Groups 1 and 2 stated that they had chosen their own car, as shown in Table 3.4.

Table 3.4 Responses to the question about who chose their car, by survey group

Who chose this car? (please select all that apply)	Group 1 (*n*)	Group 1 (%)	Group 2 (*n*)	Group 2 (%)
Me	12,610	85	1,408	88
Partner	2,685	18	376	24
Parent	597	4	29	2
Child	309	2	28	2
Other family member	549	4	44	3
Friend/co-worker	190	1	12	1
Salesperson at dealership	94	1	12	1
Other (please specify)	359	2	18	1

3.2.2 Baseline demographic data

The detailed demographic characteristics of the respondents are presented in Appendix C. The demographics are analysed in the binary logistic regression in the next section.

3.2.3 Characteristics and factors related to being an owner of a car with 1 or 2 stars

3.2.3.1 Demographic characteristics of respondents in Group 1

A forward conditional binary logistic regression was used[12] to examine the demographic characteristics (eg gender, age, ethnicity, income, location, town/city/rural area) of the survey respondents who owned a car with 1 or 2 stars (Group 1 – see Table 3.). While there was a significant relationship between the independent and dependent variables (χ^2 (7, N = 13,751) = 112.7, p < .001), the model only explained 1.7% (Nagelkerke R^2 = 0.017) of the variance between Groups 1 and 2. Therefore, a key take-away point is that relying on demographic characteristics to target efforts to influence people's vehicle-purchasing decisions may not be useful.

Three of the key characteristics of those in Group 1 (owners of cars with 1 or 2 stars) were:

- having a household income under $50,000 (as there is a negative relationship with the two higher income groups)
- being under 30 years of age (combining the groups 'age 24 years or under' and 'age 25–29 years')
- identifying as female.

The gender finding was unexpected, as previous research has indicated that females typically value vehicle safety more highly than males, but as Vrkljan and Anaby (2011) explained, males can influence a female's decision-making around vehicle selection.

Table 3.5 Model summary for the binary logistic regression of the demographics of those in Group 1 (variables ranked in order of greatest influence)[a]

Variable	β	SE	Wald	*df*	Sig.	Exp(β)	95% CI for exp(β)	
							Lower	Upper
Income $150,001 or more	−0.54	0.083	41.951	1	.001	0.583	0.495	0.686
Age 24 years or under	0.463	0.152	9.275	1	.002	1.589	1.179	2.14
Female	0.32	0.063	25.913	1	.001	1.378	1.218	1.559
Age 25–29 years	0.296	0.121	6.009	1	.014	1.344	1.061	1.703
Bay of Plenty	−0.267	0.118	5.154	1	.023	0.766	0.608	0.964
Income $100,001–$150,000	−0.256	0.08	10.342	1	.001	0.774	0.662	0.905
Age 40–49 years	−0.186	0.078	5.745	1	.017	0.83	0.713	0.967
Constant	2.187	0.041	2,786.299	1	.001	8.908	–	–

[a] For the regression table, all of the factors are significant. A negative β value indicates a negative relationship. The Exp(β) column is an indicator of the strength of the relationship. Values below zero, indicating a negative relationship, can be adjusted with the multiplicative inverse (ie 1/Exp(β)) to estimate the relative strength of the relationship.

3.2.3.2 The factors that had influenced the purchase decision for those in Group 1

To examine the factors that had influenced the respondents' purchase of a car with 1 or 2 stars, a forward conditional binary logistic regression was used. The variables examined were Purchase location, Source of

[12] See Hair et al. (1995) for details on regression analyses.

influence (eg family, sales person, online review), top 3 priorities for vehicle purchase (16 characteristics), Trust in star safety rating, Importance of vehicle safety features, Attitudes towards the contribution of different vehicle characteristics to being safer, and Intention to buy a safer car next time (see Table 3.6).

While there was a significant relationship between the independent and dependent variables (χ^2 (16, N = 10,311) = 415.4, p < .001), the model only explained 8.2% (Nagelkerke R^2 = 0.082) of the variance between the two groups of car owners.

Some key insights about the views of people in Group 1 regarding safety elements and sources of information, compared with those of Group 2 (owners of cars with 3 to 5 stars), were that they were:

- less likely to mention a high star safety rating as one of their top three priorities when selecting a vehicle, preferring 'cost of ownership (eg insurance, maintenance)', 'fuel efficiency' and 'purchase price'
- less likely to be looking for an 'electric vehicle' or a 'vehicle with additional utility (eg towing or off-road ability)'
- less focused on 'safety features', particularly ESC, reversing cameras and airbags (although the majority still rated these features as somewhat or very important – 56%, 64% and 93%, respectively)
- less likely to trust the vehicle's star safety rating
- more likely to be influenced by 'family or friend', and less likely to be influenced by an 'online car review' (indicating the importance of informal channels of information in this area).

Table 3.6 Model summary for the binary logistic regression for the purchasing decisions of those in Group 1 (variables ranked in order of greatest influence)[a]

Variable	β	SE	Wald	*df*	Sig.	Exp(β)	95% CI for exp(β)	
							Lower	Upper
Electric vehicle[b]	−0.534	0.209	6.500	1	.011	0.586	0.389	0.884
Cost of running[b]	0.479	0.120	15.922	1	.001	1.615	1.276	2.044
Fuel efficiency[b]	0.461	0.079	33.671	1	.001	1.585	1.357	1.852
Vehicle utility[b]	−0.445	0.088	25.614	1	.001	0.641	0.539	0.761
Purchased at used-car dealer	−0.409	0.075	29.419	1	.001	0.665	0.573	0.770
Vehicle large size[b]	−0.338	0.081	17.497	1	.001	0.713	0.609	0.836
Safety rating[b]	−0.331	0.097	11.636	1	.001	0.718	0.594	0.869
Intention to buy a safer car next time	0.316	0.070	20.258	1	.001	1.372	1.195	1.574
Purchased at new-car dealer	−0.229	0.106	4.690	1	.030	0.795	0.646	0.978
Vehicle purchase cost[b]	0.199	0.070	8.174	1	.004	1.220	1.064	1.398
Influenced by online car review	−0.195	0.032	37.250	1	.001	0.823	0.773	0.876
Importance of reversing camera	−0.150	0.032	22.256	1	.001	0.861	0.809	0.916
Importance of airbags	−0.134	0.057	5.508	1	.019	0.875	0.783	0.978
Trust in car star safety rating	−0.090	0.040	5.093	1	.024	0.914	0.846	0.988
Importance of electronic stability control	−0.067	0.022	9.108	1	.003	0.935	0.896	0.977
Influence of friends and family	0.063	0.032	3.892	1	.049	1.065	1.000	1.133
Constant	4.530	0.320	200.516	1	.001	92.720	–	–

[a] All of the factors are significant. A negative β value indicates a negative relationship. The Exp(β) column is an indicator of the strength of the relationship. Values below zero, indicating a negative relationship, can be adjusted with the multiplicative inverse (ie 1/Exp(β) to estimate the relative strength of the relationship).

[b] A 'top 3' priority.

3.2.4 Respondents' priorities when purchasing a vehicle

All survey participants were asked to nominate their 'top 3 priorities' when selecting a vehicle (out of 16 vehicle characteristics, in which only 2 were directly linked to safety).[13]

3.2.4.1 Groups 1 and 2 respondents' priorities regarding safety characteristics

Respondents in Group 1 were significantly less likely than people in Group 2 to rank 'safety features' (χ^2 (1, N = 13,753) = 25.1, p < .001) or 'safety rating' (χ^2 (1, N = 13,753) = 54.4, p < .001) in their top 3 priorities. 'Safety rating' was ranked by both groups more highly than 'safety features' (see Table 3.7), and very few people selected both safety characteristics in their top 3 ranking (n = 106; 0.8%).[14]

Table 3.7 Proportion of respondents in Groups 1 and 2 who ranked safety characteristics in their 'top 3 priorities', by group

Ranked in top 3 priorities	Group 1		Group 2	
	n	%	*n*	%
Safety features	1,044	8.4	173	12.5
Safety rating	1,132	9.2	213	15.4
Any safety	2,086	16.9	370	26.7

3.2.4.2 Groups 1 and 2 respondents' priorities regarding non-safety characteristics

When asked about their top three priorities when selecting their vehicle (out of 16 vehicle characteristics), 61.3% of Group 1 and 52.2% of Group 2 named 'cost of purchase', followed by 'make/model/brand' (Group 1 37.4%, Group 2 42.1%). While the features listed were not identical to those in the European Commission's survey (see Figure 2.8 earlier), that survey demonstrated the same pattern, with 64% and 27% citing price and brand/manufacturer, respectively, as their first, second or third priorities.

Further differences between these two groups emerged in relation to valuing 'fuel efficiency' (Group 1 35.3%, Group 2 24.7%) and 'size/spaciousness, including luggage' (Group 1 16.6%, Group 2 25.4%). As noted earlier, people in Group 1 were more likely than people in Group 2 to prioritise 'cost of ownership (insurance, maintenance)', 'fuel efficiency' and 'cost of purchase' and were less likely to be looking for an 'electric vehicle' or a 'vehicle with additional utility (eg towing or off-road ability)'. The full details for both groups are shown in Figure 3.1 and Figure 3.2.

3.2.4.3 Group 3 respondents' priorities

For most of the respondents in Group 3 (potential car purchasers), 'cost of purchase' was the first priority (see Figure 3.3). This group rated 'safety rating' and 'safety features' more highly than those in Groups 1 and 2. (Note: the 'utility' option was added after this survey had been distributed).

[13] Priority characteristics ranked were: Vehicle age; Cost of ownership (insurance, spare parts); Cost of purchase; Design/appearance/colour; Electric vehicle; Environmental impact/CO_2; Fuel efficiency; Low mileage; Make/model/brand; Safety features; Safety rating; Service history; Size/spaciousness including luggage; Speed/performance/engine size; Technology features (eg phone & internet connectivity, good multimedia systems; Utility (eg towing/4WD)

[14] See Aron & Aron (1994) for more details on chi-square analysis.

Figure 3.1 Top three priorities when choosing current car (Group 1)

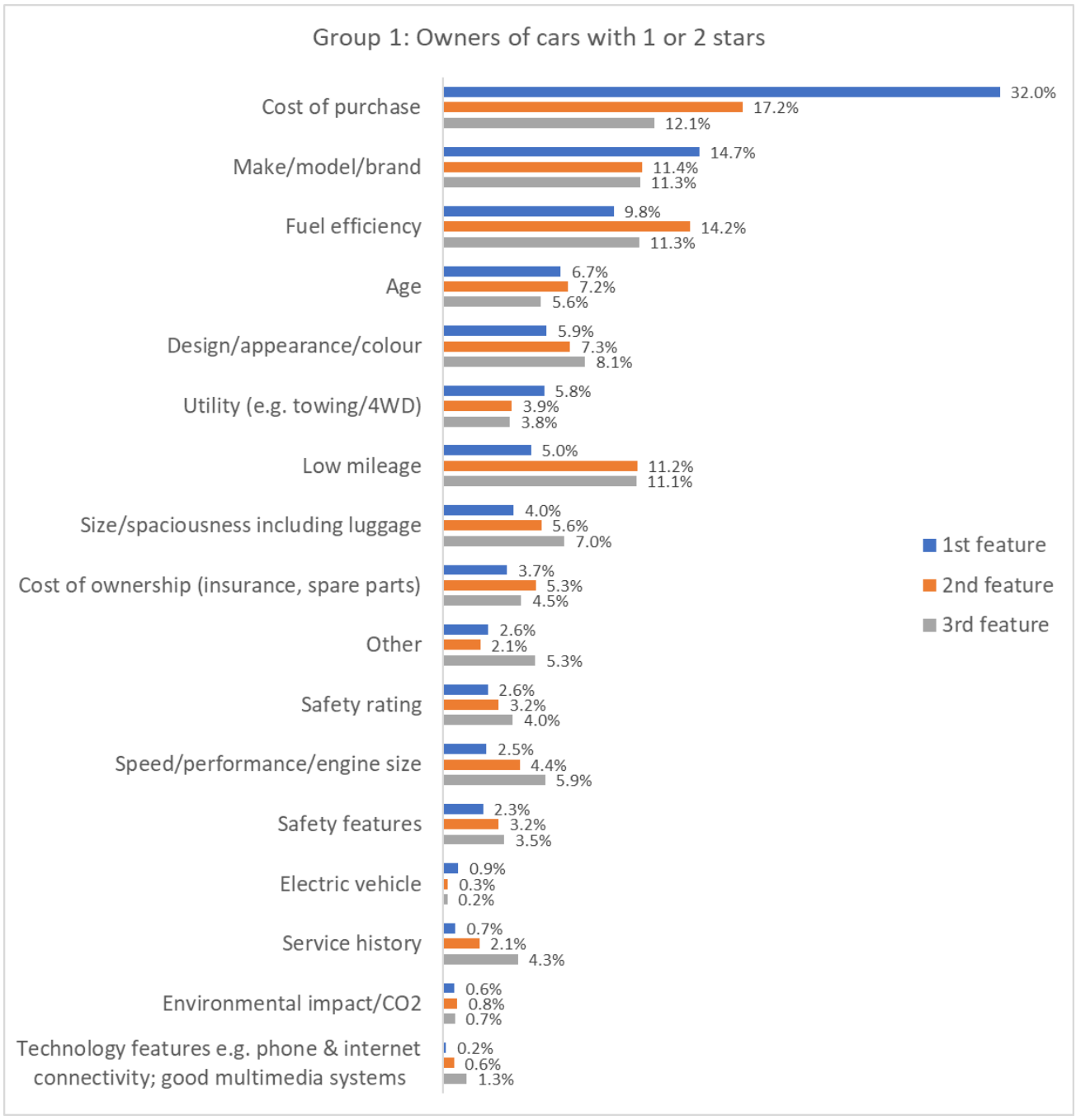


Figure 3.2 Top three priorities when choosing current car (Group 2)

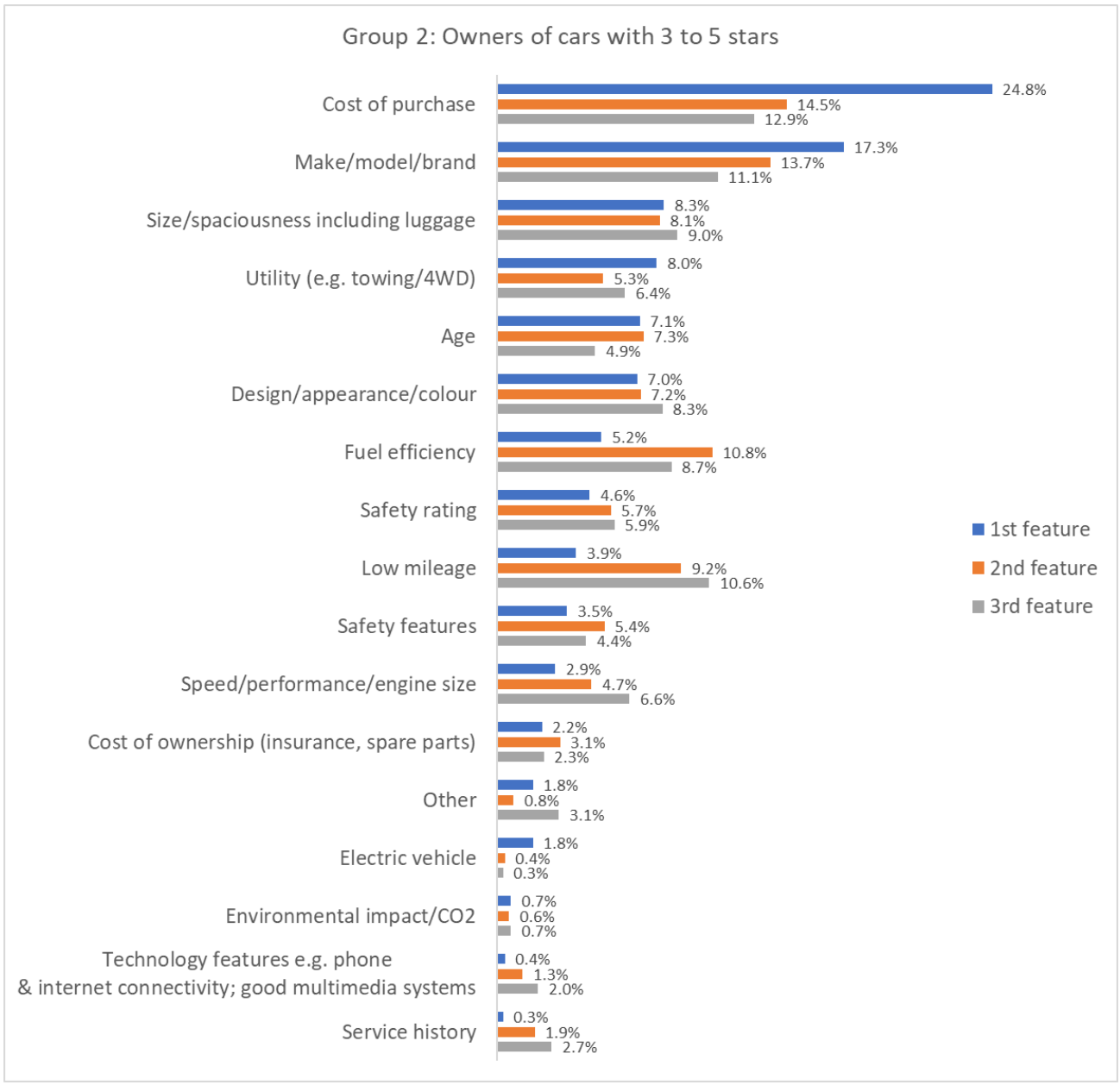
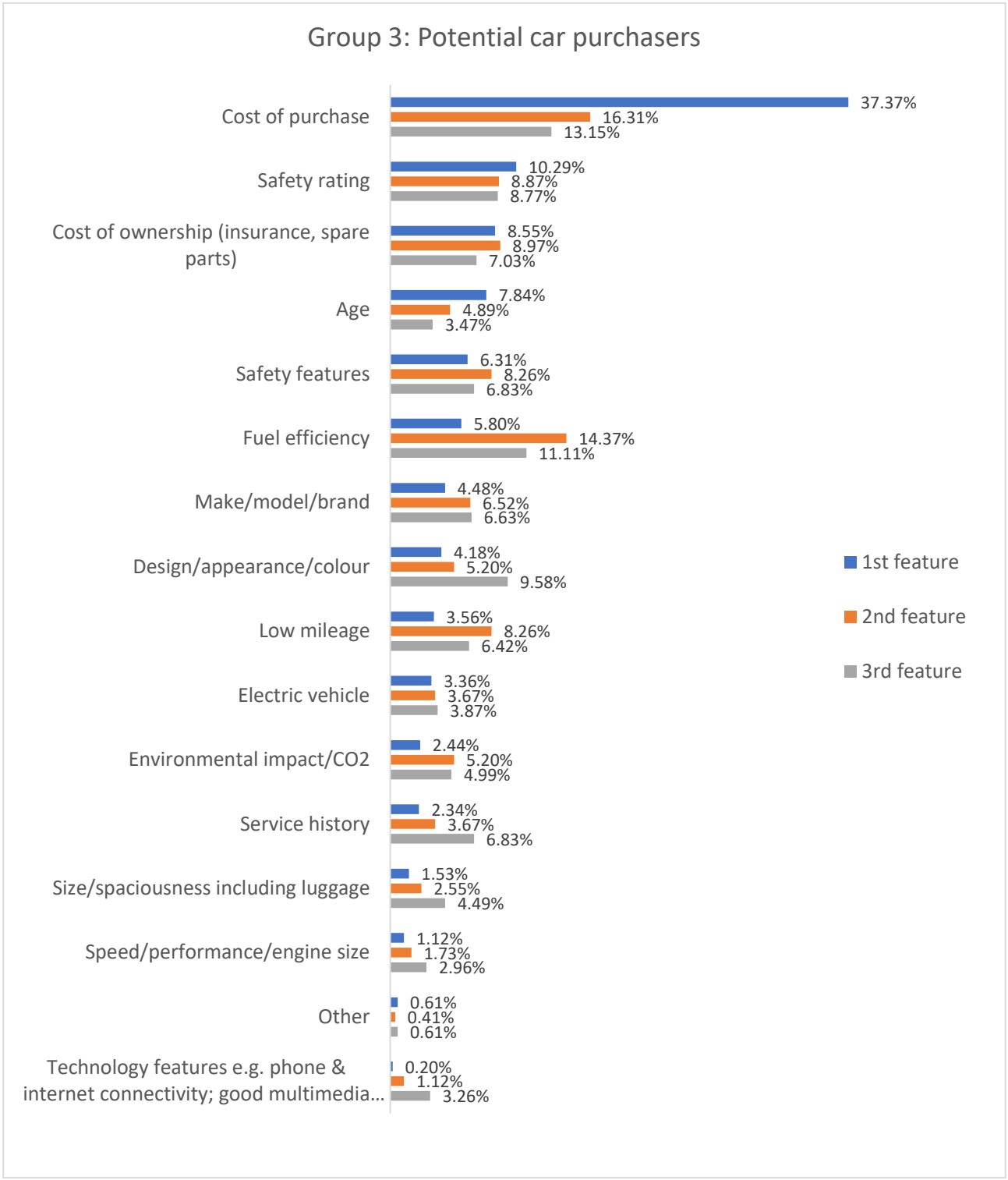


Figure 3.3 Top three priorities when choosing current car (Group 3)



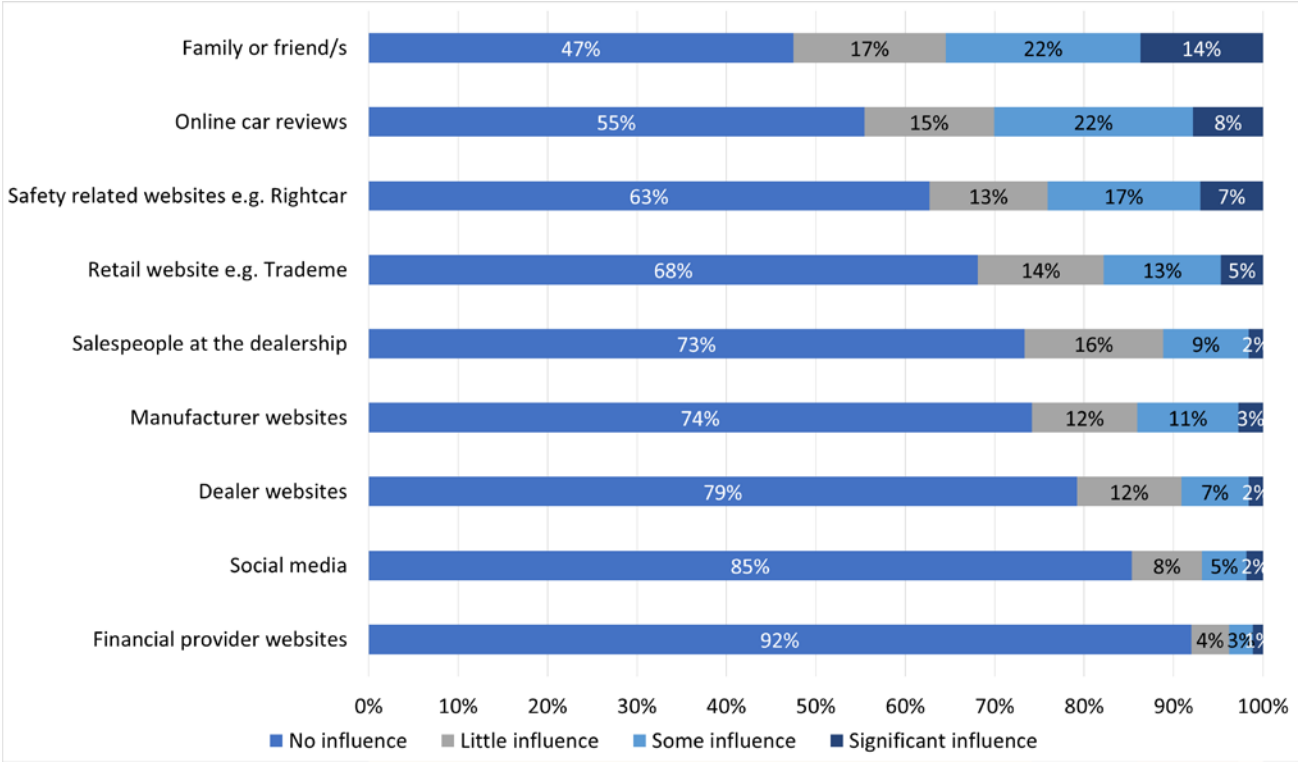
3.2.5 Sources of influence in the car-purchasing decision

Chi-square analyses were conducted to determine the level of influence of the nine information sources on the respondents' vehicle-purchasing decisions. For each information source there was a significant difference between the groups[15] (see Figure 3.4–Figure 3.6).

The two sources most mentioned across all three groups were 'family or friends' and 'online car reviews'. Overall, the people in Group 3 (potential car purchasers) were more likely to be influenced by *all* the information sources mentioned in the survey, arguably indicating an opportunity for education in a range of ways. However, the results for this group should be treated with caution, as their answers may have been assumptions because they had not yet been through the process of selecting a vehicle.

People in Group 1 (owners of cars with 1 or 2 stars) were less likely to be influenced by any information source, apart from 'family or friends', which they rated significantly higher than the people in Group 3 (χ^2 (1, N = 12,471) = 86.22, p < .001). People in Group 3 were more likely to be influenced by 'salespeople at the dealership', 'dealer websites', 'manufacturer websites', 'safety-related websites' and 'online car reviews'.

Figure 3.4 Sources of influence on car-purchasing decision for Group 1 (owners of cars with 1 or 2 stars)



[15] Pearson chi-square results for influences on the vehicle-purchasing decision: Family or friend/s (χ^2 (2, N = 13,093) = 33.3, p < .001); Salespeople (χ^2 (2, N = 12,656) = 75.3, p < .001); Dealer websites (χ^2 (2, N = 12,553) = 68.9, p < .001); Manufacturer websites (χ^2 (2, N = 12,570) = 57.4, p < .001); Retail websites (χ^2 (2, N = 12,542) = 39.6, p < .001); Safety-related websites (χ^2 (2, N = 12,618) = 70.4, p < .001); Financial provider websites (χ^2 (2, N = 12,439) = 293.6, p < .001); Social media (χ^2 (2, N = 12,479) = 67.9, p < .001); Online car reviews (χ^2 (2, N = 12,771) = 91.5, p < .001).

Figure 3.5 Sources of influence on car-purchasing decision for Group 2 (owners of cars with 3–5 stars)

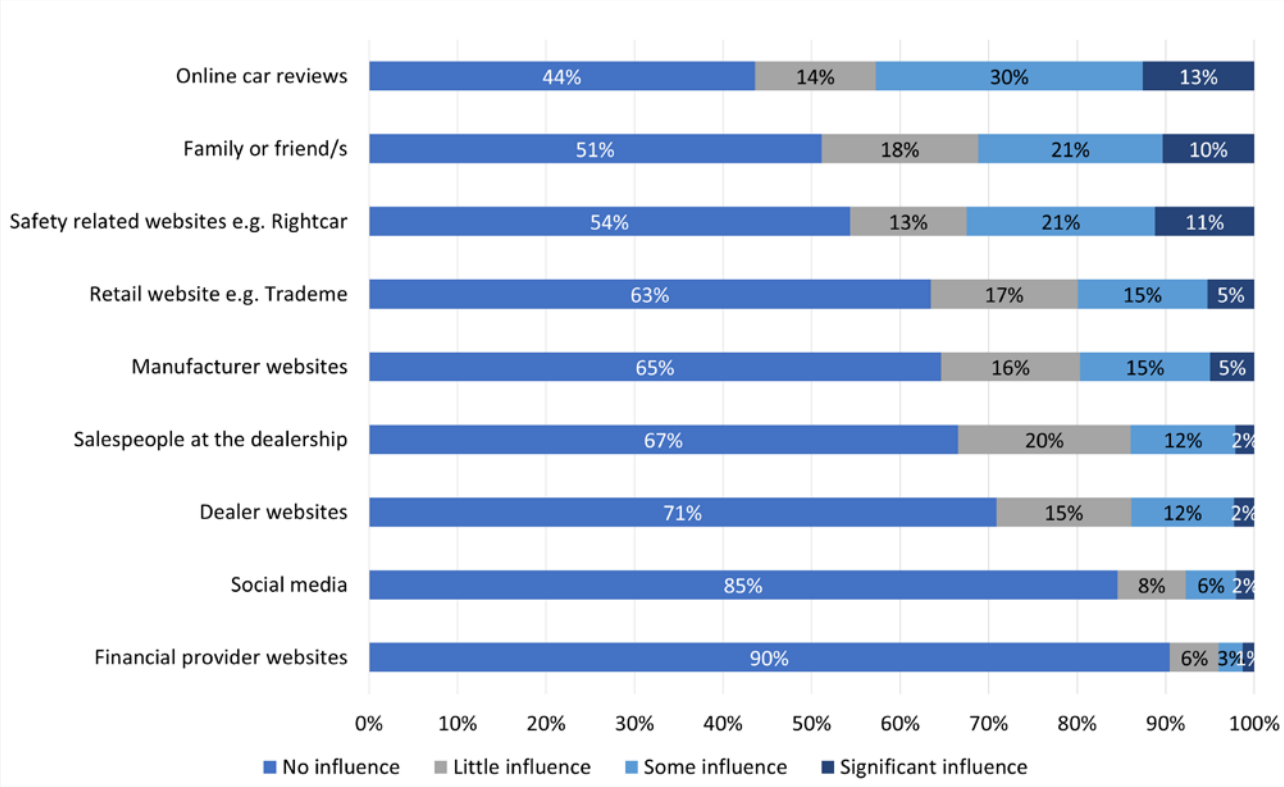
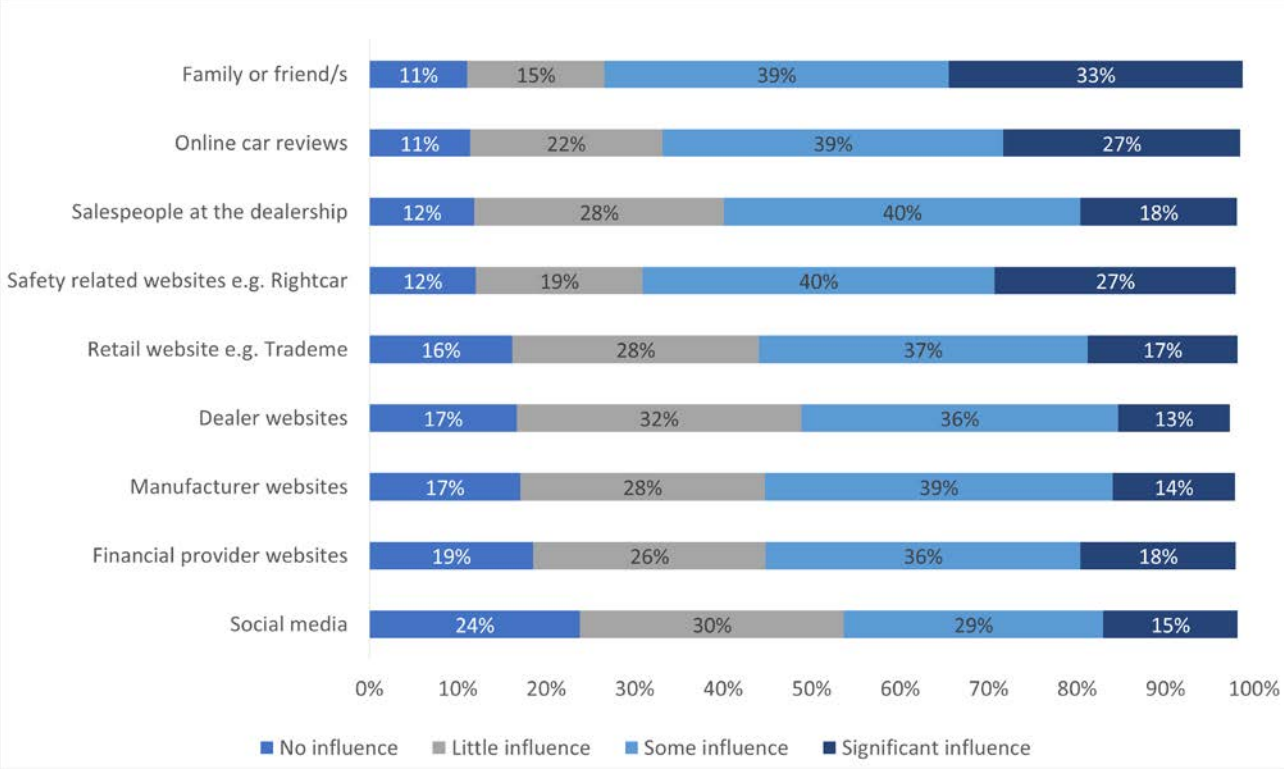


Figure 3.6 Sources of influence on car-purchasing decision for Group 3 (potential car purchasers)



3.2.6 Knowledge of their vehicle's safety rating and safety features

In both Groups 1 and 2, many respondents (55.9% and 45.9%, respectively) stated that they did not know their car's current safety rating (see Table 3.8). Only 13.6% of Group 1 respondents identified that their car had 1 or 2 stars (see Table 3.8). Table 3.9 shows that of those who said they did know their car's safety rating, **69.1% of Group 1 respondents who picked a safety rating incorrectly thought their vehicle had a higher safety rating** than it actually did.

Table 3.8 Groups 1 and 2 – current vehicle's safety rating (including those who did not know it)

Are you aware of your car's current safety rating?	Group 1: owners of cars with 1 or 2 stars	Group 2: owners of cars with 3–5 stars
No, I do not know the safety rating of my car	6,910 (55.9%)	605 (45.9%)
Yes, my car has a 1-star safety rating	914 (7.4%)	20 (1.5%)
Yes, my car has a 2-star safety rating	768 (6.2%)	22 (1.7%)
Yes, my car has a 3-star safety rating	1,075 (8.7%)	102 (7.7%)
Yes, my car has a 4-star safety rating	1,128 (9.1%)	224 (17.0%)
Yes, my car has a 5-star safety rating	1,564 (12.7%)	345 (26.2%)

Table 3.9 Groups 1 and 2 – current vehicle's safety rating (only respondents who picked a safety rating)[a]

Are you aware of your car's current safety rating?	Group 1: owners of cars with 1 or 2 stars	Group 2: owners of cars with 3–5 stars
Yes, my car has a 1-star safety rating	914 (16.8%)	20 (2.8%)
Yes, my car has a 2-star safety rating	768 (14.1%)	22 (3.1%)
Yes, my car has a 3-star safety rating	1,075 (19.7%)	102 (14.3%)
Yes, my car has a 4-star safety rating	1,128 (20.7%)	224 (31.4%)
Yes, my car has a 5-star safety rating	1,564 (28.7%)	345 (48.4%)

[a] Grey shading = correct identification of star rating; peach shading = incorrect identification of star rating.

The people in Group 1 were asked whether their next car would have a rating that was higher, the same or lower (see Table 3.10). For those who responded to this question, only half (49.8%) of those who thought they had a safe car indicated that they would purchase a vehicle with a higher safety rating next time, while almost all those who did not know their car's safety rating or who knew they had a car with only 1 or 2 stars (89.2% and 95.1%, respectively) indicated that their next vehicle would have a higher safety rating. There was a significant difference in the chi-square test χ^2 (4, N = 6,736) = 1,457.83, p < .001). These results indicated that making people aware of their correct safety rating had the potential to encourage up to 45% of those who incorrectly identified their vehicle's safety rating to purchase a safer vehicle next time.

Table 3.10 Groups 1 respondents' expected safety rating of their next vehicle, based on how accurately they identified the star rating of their current vehicle

Safety rating of next vehicle	Incorrectly identified current vehicle's star rating	Did not know star safety rating	Correctly identified current vehicle's star rating
Lower safety rating	13 (0.5%)	9 (0.3%)	8 (0.4%)
Safety rating will stay the same	1,359 (49.1%)	310 (10.5%)	43 (4.1%)
Higher safety rating	1,360 (49.8%)	2,640 (89.2%)	994 (95.1%)

Respondents from all three groups were asked to indicate the importance to them in their car selection of 12 possible safety features.[16] Knowledge of safety features was also determined in this question. The chi-square test identified the following differences in knowledge between the respondents of all three groups.[17]

- Respondents in Group 1 were more likely to have no knowledge of seven of the safety features (AEB, FCW, lane keeping assist [LKA], LDW, ESC, pedestrian detection, traffic sign recognition).
- Respondents in Group 3 were more likely to have no knowledge of four of the safety features (airbags, ABS, ACC, reversing camera).
- Respondents in Group 2 were more likely to have knowledge of 11 of the safety features (all except airbags).

3.2.6.1 Factors that might have influenced Group 1 respondents who incorrectly believed they had a safer car

To understand more about the factors that might have influenced the respondents in Group 1 who incorrectly believed they had cars with 3 to 5 stars (compared with all other respondents in Group 1), we ran a binary logistic regression. An initial complex model was refined down to the eight variables entered into the model, as shown in Table 3.11.[18] There was a significant relationship between the independent and dependent variables (χ^2 (8, N = 9,421) = 2,382.2, p < .001); the model explained 31.2% (Nagelkerke R^2 = 0.312) of the variance in incorrect belief of being in a safer vehicle, and correctly classified 77% of the cases.

Some key insights about the respondents in Group 1 who held an incorrect belief that their car had 3 to 5 stars were as follows:

- Safety was a key priority for these respondents, particularly the star safety rating.

[16] Airbags, ABS, BSM, ACC, traffic sign recognition, pedestrian detection, reversing camera, ESC, LDW, AEB, LKA and forward collision warning (FCW).

[17] Airbags (χ^2 (10, N = 14,598) = 234, p < .001), ABS (χ^2 (10, N = 14,559) = 448, p < .001), BSM (χ^2 (10, N = 14,558) = 99, p < .001), ACC (χ^2 (10, N = 14,542) = 202, p < .001), traffic sign recognition (χ^2 (10, N = 14,513) = 354, p < .001, pedestrian detection (χ^2 (10, N = 14,549) = 133, p < .001), reversing camera (χ^2 (10, N = 14,578) = 190, p < .001), ESC (χ^2 (10, N = 14,549) = 177, p < .001), LDW (χ^2 (10, N = 14,545) = 174, p < .001), AEB (χ^2 (10, N = 1,414,553) = 119, p < .001), LKA (χ^2 (10, N = 14,552) = 274, p < .001), FCW (χ^2 (10, N = 14,552) = 164, p < .001).

[18] The initial exploratory model was determined by the analysts to be too complex, with 33 variables making up 41% of variance, including variables that held very little influence. This was re-run, focusing on factors that 1) logically could influence purchase decisions and 2) were the most influential in the initial model.

- Those who mentioned the safety rating in their top three priorities for the purchase of their current vehicle were:
  - about four times more likely than the others to have this incorrect belief about their current car's safety rating
  - more likely to trust the safety rating
  - less likely to be influenced by knowledge about the benefits of having a car with a higher safety rating, as they already believed they had a safer vehicle.
- Similarly, those who mentioned safety features in their top three priorities were:
  - about 2.6 times more likely than the others to have this incorrect belief about their current car's safety rating
  - less likely to consider a safer car next time, because they already believed they had a safe vehicle
  - more likely to have purchased from a new-car dealer and less likely to have obtained it from a family member or friend
  - more likely to be influenced by a safety-related website.

Overall, the patterns above were repeated in the patterns of those in Group 2 (owners of cars with 3 to 5 stars), which made sense because that was the type of vehicle they believed they had bought. These findings indicated a potential group who wanted to have a safer vehicle, were influenced by safety concerns (especially the star ratings), but were simply working with incorrect (or out-of-date) information about their vehicle. This finding was seen in the top two car-purchasing priorities of those who knew they had a less safe car and those who thought they had a safer car (see Figure 3.7 and Figure 3.8).

Table 3.11 Model summary for the binary logistic regression of the Group 1 respondents who incorrectly believed they had a safer car (variables ranked in order of greatest influence)[a]

Variable	β	SE	Wald	*df*	Sig.	Exp(β)	95% CI for exp(β)	
							Lower	Upper
Star safety rating[b]	1.408	0.088	257.201	1	0.000	4.087	3.441	4.854
Purchased from new-car dealer	0.985	0.075	172.369	1	0.000	2.679	2.313	3.104
Safety feature rating[b]	0.947	0.089	114.106	1	0.000	2.577	2.166	3.066
Influenced by new knowledge of star rating	−0.714	0.060	142.729	1	0.000	0.489	0.435	0.550
Obtained from family or friend	−0.610	0.088	47.790	1	0.000	0.543	0.457	0.646
Influenced by safety-related website	0.570	0.027	454.273	1	0.000	1.768	1.678	1.863
Intention to buy a safer vehicle next time	−0.489	0.055	80.158	1	0.000	0.613	0.551	0.683
Trust in star safety ratings	0.371	0.030	153.028	1	0.000	1.449	1.366	1.537
Constant	−3.005	0.118	643.272	1	0.000	0.050	–	–

[a] All of the factors are significant. A negative β value indicates a negative relationship. The Exp(β) column is an indicator of the strength of the relationship. Values below zero, indicating a negative relationship, can be adjusted with the multiplicative inverse (ie 1/Exp(β)) to estimate the relative strength of the relationship).

[b] A 'top 3 priority'.

Figure 3.7 Factors that had influenced the selection of their current vehicle for Group 1 respondents who correctly identified the star rating of their vehicle

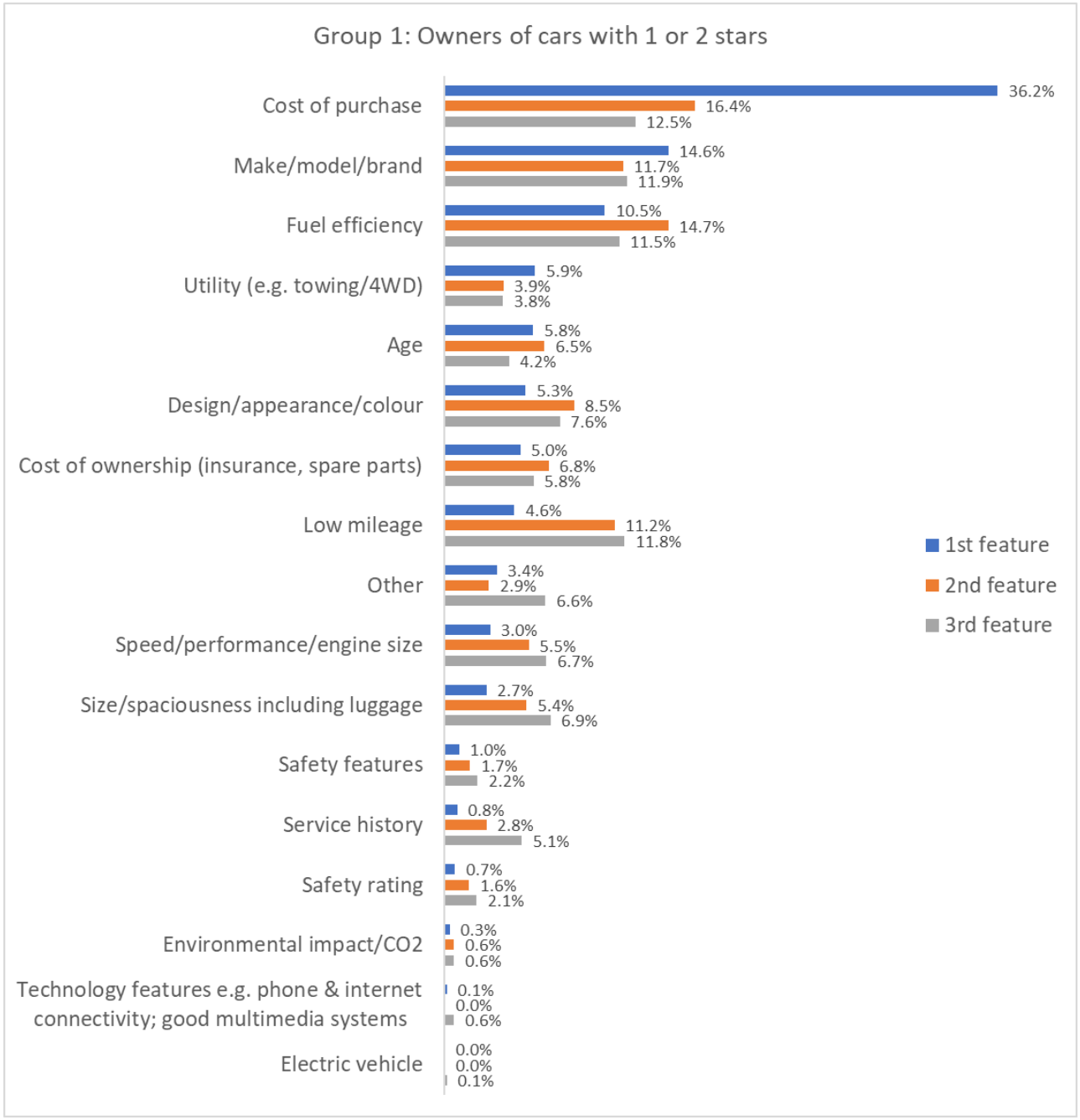
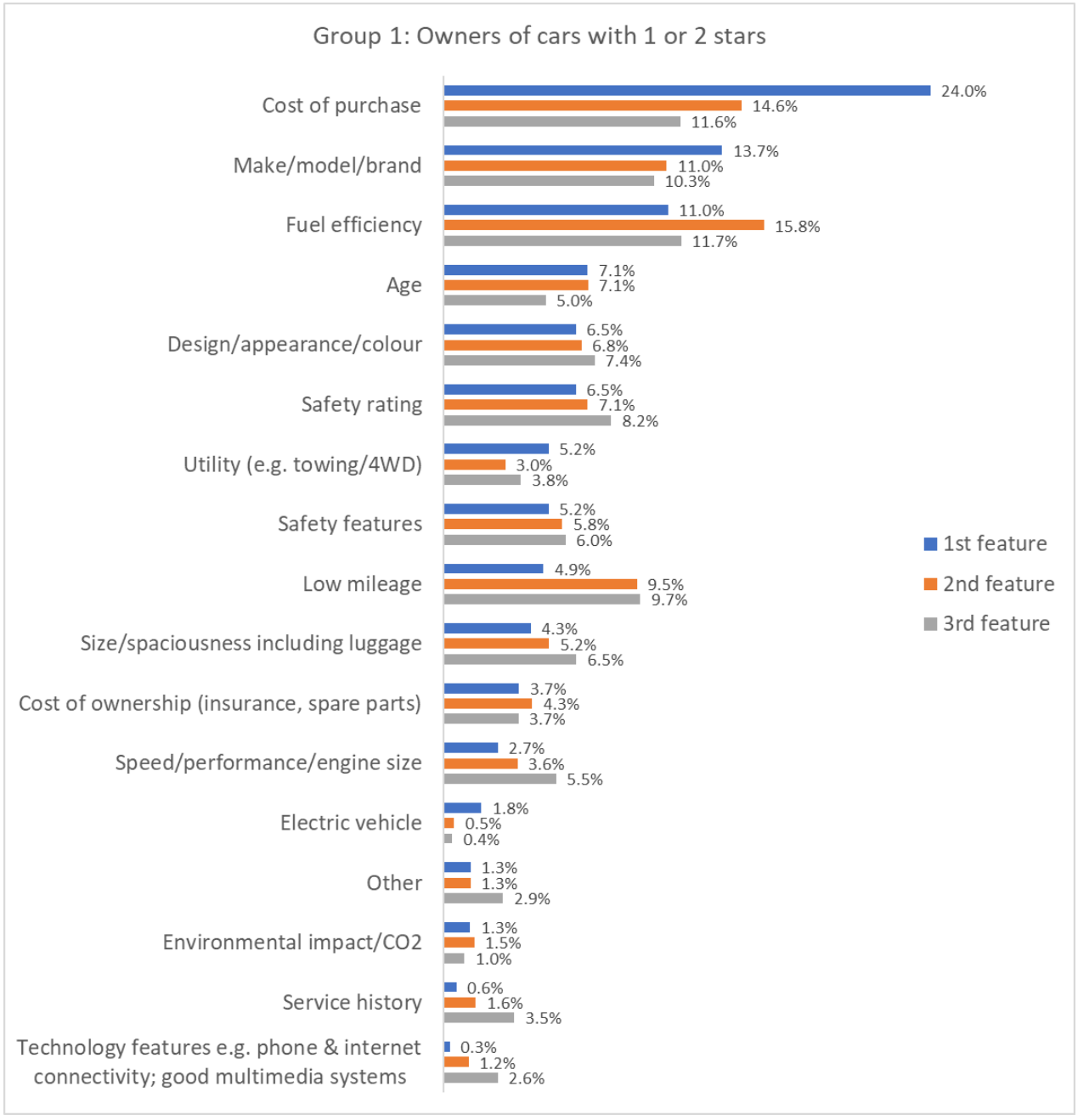


Figure 3.8 Factors that had influenced the selection of their current vehicle for Group 1 respondents who incorrectly identified the star rating of their vehicle



3.2.6.2 Influence of gender in valuing and trusting safety ratings and safety features

The literature review indicated that women were more likely to value safety. Additional analysis was conducted to determine whether this was accurate for the samples in these surveys. Women in Groups 1 and 2 were more likely than men to rank safety features or safety rating in their top three factors (χ^2 (1, N = 11,425) = 41.57, p < .01). This was consistent for the Group 1 respondents, whether they correctly identified, incorrectly identified or did not know their vehicle's star rating (χ^2 (1, N = 10,252) = 41.06, p < .01).

In Group 1, men were more likely than women to trust the safety rating (χ^2 (2, N = 7,250) = 51.97, p < .01). There was no gender difference for this aspect in Group 2. Further analysis identified that women in Group 1

were more likely (11.9%) than men (7.8%) to rank safety features in their top three factors (χ^2 (1, N = 10,277) = 50.031, p < .01).

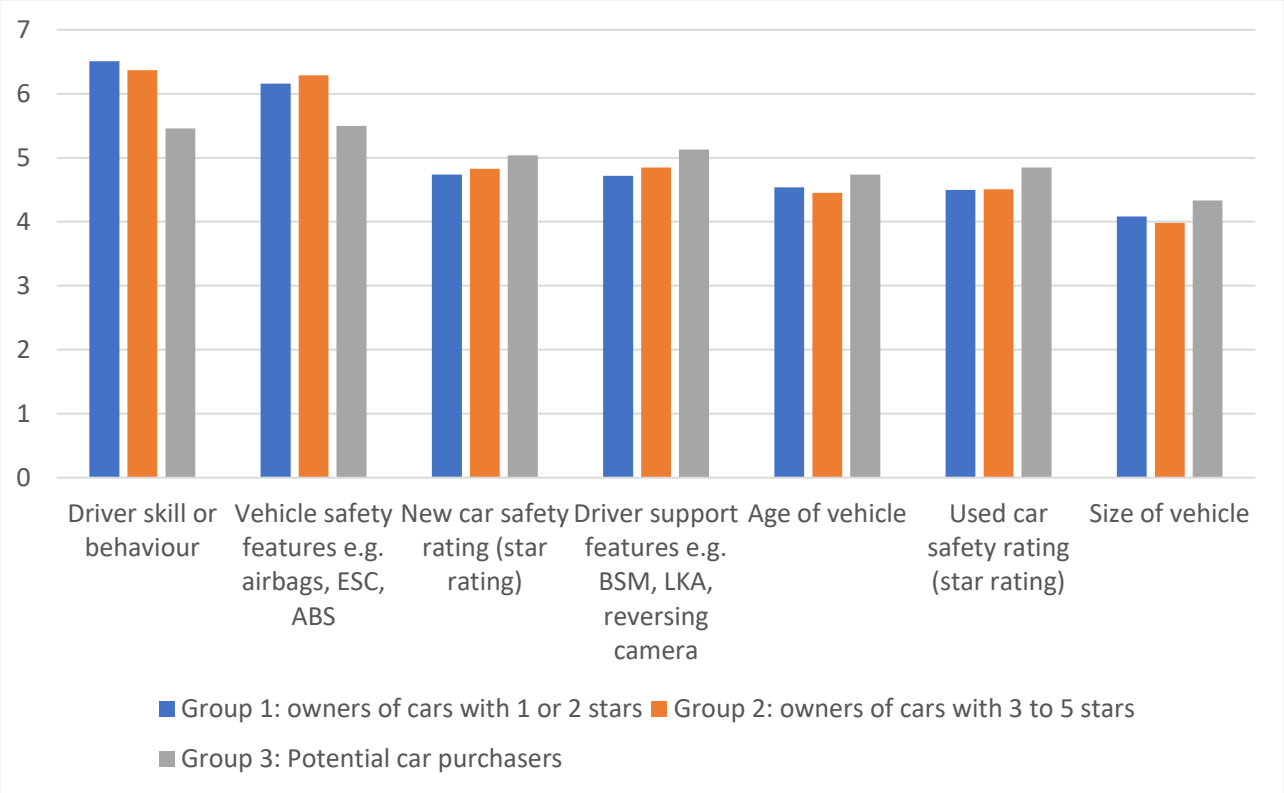
Overall, three-quarters of respondents in Group 2 and two-thirds of respondents in Group 1 trusted the safety ratings, which indicated the potential to improve trust in safety ratings in these groups.

3.2.7 Factors that respondents believed contributed to vehicle safety

Respondents were asked to rank seven factors in terms of contribution to vehicle safety. Average weighted ranked scores are displayed for each factor in Figure 3.9, with a maximum potential weighted ranked score of 8.

For Groups 1 and 2, 'driver skill or behaviour' was considered to make the largest contribution to vehicle safety (59% and 57%, respectively), followed by 'vehicle safety features'. Respondents in Group 3 considered 'vehicle safety features' to make the largest contribution to vehicle safety, followed by 'driver skill or behaviour'. For all groups, the 'new car safety rating' was considered to make a greater contribution than the 'used car safety rating'.

Figure 3.9 Average ranked score when considering the contribution of each factor to vehicle safety



The Kruskal–Wallis H test was used to determine whether there was a significant difference between the three groups in ranking the contribution of these factors. No significant difference was found for age of

vehicle. Mann–Whitney *U* tests with Bonferroni correction then identified whether the differences found in the previous test were significant, with the following results:[19]

- Respondents from Group 1 (U = 4,313,130, $p < .01$) and Group 2 (U = 478,025, $p < .01$) ranked 'driver skill or behaviour' higher than respondents from Group 3.
- Respondents from Group 2 ranked 'vehicle safety features' (U = 5,114,476, $p < .01$) and 'driver support features' (U = 5,302,947, $p < .04$) higher than respondents from Group 1.
- Respondents from Group 3 ranked 'used car safety rating' (U = 5,301,756, $p < .01$), 'new car safety rating' (U = 5,154,458, $p < .01$), 'vehicle safety features' (U = 4,719,573, $p < .01$) and 'driver support features' (U = 4,849,815, $p < .01$) higher than respondents from Group 1.
- Respondents from Group 2 ranked 'used car safety rating' (U = 565,095, $p < .01$), 'driver support features' (U = 543,311, $p < .01$) and 'age of vehicle' (U = 564,335, $p = 0.02$) higher than respondents from Group 3, and ranked 'vehicle safety features' (U = 470,879, $p < .01$) lower.

3.2.8 Selected interventions to encourage a shift into a safer vehicle

3.2.8.1 Intervention 1: Provision of star safety rating and safety features

The literature review determined that purchasers considered safety only after searching within the parameters of a certain price band, make and model, and some purchasers prioritised safety features over star safety ratings. To test this in a controlled setting, the survey respondents were asked to select the vehicle they would be likely to choose, from a choice of four (hatchback < $5,000; ute < $10,000; hatchback > $15,000; SUV > $20,000). Based on their selection, they were then shown the vehicle type of their choice with one of three conditions as detailed earlier in Table 3.1 and asked for their first choice of vehicle. Group 3 participants who did not intend to purchase a vehicle because of financial reasons were presented with a $5,000 gift scenario, as explained earlier in Section 3.1.2.

Pearson chi-square tests were performed for each vehicle type to examine the relationship between the condition presented and the vehicle selected. A summary of the significant results is presented in Table 3.12.

- In the safety ratings-only condition (Condition 3), the respondents were more likely to select the vehicle with the highest safety rating and less likely to select the vehicle with the lowest safety rating.
- When the level of safety rating did not align with the level of safety features (Condition 2), the pattern was not as clear, with choosers of SUVs and utes appearing to prioritise other features. Further investigation into comments made on vehicle choice provided insight into other contributing factors, as follows:
  - SUV: For respondents who chose a vehicle with the lowest safety rating and highest number of features, the most frequently mentioned reason was fuel economy (40%). While 32% of these respondents mentioned safety, only 6% specifically referred to the safety rating of the vehicle. Additionally, 26% of respondents mentioned a vehicle feature (including safety features) as a reason for their selection.
  - Ute: The most mentioned reason for this choice was related to fuel economy (52%). Only 22% of comments mentioned safety, and a vehicle feature (including safety features) was mentioned in only 8% of the responses.

[19] For more information on the Kruskal–Wallis *H* and Mann–Whitney *U* tests, see Nahm (2016).

Table 3.12 Preferred vehicle (A, B, or C) in the three different conditions (significant results)

Condition	A. Vehicle with the lowest safety rating	B. Vehicle with a medium safety rating	C. Vehicle with the highest safety rating
Condition 1: Level of safety rating aligns with level of safety features (eg high safety ratings, most safety features)	Choosers of SUV **less** likely to select this vehicle Choosers of hatchback > $15,000 **more** likely to select this vehicle Choosers of ute **less** likely to select this vehicle	–	Choosers of hatchback > $15,000 **less** likely to select this vehicle Choosers of ute **more** likely to select this vehicle
Condition 2: Level of safety rating does not align with level of safety features (eg high safety ratings, least safety features)	Choosers of SUV **more** likely to select this vehicle Choosers of hatchback > $15,000 **less** likely to select this vehicle Choosers of ute **more** likely to select this vehicle	–	Group 3 **less** likely to select this vehicle Choosers of SUV **less** likely to select this vehicle Choosers of ute **less** likely to select this vehicle
Condition 3: Level of safety rating only (no safety features listed)	Group 3: **Less** likely to select this vehicle Choosers of hatchback < $5,000 **less** likely to select this vehicle Choosers of ute **less** likely to select this vehicle Choosers of SUV **less** likely to select this vehicle	Choosers of hatchback > $15,000 **less** likely to select this vehicle	Group 3 **more** likely to select this vehicle Choosers of hatchback > $15,000 **more** likely to select this vehicle Choosers of ute **more** likely to select this vehicle Choosers of SUV **more** likely to select this vehicle

The results were further analysed to determine whether those who trusted safety ratings were more likely to select a vehicle that had a high safety rating, with the following results:

- For those who trusted safety ratings, no significant difference in vehicle choice was found for the ute, hatchback < $5,000 or hatchback > $15,000.
- In the safety ratings-only condition, the choosers of SUV were less likely to select the vehicle with the lowest safety rating.
- In the 'level of safety ratings does not align with level of safety features' condition, the choosers of SUV were more likely to select the vehicle with the lowest safety rating, indicating that other aspects of the vehicle were prioritised over safety (χ^2 (4, N = 1,943) = 23.417, p < .01).

3.2.8.2 Intervention 2: Safety facts

Group 1 respondents were asked how much they agreed with the statement 'You are less likely to be injured in a road crash when using public transport than when travelling by car'. They were then asked whether knowing that 'In New Zealand, passengers in cars and vans are seven times more likely than bus passengers to be killed or injured in a vehicle crash (for the same time spent travelling)' would make them more likely to travel by bus. Analysis was conducted for those who disagreed with the first statement (χ^2 (2, N = 1,558) = 11.235, p = 0.04), with the following results:

- Those who disagreed with the statement and thought they had a safe car were less likely to consider travelling by bus (80.1% of them would not change)

- Those who disagreed with the statement and did not know the safety rating of their vehicle were also less likely to consider travelling by bus (89.0% of them would not change).

The Group 1 respondents were then asked if they would consider changing their vehicle in response to the statement, 'You are more than twice as likely to die or be seriously injured in a crash in a 1-star [vehicle] than in a 5-star vehicle'. An analysis of their responses by safety awareness group revealed a significant difference between the groups (χ^2 (2, N = 10,551) = 205.234, p < .01), as follows:

- Those who thought they had a safe car were less likely to consider changing their vehicle (77% would not change).
- Those who knew they had a less safe car and did not know their vehicle's star rating were more likely to consider changing their car (39% and 37%, respectively).

3.2.8.3 Intervention 3: Car scrappage scenario

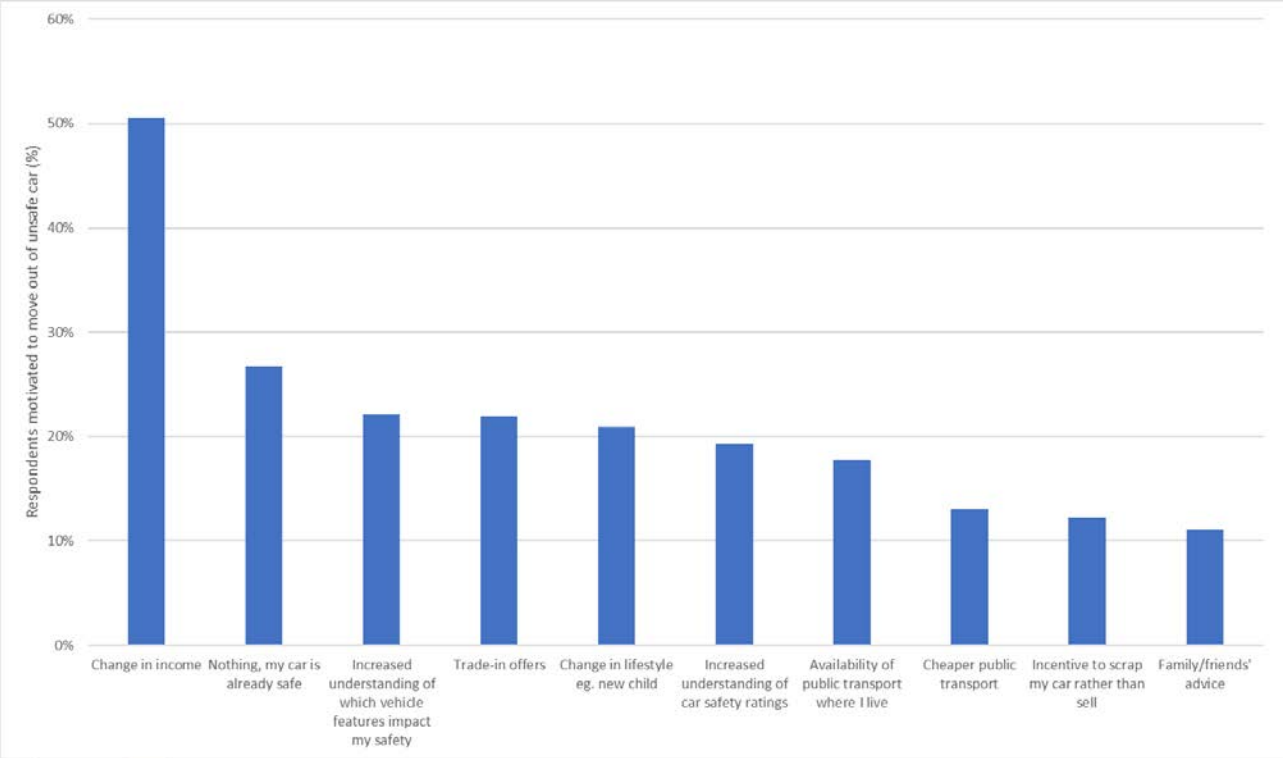
Group 1 respondents were asked what they would choose to do with their car when upgrading: scrap it or sell it to another person or dealer. Overall, most of them said they would sell their car (95.5%) rather than scrap it (4.5%).

To test whether the safety information provided within the survey would change their intentions, half of them were asked this question at the beginning of the survey and half at the end. The analysis of their responses revealed a significant relationship between the timing of the presentation of the scrappage scenario (ie before or after the safety-related questions) χ^2 (1, N = 10,524) = 5.259, p = 0.022) and whether or not they knew their vehicle's star rating, as follows:

- After the safety information was presented, those who thought they had a safer car were not significantly more likely to scrap their car than sell it.
- After the safety information was presented, those who knew they had a less safe car (the target group for change) were 2.4 times more likely (from 3.3% to 8.0% of the sample) to scrap their vehicle (χ^2 (1, N = 10,524) = 37.013, p < .01).

When asked directly what would motivate them to move out of an unsafe car, the most popular response was 'change in income' (51%) followed by 'nothing, my car is already safe' (27%), as shown in Figure 3.10.

Figure 3.10 Group 1 (owners of cars with 1 or 2 stars) respondents' responses to 'What would motivate or encourage you to move out of an unsafe car?'



3.2.9 Discussion of survey results

3.2.9.1 Demographic characteristics of people who owned a car with 1 or 2 stars

Owners of cars with 1 or 2 stars (Group 1) were more likely than those who owned cars with 3 to 5 stars (Group 2) to be young, female and earn less than $50,000 per year. While Figure 2.25 in the literature review chapter indicated variation in the distribution of cars with 1 or 2 stars across New Zealand, our survey found only marginal differences between locations for the three groups of respondents. The income of Group 1 respondents clearly restricted the price range for their vehicle choices. While there was evidence in the literature that women value vehicle safety more than men, in our sample, people who had bought cars with only 1 or 2 stars were most often women and they were more likely to have been influenced in their vehicle-purchasing decisions by family and friends, who may not necessarily have knowledge on vehicle safety.

Overall, the demographic variables did not have a strong link with the purchase of a car with 1 or 2 stars, which may have related to many respondents' lack of knowledge that they had this type of car, as detailed later in this chapter.

3.2.9.2 Factors that respondents had prioritised when buying their vehicle

When asked about their top three priorities when selecting a vehicle, 'cost of purchase' was the highest-ranking factor across all three groups. This was consistent with the findings in the literature review (eg European Commission, 2015; University of Buckingham, 2014).

Owners of cars with 1 or 2 stars (Group 1) were less likely than owners of cars with 3 to 5 stars (Group 2) to rank safety rating or safety features as one of their top three priorities (17% and 27%, respectively). They were more likely to prioritise 'cost of ownership (insurance, maintenance)', 'fuel efficiency' and 'cost of

purchase'. They were also less likely to be looking for an electric vehicle or a vehicle with additional utility (eg towing or off-road ability).

Respondents in Group 1 prioritised safety features less than those in Group 2, although most of them considered ESC, reversing cameras and airbags 'somewhat' or 'very important' (56%, 64% and 93%, respectively).

While the females in these surveys valued vehicle safety ratings and features more than men, they were less trusting of safety ratings. This initially appeared to be counter-intuitive, but further analysis determined that woman placed higher value on safety features than men. Overall, 33% of all respondents in Group 1 and 25% in Group 2 did not trust vehicle safety ratings, possibly due to a lack of awareness of how the safety ratings are established, or because of changes in the safety ratings of their vehicles.

3.2.9.3 Respondents' beliefs about what contributes most to vehicle safety

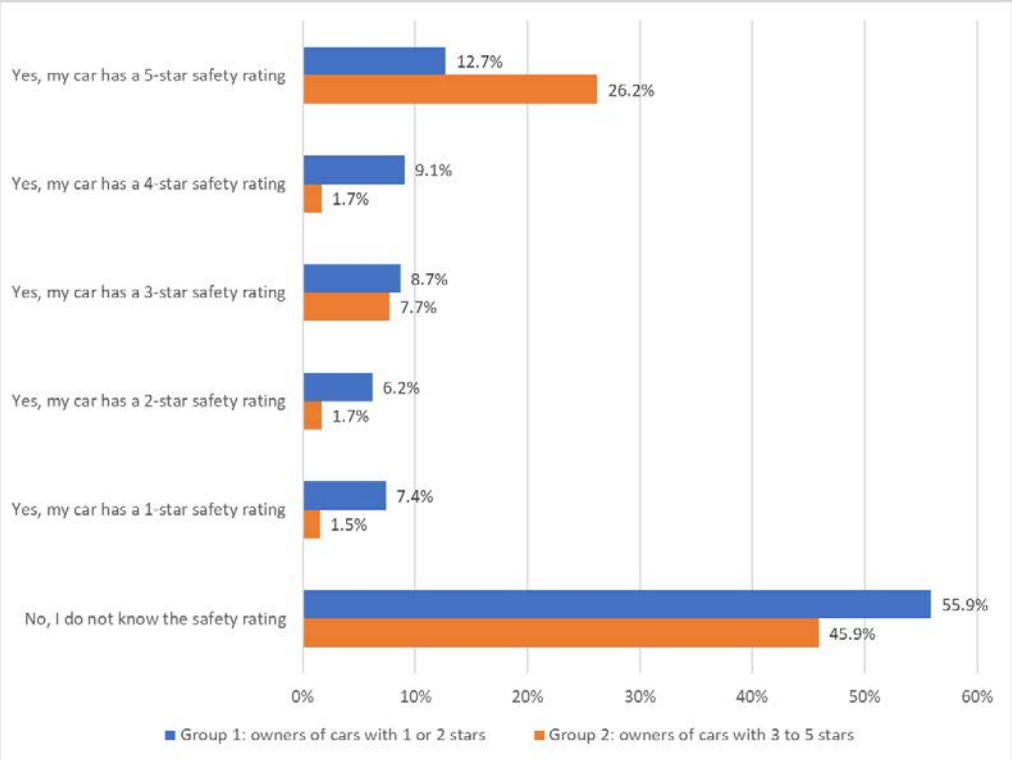
Respondents from Group 1 and Group 2 ranked 'driver skill or behaviour' as making the greatest contribution to overall vehicle safety, significantly more than those in Group 3. This was likely due to their greater driving experience and may be explained by the 'self-enhancement bias' that is commonly seen in driving research, whereby drivers consistently rate their own driving as being better than that of others (Harré & Sibley, 2007).

Respondents from Groups 2 and 3 ranked 'vehicle safety features' and 'driver support features' higher than those in Group 1, who were less likely than Group 2 respondents to understand what many of the safety features were and therefore, less likely to value them.

3.2.9.4 Respondents' beliefs and influences regarding their vehicles' safety ratings

Over half (56%) of the Group 1 respondents said they did not know their car's safety rating (see Figure 3.11). This was in line with the results of the Waka Kotahi (2021b) *Public Attitudes to Road Safety* survey.

Figure 3.11 Groups 1 and 2 respondents' knowledge of the safety ratings of their vehicles



This study revealed the presence of a group who believed they had a safer car (ie one with 3–5 stars) but actually had a car with 1 or 2 stars. This group comprised over two-thirds (69%) of the Group 1 car owners who said they knew their vehicle's star safety rating, as shown in Figure 3.12.

Figure 3.12 Percentage of correct and incorrect star ratings for vehicle owners who said they knew their vehicle's star safety rating

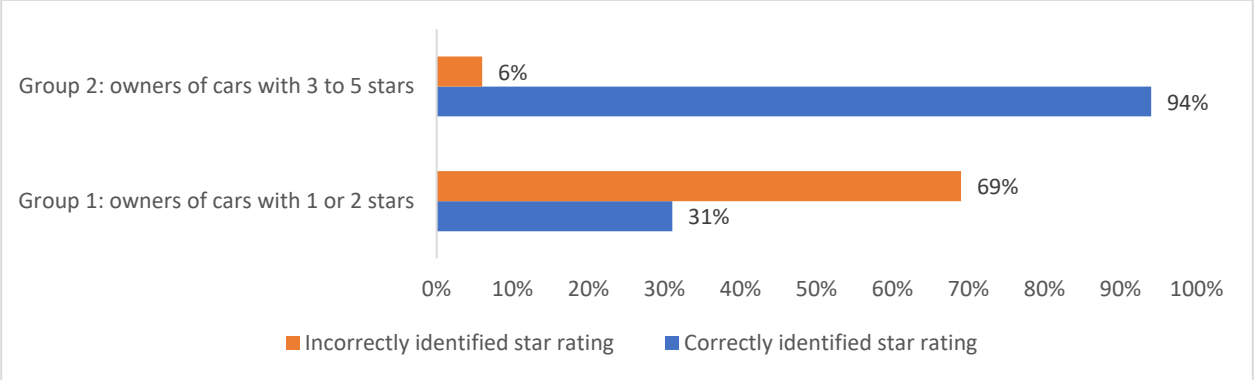


Figure 3.11 showed that fewer than 15% of Group 1 respondents identified that they had a car with only 1 or 2 stars, and Table 3.10 earlier showed that almost all of these Group 1 respondents who were *correct* intended to purchase a vehicle with a higher safety rating next time, as were the respondents who were unaware of their car's safety rating. Less than half of those who were *incorrect* intended to purchase a safer vehicle next time (because they already thought they had a safer vehicle). Given that people who knew they had a less safe car would purchase a safer car next time, and that they could be influenced by some safety interventions, it is clear that increasing people's awareness of their vehicle's star safety rating would be an essential aspect of efforts to shift people out of cars with only 1 or 2 stars.

Respondents from Group 3 prioritised safety more than those in Groups 1 and 2, and they were more likely to be influenced by a variety of information sources. Respondents from Group 1 were more likely to be influenced by family and friends, whose advice could be more informal than that from other sources. This was congruent with the findings of the Deloite Global Automotive Consumer Study (2018); in both Germany and Canada, family and friends were reported as having the biggest influence before purchase. All the groups in our survey appeared to be more likely to be influenced by online car reviews than was reported in the Deloitte survey (shown earlier in Section 2.1.4).

3.2.9.5 The interventions that were most likely to be successful in influencing people to select a safer car

This study found that safety-related facts were around 1.6 times more likely to encourage people to shift to a safer car when the respondents knew they had a car with only 1 or 2 stars or did not know their vehicle's star rating, compared with those who thought they already had a safe car.

Group 1 respondents who knew they had a less safe car were 2.4 times more likely to scrap their car once they had been presented with safety facts, compared with those who were presented with the safety knowledge after they had completed this question on scrapping their vehicle.

Provision of star safety ratings as part of a wider range of information was not a strong indicator that the survey respondents would choose the safest vehicle for their next purchase. When no features were provided with the vehicle choices, the vehicle with the highest safety rating was preferred for all vehicle types. However, when safety features were listed, the responses were mixed; those who chose larger

vehicle types (eg SUV, ute) often prioritised fuel economy over safety. This supported the findings in the literature review, which found that buyers of new cars appeared to look at a range of other factors, such as price and the purpose of the vehicle, and then consider safety within those parameters.

A change in income was identified as the biggest single factor that could get the respondents to shift from a less safe car, indicating that interventions with a financial benefit could be worth further investigation. Many respondents (1 in 5) also indicated that an increased understanding of vehicle features that impact safety, trade-in offers or a change in lifestyle would move them out of a less safe car. However, a quarter of respondents also indicated that nothing would motivate them to shift to a safer car, as they believed their car was already safe. Therefore, interventions to improve knowledge of current safety ratings, and adding regular reminders about the current star rating of an individual's vehicle (eg during vehicle registration, servicing, warrant of fitness [WOF]), could increase the demand for safer vehicles.

3.2.9.6 Summary of the opportunity to shift people out of cars with only 1 or 2 stars

Table 3.13 summarises the size of the opportunity to shift people out of cars with only 1 or 2 stars, based on their knowledge of star safety ratings and the effectiveness of selected interventions.

Table 3.13 Size of the opportunity to shift people out of cars with 1 or 2 stars (*N* = 12,364)

Owners of cars with 1 or 2 stars	A. Size of the group (% of total sample) *N* = 10,540	B. Number who intended to purchase a safer car next time (% of group) *N* = 6,736	C. Number who were influenced by safety-related facts to choose a safer car (% of group) *N* = 10,511	D. Number who were influenced by the car scrappage scenario to scrap their unsafe car when upgrading (% of group) *N* = 10,524
1. Who knew they had a less safe car	1,461 (13.9%)	994 (95.1%) *N* = 1,045	569 (39%) *N* = 1,457	32 (4.7%) *N* = 1,460
2. Who thought they had a safer car but did not	3,339 (31.7%)	1,360 (49.8%) *N* = 2,732	781 (23.5%) *N* = 3,330	3 (0.1%) *N* = 3,336
3. Who did not know their car's star safety rating	5,740 (54.5%)	2,640 (89.2%) *N* = 2,959	2,125 (37.2%) *N* = 5,724	35 (1.5%) *N* = 5,728
Overall opportunity to shift into purchasing a safer car next time	**9,079 (86.1%)** opportunity to raise awareness of car star safety rating	**4,993 (74.1%)** intended to purchase a safer car next time (regardless of awareness of current car's star rating)	**3,480 (33.1%)** opportunity to encourage purchase of a safer vehicle though a simple knowledge intervention	**70 (1.0%)** opportunity for safety information alone to encourage scrappage of cars with only 1 or 2 stars

This table indicates that interventions to improve awareness of their current vehicle's star safety rating could be useful for approximately 86% of the target group, moving them into a position of knowing the correct star rating.

Current actions to improve purchasing behaviour are only able to influence those who know they have a car with only 1 or 2 stars, which was only about 14% of the target group in this research. Where people were aware of their correct star safety rating, the majority (95%, B1 in the table above) said they intended to purchase a safer vehicle next time, and there was evidence that this group was influenced by improved vehicle safety knowledge: two out of five people in this group (39%, C1) said they would consider purchasing a safer vehicle next time after they had been presented with vehicle safety facts. One in 20 (4.7%, D1) became more likely to scrap their vehicle than to sell it on after they had been presented with the scrappage scenario, which would help to make these vehicles unavailable to others.

These findings indicate that there is a significant opportunity to shift people into safer cars. Making people aware of their correct vehicle safety rating AND increasing general awareness of safety ratings could help to encourage up to 45% of those who incorrectly identified their car's safety rating[20] to purchase a safer vehicle next time, as well as 6% of those who did not know their car's safety rating.[21]

3.2.9.7 Limitations

This research was limited to car owners and potential car purchasers in New Zealand, rather than all holders of driver licences. To mitigate the possibility of location bias, the two samples of car owners were drawn randomly from all registered vehicles and the analysis focused on the differences among all three groups (ie the two groups of car owners and one group of potential car purchasers).

It is possible that the vehicles of some of the Group 1 respondents who incorrectly believed that their car had 3 to 5 stars had had a higher star rating when purchased, but the rating had since declined without the owner being aware of the change. However, for the purposes of this research about influencing a shift into safer vehicles, the key finding was that these vehicle owners were influenced by knowledge about vehicle safety.

3.2.10 Conclusions and possible areas for Waka Kotahi action

This research has identified a large opportunity to influence people who *incorrectly* believe they have a safe car to shift into a safer car by making them aware of their current vehicles' safety rating. The research found that this group was more likely to trust safety ratings than those who already knew they had a car with 1 or 2 stars and therefore, they would be more likely to shift if they had greater knowledge of the rating of their vehicle. In other industries, increasing the visibility of consumer safety information at the right time has been successful in encouraging better consumer choices (Croker et al., 2020). In terms of vehicle star safety ratings, this could be achieved through the following actions:

1. Provide improved visibility of vehicle safety ratings at touch points such as when getting a WOF, when getting the vehicle serviced and at vehicle registration.
2. Run targeted campaigns to highlight the value of vehicle owners checking their car's safety rating, in case it is not what they think it is.
3. Proactively inform vehicle owners (eg through the existing registration process) about changes to their vehicle's star safety ratings and the reasons for these changes, to maintain trust and understanding.

[20] Determined by the difference between those who knew they had a less safe car and intended to purchase a safer car next time (95.1%) and those who incorrectly thought they had a safer car and intended to purchase a safer car next time (49.8%) = 45.3% (see Table 3.13).

[21] Determined by the difference between those who knew they had a less safe car and intended to purchase a safer car next time (95.1%) and those who did not know their car's safety rating and intended to purchase a safer car next time (89.2%) = 5.9% (see Table 3.13).

4. Encourage platforms that host online vehicle searches to make safer cars more prominent (eg this is the first search criterion on Rightcar) or even the default option (ie use a check box to deliberately opt out of 'safer cars only').

As the respondents who had a car with only 1 or 2 stars were more likely to be influenced by family and friends, and two-thirds of them said that safety-related websites had no influence on their vehicle-purchasing decisions, Waka Kotahi could consider targeted interventions:

- to shift preferred information sources when searching for a car from informal ones (eg family and friends) towards factual ones (eg rightcar.govt.nz)
- towards those who are more likely to be driving a less safe car (ie female, age < 30, household income < $50,000).

Potential car purchasers and owners of cars with only 1 or 2 stars had less knowledge of vehicle safety features, and the latter group did not prioritise these when looking for a vehicle. To facilitate the shift into safer vehicles, the following actions could be considered:

- Socialise vehicle safety information through advertising campaigns (eg TV, radio, social media) and at point of purchase, emphasising the crash avoidance and crash protection features that purchasers should search for.
- On the Rightcar website, highlight the priority vehicle safety features to look for when these are listed for a particular model, and provide links to explanations of what each feature offers and any relevant safety facts.
- On the Rightcar website, provide information on the crash avoidance and crash protection features of older vehicles.

4 Interviews

Six phone interviews were conducted with car dealers and representatives of motor vehicle trade/importer associations. The objective of these interviews was to investigate the factors (eg supply, demand, profit, policy, etc) that motivated vehicle importers, dealers and traders to buy and sell cars with 1 or 2 stars, as well as their opinions regarding opportunities to reduce the number of transactions around cars that are less safe. The interviews were semi-structured, with some prompting and clarification when necessary. All interviewees were informed that their responses would be anonymous. Key notes were written during the interviews, and the interviewees consented to the interviews being recorded so that detailed notes could be taken and to ensure the notes accurately represented the interviewee.

The three 'car dealer' interviews involved people who had direct input into the cars selected for sale at a car dealership. Car dealerships in the South Island were prioritised, as the literature review identified this area as having a higher proportion of cars with 1 or 2 stars. It was recognised that the three dealers were not representative of all car dealers, but they provided some insight into dealers selling these cars.

The three 'association' interviews were conducted with staff from associations that represented vehicle trading and vehicle importing in New Zealand.

Once the interviews were complete, a thematic analysis was conducted across all the interviews for each group, to identify any overarching themes.

4.1 Interview questions

The questions that the dealers and associations were asked are shown in Table 4.1.

Table 4.1 Interview questions for dealers and associations

Dealer questions	Association questions
1. What makes your customers come to you as a dealer? 2. What tends to be their reason for purchasing a vehicle? 3. Do you work within a certain sales price range and if so, what is it? 4. Do you specialise in a type of vehicle and if so, what type? 5. What factors do you look at when deciding to purchase a vehicle for on-selling? 6. What, if anything, puts you off stocking a particular vehicle? 7. How do you work out if a vehicle is safe or not? 8. What level of importance do you put on vehicle safety ratings and why? 9. What level of importance do you think your customers put on vehicle safety ratings? 10. What, if any, specific safety features do your customers commonly ask about?	1. What importance do you think your members place on safety ratings? 2. What importance do you believe your members think the public place upon safety ratings? 3. What change, if any, do you wish to see in the level of 1- and 2-star vehicles (as defined by Rightcar) being imported and sold in New Zealand and why? 4. How do you think a reduction in the availability of 1- and 2-star vehicles (as defined by Rightcar) would affect your members? 5. What do you think about the Rightcar star rating system, as presented on the Rightcar website, and how, if at all, do you think it could be improved?

Dealer questions	Association questions
11. Do you think different groups of customers put a different emphasis on safety, and if so, how? 12. What do you think could be done to reduce the number of unsafe cars on the roads? 13. What do you think about the Rightcar star rating system, as presented on the Rightcar website, and how, if at all, do you think it could be improved? 14. Four out of every 10 cars in New Zealand are 1- and 2-star safety rated. How do you feel about this? 15. How do you think a reduction in the availability of 1- and 2-star cars would affect your business?	

4.2 Dealers' themes

The interviews were conducted with car dealers to help gain insight into the buying and selling of cars with 1 or 2 stars. The interviewees differed on their typical price ranges, with the lowest being $1,000 to $8,000, followed by $3,000 to $15,000. One of the interviewees sold both new and used cars, which meant their typical price range was much wider, from $5,000 to $90,000.

4.2.1 Car selection

Dealers said the customers' reasons for buying a car varied, including to upgrade their vehicle model, buy a first car, replace a stolen or damaged car, or their car needs had changed:

> *A lot of parents come here with their kids, new drivers, 16-, 17-year-old kids that have got a licence, need a car. They want something under $5,000, and most other people I sell to are people that just want a work vehicle.*

> *There are various different reasons. People will change their car because their situation has changed; they don't need a car that is as big as they have at the moment, or they either need to downsize or upsize, or they just want something newer.*

When asked about factors they considered when selecting cars for reselling, all dealers mentioned the price. Other factors included the popularity of the car model, the condition of the car (eg needed to be able to pass a WOF test) and getting a good mix of stock, such as different price ranges, colours and sizes:

> *Price would be the main thing. If the price is right, I'll buy it. If the price is not right, I'll walk away.*

> *Condition and desirability in terms of how well it is going to sell. Obviously, the price has to be right.*

> *Depends on if it fits the price brackets that I'm willing [to sell]. … We try to think about what in a car is popular. We sometimes make more money selling an old car because it's a one-off, whereas with an import …, you are competing with the other person selling the same sort of car.*

> *Fuel is expensive. Fuel is usually a pretty important thing, then it's safety.*

In relation to reasons that might stop a dealer from stocking a particular vehicle, all interviewees mentioned that faults commonly associated with a model would make them less likely to select that car. Additionally,

cars that were in poor condition, less desirable to buyers, or known to cost more to maintain were less likely to be selected. One car dealer mentioned that the age of the vehicle was not always a determining factor:

> *Something with buying the cars that are older – sometimes they are the most problem-free cars, that's why they have made it to their age, so not always is age a bad thing. We sell a few older cars and make similar money.*

4.2.2 Vehicle safety

While star safety ratings were mentioned as a resource when assessing a vehicle's safety, they were considered alongside personal knowledge and experience. Two of our interviewees had previously been panel beaters and this had influenced their assessment of vehicle safety. One of the interviewees believed that a person's driving was an important indicator of car safety:

> *Because of my experience and my work that I've come from, my background, I don't care what the safety rating is on a car …. A vehicle is as safe as the person you put behind the wheel. I'm not into this whole 5-star safety rating because I've seen some horrific vehicle crashes with cars that have not had [any] safety ratings and [the people] walked away [unharmed]. I've seen them in a car with a 5-star rating and they are dead.*

Additionally, interviewees mentioned the safety rating in relation to the price of the vehicle. A buyer with a lower budget for their car needed to be realistic about the safety features and ratings that were available at their price point – lower-cost cars would not have the safety ratings and safety features of more expensive or newer cars:

> *To get a car with a high safety rating, that's a good reliable car … you are not going to buy it for under $8,000, they are just not there.*
>
> *Obviously an older car is nowhere near as safe as a newer car but you take that all in, it's all relative to what you look at …. The new-car market expects them [new cars] to have it [safety features]. The older $5,000 standards, … people are kind of realistic about what safety features there might be.*
>
> *I don't get a lot of people that are coming in here and are looking at the safety rating. … Most of them, when you talk to them, realise that … safety costs money.*

Having a WOF was mentioned by two of the interviewees, with the underlying idea that an unsafe car would not pass a WOF. When asked how much importance they placed on safety ratings, interviewees mentioned the purpose of the car, as well as features such as the car's age and size:

> *[If] it's just a 'round-the-town car' and just [for doing] low mileage, then the safety rating isn't really needed for that purpose, but I think if you are a family and you do a lot of mileage, and you're more exposed and there is more risk, then a higher safety rating is quite important, especially with children. So I think that safety rating is important but not the be-all and end-all of everything. The overall condition of the car, … size and other factors come into it as well.*

Dealers believed that larger vehicles, even if they had lower safety ratings, were safer than small cars with higher safety ratings:

> *I don't care what the safety rating is on a car. I don't feel safe driving in any small car on a New Zealand main road …. I think I'd rather be in the big car with a lower safety rating than one of these little tin cans.*

The interviewees expressed a range of views about the star safety ratings as displayed on the Rightcar website. One said the system was good, easy to use and had fair ratings, but noted that some cars, particularly hybrid cars, did not have ratings on the website. Another said while Rightcar was doing the best they could in relation to rating car safety, they believed driver behaviour was more important:

> *[Rightcar ratings and car manufacturers] are doing the best that they can to make the vehicle safe BUT how do you make the people safe? You can make a car as safe as you like – the idiot that gets behind the wheel may have a big crash.*

One interviewee said the star rating system was confusing and needed a revamp, increasing the number of stars used for new cars with better safety, rather than changing a car's earlier rating. If dealers advertised a car with its original star rating, but it had since been downgraded, car purchasers could become distrusting of dealers:

> *A lot of cars [might have been] sold brand new in 2014 or 2015 [with] 5 stars and a lot of dealers [might be] still advertising them as being 5 stars, but on Rightcar [they] may have been downgraded to a 3 or 4. Sometimes it can be confusing because people will look up records and it will be a 5-star on one system and a 3-star on another, so it's a matter of which one do you choose? Some brand-new cars are 4-star rated because they have been tested on the latest safety systems, and the ['safety] bar' keeps going up but the [star] level doesn't change, so some people may think that a second-hand car is as safe as a new car with a 4-star [rating] – but in actual fact, the new car is much better …. When they lift the bar for the safety features, they should lift the numbers of the safety [stars] – for example, a brand-new car should probably be a 10-star car.*

Dealers reported that car prices had been affected recently by changes to legislation related to car imports, with tightening standards reducing the number of 1- and 2-star cars being imported:

> *Affordability is only going to get worse in the short term because prices are going up across the range of new cars and used cars, so that is going to make it harder for people to get out of 1- and 2-star cars, into a higher safety-rated car …. Because there is just not the supply to get in. Traditionally, New Zealanders had lots of cars imported from overseas, so … prices came down and people could afford them.*
>
> *We are not allowed to import a car that doesn't have crumple zones, that doesn't have airbags …. Now [we are not allowed to import a car with] no stability control, so all your imports [are safe], unless they are old cars that are collectable.*

When asked what we could do to reduce the number of unsafe cars on the road, a dealer who sold both new and used cars said they believed the new WOF standards were concerning, as some people did not maintain their car to a reasonable safety standard:

> *I notice customers coming in with bald tyres and blown headlights, or just general things [that] they don't get checked often enough and [they] don't check themselves. I think that's … more dangerous … than [not having] some of the [car] safety features ….*
>
> *When a car is sold brand new, it doesn't have to go back for a warrant for three years, regardless of mileage. If they do high mileage, the tyres can be bald [by then]. And [tyres] that have 1.5 mm [of tread] can be deemed okay to go another 12 months. If there is a good downpour of rain, that car is a death trap on wet roads.*

Dealers believed that the number of cars with 1 or 2 stars was naturally reducing over time, as older cars left the national fleet, and one dealer wondered who would pay for any incentives to scrap cars with 1 or 2 stars:

> *I think you will find that all the older stuff, [year] 2000 and less, is slowly disappearing from our roads, or … quite drastically disappearing off our roads, anyway.*
>
> *I am seeing more of the 3-star cars coming through now – that is where I am at. I still have one or two 1-star cars.*
>
> *As the cars [in the national fleet] get newer, those star ratings will improve to 3 or 4. I can see it happening already because eventually, those cars [with only 1 or 2 stars] are getting more difficult to repair …. It's a simple factor of the older cars … coming to the end of their life. I know that's the major factor, so it's probably a bit of a self-fixer.*

When asked how a reduction in the availability of cars with 1 or 2 stars would affect their business, the dealers noted that this would depend on the typical price of the cars held by a dealer and the proportion of 1- and 2-star cars sold at the dealership. They said both the dealers and the buyers would have to take on more debt, which would result in larger repayments:

> **Typical car price $1,000 to $8,000:** *It would probably shut me down, if I had to get … 3- and 4- and 5-star cars. I'd have to start selling stuff above 3 grand, or be selling some real expensive-to-run older-style European cars.*
>
> **Typical car price $3,000 to $15,000:** *Well, it definitely would affect my business but more the middle to bottom end …. I'd be forced to buy [cars with] 3 and 4 stars. I'd be getting into more debt. I think that's the major factor for a lot of people. Those cars are between 2 and 5k, so the payments on those sorts of cars … would affect my business, but again, I will sell what is there.*
>
> **Typical car price $5,000 to $90,000:** *It probably wouldn't actually [affect me] because most of the cars we deal in are of a … higher standard than that. It would have an effect, but not a major effect because luckily, we are a new-car franchise.*

4.3 Association themes

4.3.1 Safety

In terms of the importance placed on safety ratings, both by the association members themselves and their perceptions of what the public thought, all the interviewees agreed that while safety ratings were very important, they came after factors of cost or planned use of the vehicle:

> *Oh yes, it is important but … usually, price is the key determinant.*
>
> *They will look to get the safest vehicle that they can in their price range.*
>
> *[I'd say they come] second or third or so …. It's certainly not on the top of the … list.*

4.3.2 Make-up of the national fleet

All interviewees mentioned that the make-up of the New Zealand fleet had changed significantly since the introduction of the requirement for imported cars to have ESC. They said this meant that cars with only 1 or 2 stars would slowly exit the market as their current owners moved into a new vehicle:

> *There's a quasi-age limitation now because of entry standards. Cars must have ESC ... so [in] that sense, most of them are probably 3 stars.*

The requirement [to have] ESC certainly stops the lower star-rating vehicles coming in.

4.3.3 Impact of reduction in number of 1- and 2-star cars

The interviewees said there would be no impact for them from a reduction in the number of cars with 1 or 2 stars coming into the country, as they had already moved away from importing these vehicles, due to the requirement for cars to have ESC. However, they said that if these vehicles were not removed from the national market, they would be bought by people who were more vulnerable:

When they go out of [the] average person's usage, they go down to the next tier … the lower socio-economic [group].

They [dealers who sell direct imports] will move them off to other dealers … further down the food chain.

4.3.4 Rightcar star rating system

Overall, the interviewees were supportive of the Rightcar star rating system:

It is very good, with [the] best intent …. Rather than hiding the information, it is fully out there.

It has been done in a pretty good manner.

[Waka Kotahi] have done a lot of work in broadening the scope of Rightcar and in informing consumers.

The predominant issue the interviewees had with the current system was the way the Rightcar ratings were arrived at and the public's understanding of them. They highlighted the following points:

- The Rightcar star ratings are an amalgamation of three different systems: NCAP, UCSR from Monash University and the VSRR.
- Ratings from other countries need to be understood in the context of their roading environment – for example, crash types (and therefore ratings based on these crash types) in Japan are different from those in Australia and New Zealand (Japan has fewer head-on crashes).
- There may not be an understanding that not all vehicles with the same star rating are equal (eg larger vehicles are safer than smaller vehicles with the same star rating).

When small meets big, it doesn't fare so well.

4.4 Insights from these interviews

The car dealers emphasised that purchasers could have a range of reasons for selecting a specific vehicle, such as lifestyle change, price or fuel efficiency – safety was not a strong factor. This view was also endorsed by the representatives of motor vehicle trade/importer associations.

When dealers were looking at vehicles for on-selling, safety was not a priority. They focused more on price, vehicle condition, potential to on-sell and any known maintenance issues with particular models.

Safety ratings were not seen as being essential contributors to vehicle safety, with dealers considering driver skill and experience to be more important, citing examples of 5-star cars being involved in crashes in which the people in the vehicle were killed. They saw price as being a barrier to purchasing a safer car, and higher safety ratings and levels of safety features meant a higher price.

Both the dealers and the association members were aware of the safety ratings on the Rightcar website but had divergent views on them. While they were seen as useful, they said the system could be confusing,

particularly when the safety rating of a vehicle changed or the ratings from other countries did not relate well to the New Zealand context. They noted a lack of trust in, or understanding of, the safety ratings in some people. **They believed that bigger cars were always safer than smaller cars with the same safety rating**.

The dealers felt that reducing the number of unsafe vehicles on the road would occur naturally, and targeted efforts to remove 1- and 2-star cars from the current national fleet were unnecessary. The association representatives also believed this decrease would occur naturally and had actually happened already, with the requirement for ESC in imported vehicles making the national fleet safer. However, in the current system, this could never happen because the definition of cars with only 1 or 2 stars will be continually amended to maintain the *proportion* of these types of cars in the national fleet (currently around 50%; previously, it was around 41%). This will not reflect the changes over time in the *absolute* level of safety of cars with 1 or 2 stars – merely the relative level of safety, compared with all available cars.

While the dealers thought that a reduction in the nationwide number of cars with only 1 or 2 stars would affect their business negatively, due to the higher cost of safer vehicles, the association members thought their members would not be affected by this because they had already moved away from importing these vehicles – the problem would simply be passed on to others.

5 Conclusions

The New Zealand vehicle fleet will naturally become safer as the safety requirements for imported new and used vehicles become more stringent and the new-vehicle market becomes dominated by NCAP 5-star vehicles. However, around 40% of the national fleet currently consists of 1- and 2-star cars. Until recently, the safety of second-hand vehicles has not been promoted as vigorously as for new vehicles. The age of the New Zealand fleet means that UCSRs and total safety ratings may be more important here than in countries that have a newer national fleet.

The literature shows that buyers of used cars (the target group for reducing the use of less safe cars) appear to value safety less than buyers of new cars, and particularly, the owners of cars with 1 or 2 stars are less likely to rank safety ratings or safety features in their top three priorities when making vehicle-purchasing decisions. This view was supported in this research by both the respondents to our surveys and the car dealers and representatives of motor vehicle trade/importer associations that we interviewed.

In our research, the respondents who were owners of cars with 1 or 2 stars said they had made their choice of vehicle based on elements such as cost, fuel economy and utility, and then considered safety within those parameters. Therefore, to ensure prospective car purchaser's search criteria have safety considerations embedded at a high level, efforts to influence their decision-making need to occur well before they are near the point of purchase. In our survey, the 'potential car purchasers' group seemed to prioritise safety more than those who were already car owners, and they were more likely to be influenced by a range of information sources.

We found that to increase the demand for safer cars, better awareness of a vehicle's star safety rating was essential – both at the purchasing point and in the existing owners of cars with 1 or 2 stars. In this research, **86% of our 1- and 2-star car owners did not know their vehicle's true star rating** (including those who were unsure about it and a significant group who incorrectly believed they had a safer vehicle). The respondents who incorrectly thought they had a safer vehicle were more likely to trust the safety ratings and therefore, would potentially shift if they had greater knowledge about vehicle safety ratings and safety features.

Where respondents did understand their vehicle's safety rating, the majority (95%) intended to purchase a safer vehicle next time, and they were likely to be influenced and motivated by improved vehicle safety knowledge. Therefore, efforts should be made to direct vehicle purchasers to a reputable, up-to-date source of information, and to encourage their informal advisors (friends and family) to do the same.

6 Summary of recommendations

This research has led to the following recommendations for Waka Kotahi.

6.1 Improvements to the current Waka Kotahi rating system

1. Provide messaging that is evidence based and consistent over time, such as making sure people understand why the star safety rating of a particular vehicle can decline over time, and explaining the need for safety ratings.
2. Ensure that when an initial star rating is given to a vehicle, that rating does not increase over time. It is better to delay the allocation of a star rating than to provide one prematurely and later have to adjust it upwards.
3. Avoid the occurrence of large changes in a vehicle's star rating at the stage of switching from NCAP ratings to the UCSR system.
4. Create a mechanism that can capture any anomalies in vehicle ratings (eg unusually large changes in rating) before they are added to the Rightcar website.
5. Investigate the possibility of adjusting historical ANCAP ratings to estimate how a vehicle would score under the latest ANCAP rating system.
6. Provide more education to dealers on how they should be using the Rightcar website.

6.2 Shifting people out of vehicles that are less safe

1. Provide information to car owners on their vehicle's current safety rating at touch points such as when getting a WOF, when servicing the vehicle and at vehicle registration.
2. Run campaigns to encourage people to check their own car's current safety rating – it might not be what they think it is.
3. Run interventions to shift car purchasers' preferred information sources away from informal sources (eg family and friends) and towards factual sources (eg rightcar.govt.nz).
4. Socialise vehicle safety information through awareness campaigns (eg TV, radio, social media) and at point of purchase, emphasising the crash avoidance and crash protection features that purchasers should search for.
5. On the Rightcar website, highlight the priority vehicle safety features to look for when these are listed for a particular model, and provide links to explanations of what each feature offers.
6. On the Rightcar website, provide information on the crash avoidance and crash protection features of older vehicles.
7. Promote a shift to using public transport where possible, because of its greater safety.
8. Monitor motorcycle usage closely to detect any move towards increased motorcycle use as a result of car safety campaigns, and promptly make appropriate changes to advertising if this occurs.
9. Through the Rightcar website, provide access to information about JNCAP ratings so that an owner of a vehicle without ANCAP testing can learn about the safety of their imported used car.
10. Target interventions towards those who are more likely to be driving a less safe car (ie female, age < 30, household income < $50,000).
11. Consider introducing an incentive scheme (similar to the Clean Car Discount) to help shift people from a less safe car to safer car.

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Appendix A: Car owner's survey

Waka Kotahi – Car selection survey[22]/New Zealand car selection survey[23]

Thank you for taking the time to complete this survey. The purpose of the research is to understand car purchasing decisions. The research will be used by Waka Kotahi to better predict how car choice may influence New Zealand's road environment over the long-term.

This survey will take 10-15 minutes to complete.

What forms of transport do you use? (select all that apply)

- ☐ My car
- ☐ Other household car
- ☐ Car pool/ride-share
- ☐ Taxi/Uber
- ☐ Public transport
- ☐ Cycling/Ebike
- ☐ Motorcycle
- ☐ Work vehicle
- ☐ Walking
- ☐ Electric scooter or skateboard
- ☐ Other (please specify): _____

Most questions in the survey are specifically in relation to the car that was listed in the email you received. Please enter the car details below.

What is your car make?

- ◯ Choose from: I do not wish to disclose; I do not remember my car make; Alfa Romeo; Audi; BMW; Cadillac; Chery; Chevrolet; Chrysler; Citroen; Daewoo; Daihatsu; Daimler; Dodge; Eunos; Fiat; Ford; Foton; Geely; Great Wall; Haval; Holden; Honda; Hummer; Hyundai; Infiniti; Isuzu; Jaguar; Jeep; Kia; Lada; Land Rover; LDV; Lexus; Leyland; Lincoln; Lotus; Mahindra; Maserati; Mazda; Mercedes-Benz; MG; Mini; Mitsubishi; Nissan; Opel; Peugeot; Pontiac; Porsche; Proton; RAM; Reliant; Renault; Rover; Saab; Seat; Skoda; Smart; Ssangyong; Subaru; Suzuki; Tesla; Toyota; Vauxhall; Volkswagen; Volvo; Other

What is your car model?

_____

What year is your car?

- ◯ Choose from: I do not wish to disclose; I do not remember the year for my car; 2021; 2020; 2019; 2018; 2017; 2016; 2015; 2014; 2013; 2012; 2011; 2010; 2009; 2008; 2007; 2006; 2005; 2004; 2003; 2002; 2001; 2000; 1999; 1998; 1997; 1996; 1995; 1994; 1993; 1992; 1991; 1990; 1989; 1988; 1987; 1986; 1985; 1984; 1983; 1982; 1981; 1980; 1979; 1978; 1977; 1976; 1975; 1974; 1973; 1972; 1971; 1970;

[22] Car selection survey: owners of cars with 3 to 5 stars

[23] New Zealand car selection survey: owners of cars with 1 or 2 stars

1969; 1968; 1967; 1966; 1965; 1964; 1963; 1962; 1961; 1960; 1959; 1958; 1957; 1956; 1955; 1954; 1953; 1952; 1951; 1950 or older

- - - - - - - - - - -

Who is the primary driver of the car referred to in the email you have received?

◯ Me
◯ Partner
◯ Your child(ren)
◯ Shared within household
◯ Other family/friend

How often is this car used for…

	Never	Rarely	Sometimes	Often	Very often
Trips between regions	◯	◯	◯	◯	◯
Trips within my city/town	◯	◯	◯	◯	◯
Commuting to work/education	◯	◯	◯	◯	◯
For work purposes	◯	◯	◯	◯	◯
Driving others e.g. children/friends/family	◯	◯	◯	◯	◯

- - - - - - - - -

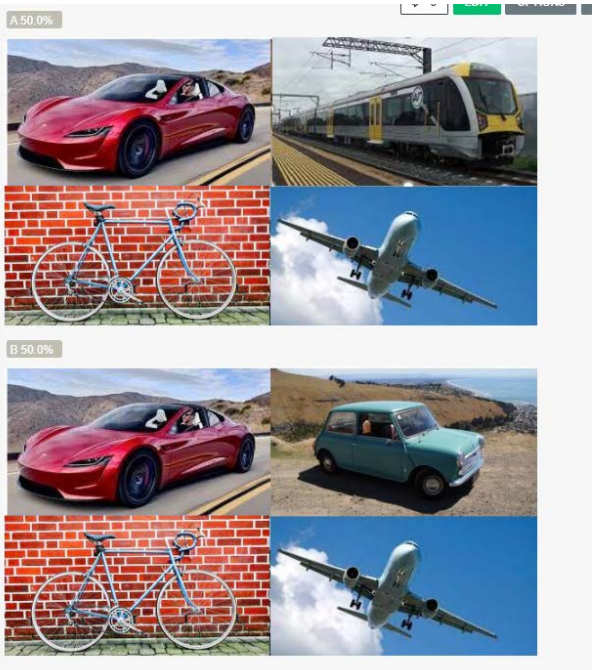
Who chose this car? Please select all that apply.

☐ Me
☐ Partner
☐ Parent
☐ Child
☐ Other family member
☐ Friend/co-worker
☐ Salesperson at dealership
☐ Other (please specify): _____

- - - - - - - - - - -

[1- or 2-star car owners only: Respondents are shown one of the two images following. As the purpose of this question is to divide the survey respondents into two groups to address the later question on car scrappage, it is presented to half of the respondents prior to them receiving any vehicle safety information, and half of them after all information has been given, immediately before the final demographics questions.]

To check you are a real person, please view the images below and answer the question that follows.



How many of these images have cars in them?

◯ 1
◯ 2
◯ 3
◯ 4

- - - - - - - - - - -

Where did you get this car?

◯ Used car dealership: in person
◯ Used car dealership: online
◯ New car dealer: in person
◯ New car dealer: online
◯ Family member
◯ Friend
◯ Online comparison sites (e.g. Trademe/Autotrader)
◯ Newspaper (online/print)
◯ Social media
◯ Road side purchase
◯ Other (please specify): _____

Why did you get this car?

☐ Replacement for damaged or crashed car
☐ Replacement for an older car (e.g. maintenance costs)
☐ Additional car in household
☐ First car purchase for myself
☐ Wanted this specific model of car
☐ Lifestyle change
☐ Other (please specify): _____

What influenced your decision when selecting this car?

	No influence	Little influence	Some influence	Significant influence
Family or Friend/s	◯	◯	◯	◯
Salespeople at the dealership	◯	◯	◯	◯
Dealer websites	◯	◯	◯	◯
Manufacturer websites	◯	◯	◯	◯
Retail website e.g. Trademe	◯	◯	◯	◯
Safety related websites e.g. Rightcar	◯	◯	◯	◯
Financial provider websites	◯	◯	◯	◯
Social media	◯	◯	◯	◯
Online car reviews	◯	◯	◯	◯

What were your top 3 priorities when selecting this vehicle?

1st	◯ Choose from: Age; Cost of ownership (insurance, spare parts); Cost of purchase; Design/appearance/colour; Electric vehicle; Environmental impact/CO2; Fuel efficiency; Low mileage; Make/model/Brand; Safety features; Safety rating; Service history; Size/spaciousness including luggage; Speed/performance/Engine size; Technology features e.g. phone & internet connectivity, good multimedia systems; Utility (e.g. towing/4WD); Other
2nd	
3rd	

If you selected other, please specify: _____

Is your next vehicle likely to be a new car or used car?

◯ New car
◯ Used car

Do you intend to purchase a car in the next...

◯ Month
◯ 6 months
◯ 12 months
◯ I do not intend to purchase a car in the next 12 months

What are your top 3 priorities when purchasing your next vehicle?

1st	◯ Choose from: Age; Cost of ownership (insurance, spare parts); Cost of purchase; Design/appearance/colour; Electric vehicle; Environmental impact/CO2; Fuel efficiency; Low mileage; Make/model/Brand; Safety features; Safety rating; Service history; Size/spaciousness including luggage; Speed/performance/Engine size; Technology features e.g. phone & internet connectivity, good multimedia systems; Utility (e.g. towing/4WD); Other
2nd	
3rd	

If you selected other, please specify: _____

- - - - - - - - - - -

[1- or 2-star car owners only – presented to 50% of owners at this point in the survey, depending on their answer to the question 'How many of these images have cars in them?' on the previous page.]

Please read the following scenario and think of yourself in this situation.]

You've decided it's time to upgrade your vehicle. What would you consider doing?

◯ Sell it to another person to drive
◯ Trade it in with a dealer
◯ Sell my car for scrap metal
◯ Donate my car for scrap metal

- - - - - - - - - - -

[Logic if 'Sell my car for scrap metal' or 'Donate my car for scrap metal' was selected on previous page.]

Why? *[options randomised]*

◯ I feel like my car is not safe
◯ I don't want others to have the maintenance cost
◯ It's not good for the environment
◯ It's not nice to drive

- - - - - - - - - - -

[Logic if 'Sell my car for scrap metal' or 'Donate my car for scrap metal' was selected.]

What would make you consider scrapping your car to be recycled/reused (i.e. taking it off New Zealand roads permanently). Select all that apply.

☐ If it failed its next Warrant of Fitness (WOF) and would cost too much to fix
☐ If it was involved in a crash and cost too much to fix
☐ If I knew it had a low safety rating (i.e. I would be less safe in a crash)
☐ If I knew more about what was involved in recycling cars into scrap metal (such as what businesses do this, where they are based, etc)
☐ If I could sell it for scrap metal at a reasonable price (e.g. $500)
☐ I would never consider selling or donating it for scrap metal

- - - - - - - - - - -

Please read the following scenario and think of yourself in this situation.

You are searching for a second-hand car on a popular purchasing site. For your next vehicle if these were the only options available, which style would you be more likely to choose to spend your money on?

◯ Hatchback (less than $5,000)
◯ Ute (less than $10,000)
◯ Hatchback (more than $15,000)

◯ SUV (more than $20,000)

Based on your selection, you will be presented with different vehicle options.

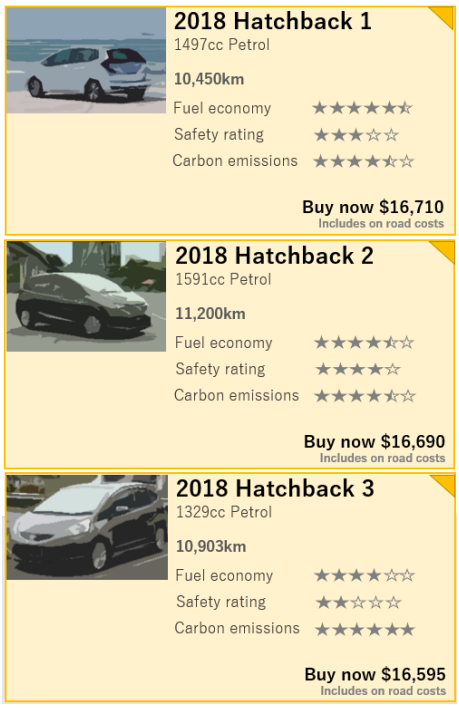
- - - - - - - - - - -

[If 'Hatchback (less than $5,000)' was selected on previous page.]

Hatchback (less than $5,000)

The following cars are displayed based on your search. Take a look at each option and answer the questions below.

[Respondents will be shown one of the below images (1/3 per image):]



Based on the information provided, rank the cars in order of 1st, 2nd, and 3rd choice.

☰ Hatchback 1
☰ Hatchback 2
☰ Hatchback 3

For the car you ranked first, why did you choose this car?

_____

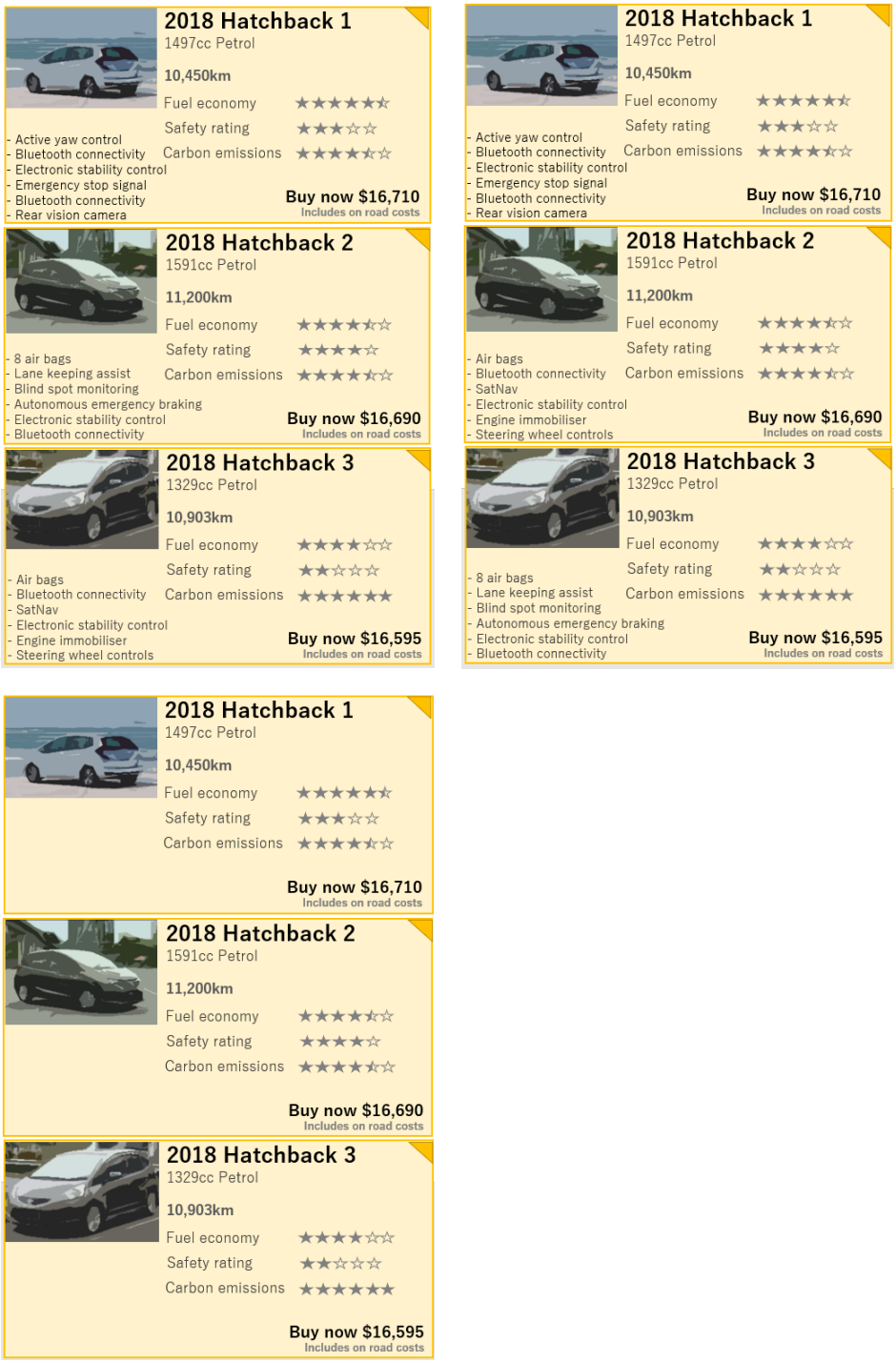
- - - - - - - - - - -

[If 'Hatchback (more than $15,000)' was selected.]

Hatchback (more than $15,000)

The following cars are displayed based on your search. Take a look at each option and answer the questions below.

[Respondents will be shown one of the below images (1/3 per image):]



Based on the information provided, rank the cars in order of 1st, 2nd, and 3rd choice.

☰ Hatchback 1
☰ Hatchback 2
☰ Hatchback 3

For the car you ranked first, why did you choose this car?

_____

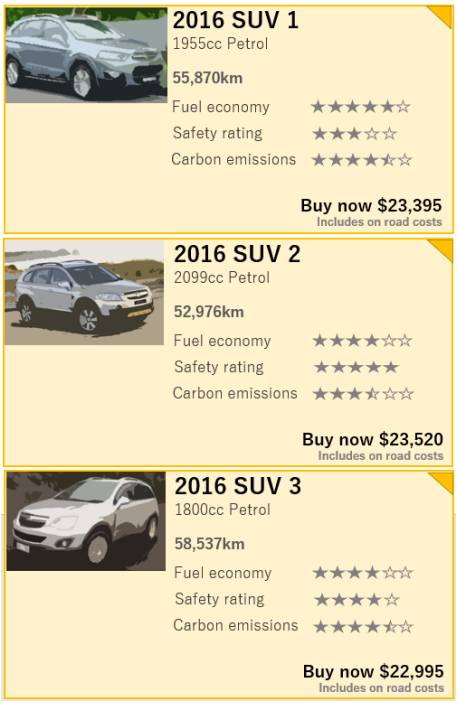
- - - - - - - - - - -

[If 'SUV (more than $20,000)' was selected.]

SUV

The following cars are displayed based on your search. Take a look at each option and answer the questions below.

[Respondents will be shown one of the below images (1/3 per image):]



Based on the information provided, rank the cars in order of 1st, 2nd, and 3rd choice.

☰ SUV 1
☰ SUV 2
☰ SUV 3

For the car you ranked first, why did you choose this car?

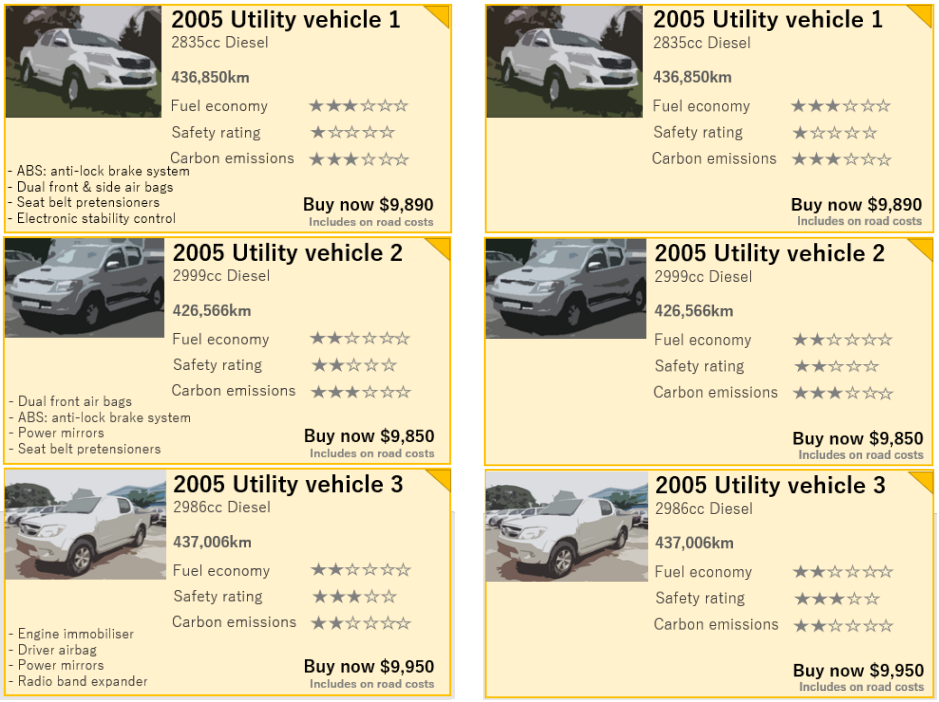
- - - - - - - - - - -

[If 'Ute (less than $10,000)' was selected.]

Ute

The following cars are displayed based on your search. Take a look at each option and answer the questions below.

[Respondents will be shown one of the below images (1/3 per image):]



Based on the information provided, rank the cars in order of 1st, 2nd, and 3rd choice.

☰ Ute 1
☰ Ute 2
☰ Ute 3

For the car you ranked first, why did you choose this car?

_____

- - - - - - - - - - -

How much do you agree with this statement?

You are less likely to be injured in a road accident when using public transport than when travelling by car

◯ Strongly disagree
◯ Disagree
◯ Neither agree nor disagree
◯ Agree
◯ Strongly agree
◯ Not sure

- - - - - - - - - - -

In New Zealand, passengers in cars and vans are seven times more likely than bus passengers to be killed or injured in a vehicle crash (for the same time spent travelling).

Based on this fact alone, would you consider travelling more by bus instead of your car?

◯ No, I would not travel by bus
◯ No, I am concerned about safety but would not travel by bus
◯ I am already travelling by bus
◯ Possibly, this has made me think about my choice of travel
◯ Yes, based on this information I would travel more by bus if I had access to one

- - - - - - - - - - -

The following section is about your car.

Are you aware of your car's current safety rating? (Without looking it up now)

◯ No, I do not know the safety rating of my car
◯ Yes, my car has a 1 star safety rating
◯ Yes, my car has a 2 star safety rating
◯ Yes, my car has a 3 star safety rating
◯ Yes, my car has a 4 star safety rating
◯ Yes, my car has a 5 star safety rating

If you are aware of your car's current safety rating, did you know the safety rating before you purchased the car?

◯ Yes
◯ No

Will your next car have a higher safety rating or lower safety rating?

◯ Higher safety rating
◯ Safety rating will stay the same
◯ Lower safety rating
◯ It does not matter
◯ Not sure / don't know

How much do you agree with the following statement: I trust car safety ratings.

◯ Strongly disagree
◯ Disagree
◯ Neither agree nor disagree
◯ Agree
◯ Strongly agree
◯ Not sure

You are more than twice as likely to die or be seriously injured in a crash in a 1-star than in a 5-star vehicle.

In car-to-car collisions, cars with three or four stars were found to be approximately 30% safer when compared with two-star cars.

Based on these facts, would you consider changing your car?

◯ No, I would not change my car
◯ No, I am concerned about safety, but this does not change my mind
◯ No, I have already have a safe car
◯ Possibly, this has made me think about my car choice
◯ Yes, based on this information I would change to a safer car

How important are the following features to your car selection?

	I do not know what this feature is	Not at all important	Somewhat unimportant	Neither important nor unimportant	Somewhat important	Very important
Air bags	◯	◯	◯	◯	◯	◯
Anti-lock brake system (ABS)	◯	◯	◯	◯	◯	◯
Blind spot monitor (BSM)	◯	◯	◯	◯	◯	◯
Adaptive cruise control (ACC)	◯	◯	◯	◯	◯	◯
Traffic sign recognition	◯	◯	◯	◯	◯	◯
Pedestrian detection	◯	◯	◯	◯	◯	◯
Reversing camera	◯	◯	◯	◯	◯	◯
Electronic stability	◯	◯	◯	◯	◯	◯

control (ESC)						
Lane departure warning (LDW)	○	○	○	○	○	○
Automatic emergency braking (AEB)	○	○	○	○	○	○
Lane keeping assist (LKA)	○	○	○	○	○	○
Forward collision warning (FCW)	○	○	○	○	○	○

When considering car safety in general, please rank these in order of largest to smallest contribution to vehicle safety: (where 1 = largest contribution, and 7 = smallest contribution):

☰ Used car safety rating (star rating)
☰ New car safety rating (star rating)
☰ Vehicle safety features e.g. airbags, electronic stability control (ESC), anti-lock brake system (ABS)
☰ Driver support features e.g. blind spot monitoring (BSM), lane keeping assist (LKA), reversing camera
☰ Age of vehicle
☰ Size of vehicle
☰ Driver skill or behaviour

When driving in different situations, how important is vehicle safety to you?

	I don't think about vehicle safety	Not important	Moderately important	Very important
On long journeys	○	○	○	○
When carrying passengers	○	○	○	○
In bad weather conditions	○	○	○	○
At night	○	○	○	○
Driving for work	○	○	○	○
In heavy traffic	○	○	○	○
In an unfamiliar environment	○	○	○	○
In towns or cities	○	○	○	○

In an unfamiliar car e.g. rental	◯	◯	◯	◯

What would motivate or encourage you to move out of an unsafe car?

☐ Incentive to scrap my car rather than sell
☐ Trade-in offers
☐ Increased understanding of car safety ratings
☐ Change in lifestyle e.g. new child
☐ Change in income
☐ Increased understanding of which vehicle features impact my safety
☐ Family/friends advice
☐ Cheaper public transport
☐ Availability of public transport where I live
☐ Nothing, my car is already safe
☐ Other (please specify): _____

- - - - - - - - - - -

[1- or 2-star car owners only – presented to the other 50% of owners at this point in the survey depending on their answer to the question 'How many of these images have cars in them?']

Please read the following scenario and think of yourself in this situation.

You've decided it's time to upgrade your vehicle. What would you consider doing?

◯ Sell it to another person to drive
◯ Trade it in with a dealer
◯ Sell my car for scrap metal
◯ Donate my car for scrap metal

- - - - - - - - - - -

[Logic if 'Sell my car for scrap metal' or 'Donate my car for scrap metal' was selected:]

Why (randomised)?
◯ I feel like my car is not safe
◯ I don't want others to have the maintenance cost
◯ It's not good for the environment
◯ It's not nice to drive

- - - - - - - - - - -

[Logic if 'Sell my car for scrap metal' or 'Donate my car for scrap metal' was selected:]

Why would you prefer your vehicle be scrapped? Select all that apply.

☐ I feel like my car is not safe
☐ I don't want others to have the maintenance cost
☐ It's not good for the environment
☐ It's not nice to drive

- - - - - - - - - - -

[Only displayed for 1- and 2-star car owners.]

What would make you consider scrapping your car to be recycled/reused (i.e. taking it off New Zealand roads permanently). Select all that apply.

- ☐ If it failed its next Warrant of Fitness (WOF) and would cost too much to fix
- ☐ If it was involved in a crash and cost too much to fix
- ☐ If I knew it had a low safety rating (i.e. I would be less safe in a crash)
- ☐ If I knew more about what was involved in recycling cars into scrap metal (such as what businesses do this, where they are based, etc)
- ☐ If I could sell it for scrap metal at a reasonable price (e.g. $500)
- ☐ I would never consider selling or donating it for scrap metal
- ☐ Other (please specify)

- - - - - - - - - - -

About you

What is your age?

- ◯ Under 20
- ◯ 20-24
- ◯ 25-29
- ◯ 30-39
- ◯ 40-49
- ◯ 50-59
- ◯ 60-64
- ◯ 65-69
- ◯ 70-74
- ◯ 75-79
- ◯ 80 or older
- ◯ I prefer not to say

What is your gender?

- ◯ Female
- ◯ Male
- ◯ Other gender
- ◯ I prefer not to say

Which ethnic group do you belong to? (Select all that apply).

- ☐ New Zealand European
- ☐ Other European
- ☐ Māori
- ☐ Samoan
- ☐ Cook Islands Māori
- ☐ Tongan
- ☐ Niuean
- ☐ Chinese
- ☐ Indian
- ☐ Middle Eastern / Latin American / African
- ☐ Pacific peoples
- ☐ Asian
- ☐ Other (please specify): _____

Where are you located?

◯ Northland, Te Tai Tokerau
◯ Auckland, Tāmaki-makaurau
◯ Waikato
◯ Bay of Plenty, Te Moana-a-Toi
◯ Gisborne, Te Tai Rāwhiti
◯ Hawke's Bay, Te Matau-a-Māui
◯ Taranaki
◯ Manawatu-Wanganui, Manawatū-Whanganui
◯ Wellington, Te Whanga-nui-a-Tara
◯ Tasman, Te Tai-o-Aorere
◯ Nelson, Whakatū
◯ Marlborough, Te Tauihu-o-te-waka
◯ West Coast, Te Tai Poutini
◯ Canterbury, Waitaha
◯ Otago, Ōtākou
◯ Southland, Murihiku

Do you live in a town, city, or rural area?

◯ Town
◯ City
◯ Rural area

What is your household income?

◯ $50,000 or less
◯ $50,001 to $100,000
◯ $100,001 to $150,000
◯ $150,001 or more
◯ Prefer not to say

What is your **main** employment type?

◯ Full-time employment (30 hours or more per week)
◯ Part-time employment (less than 30 hours per week)
◯ Retired
◯ Student
◯ Unable to work
◯ Out of work but looking for work
◯ Out of work and currently not looking for work
◯ Other (please specify): _____

What is your current living situation/household make up?

◯ Living alone
◯ Couple - no children
◯ Household - with young children
◯ Household - with teenage or adult children

◯ Household - with children of mixed aged groups
◯ Living with parent
◯ Living with extended family
◯ Flatting or sharing
◯ Other (please specify): _____

Please indicate the drivers' licence you currently hold.

◯ Learners
◯ Restricted
◯ Full
◯ I do not hold a current driver's licence

- - - - - - - - - - -

Thank you

Thank you for your time. If you have any additional questions or comments you can contact WSP research with the subject line Vehicle Safety.

If you would like to be entered into the prize draw, please enter your email.
See here for terms and conditions.

_____

If you would like to be entered into the prize draw, please enter your email in the grey box below.
See here for terms and conditions.

Appendix B: Prospective car owner's survey

Thank you for taking the time to complete this survey. The purpose of the research is to understand car purchasing decisions. The research will be used by Waka Kotahi to better predict how car choice may influence New Zealand's road environment over the long-term.*

Which of these categories best describes you?

◯ I own a car I have a full licence but do not own a car
◯ I have a learners or restricted licence and do not own a car
◯ I drive without a licence
◯ I don't have a licence, I am intending to learn to drive
◯ I don't have a licence, I am never intending to learn to drive

- - - - - - - - - - -

[Participants who did not select 'I have a learners or restricted licence and do not own a car' or 'I don't have a licence, I am intending to learn to drive' are redirected out of the survey.]

Thank you for your time.

Unfortunately, you do not meet the criteria to continue with this survey.

- - - - - - - - - - -

What forms of transport do you use? (select all that apply)

☐ My car
☐ Other household car
☐ Car pool/ride-share
☐ Taxi/Uber
☐ Public transport
☐ Cycling/Ebike
☐ Motorcycle
☐ Work vehicle
☐ Walking
☐ Electric scooter or skateboard
☐ I do not use other forms of transport
☐ Other (please specify): _____

* Do you intend to purchase a car in the next... Month 6 months 12 months I do not intend to purchase a car in the next 12 months

◯ Month
◯ 6 months
◯ 12 months
◯ I do not intend to purchase a car in the next 12 months

Where would you consider purchasing a car?

◯ Used car dealership: in person
◯ Used car dealership: online
◯ New car dealer: in person
◯ New car dealer: online

◯ Family member
◯ Friend
◯ Online comparison sites (e.g. Trademe/Autotrader)
◯ Newspaper (online/print)
◯ Social media
◯ Road side purchase
◯ Other (please specify): _____

What influenced your decision when selecting this car?

	No influence	Little influence	Some influence	Significant influence
Family or Friend/s	◯	◯	◯	◯
Salespeople at the dealership	◯	◯	◯	◯
Dealer websites	◯	◯	◯	◯
Manufacturer websites	◯	◯	◯	◯
Retail website e.g. Trademe	◯	◯	◯	◯
Safety related websites e.g. Rightcar	◯	◯	◯	◯
Financial provider websites	◯	◯	◯	◯
Social media	◯	◯	◯	◯
Online car reviews	◯	◯	◯	◯

Is your next vehicle likely to be a new car or used car?

◯ New car
◯ Used car

What were your top 3 priorities when selecting this vehicle?

1st	Choose from: Age, Cost of ownership (insurance, spare parts), Cost of purchase, Design/appearance/colour, Electric vehicle, Environmental impact/CO2, Fuel efficiency, Low mileage, Make/model/Brand, Purchase price, Safety features, Safety rating, Service history, Size/spaciousness including luggage, Speed/performance/Engine size, Technology features e.g. phone & internet connectivity; good multimedia systems, Other
2nd	
3rd	

- - - - - - - - - - -

What is your main reason for not purchasing a car?

◯ Purchase or running costs
◯ Environment
◯ Traffic
◯ Prefer alternative transport methods

◯ I don't need one
◯ I don't want one
◯ Other (please specify)_____

- - - - - - - - - - -

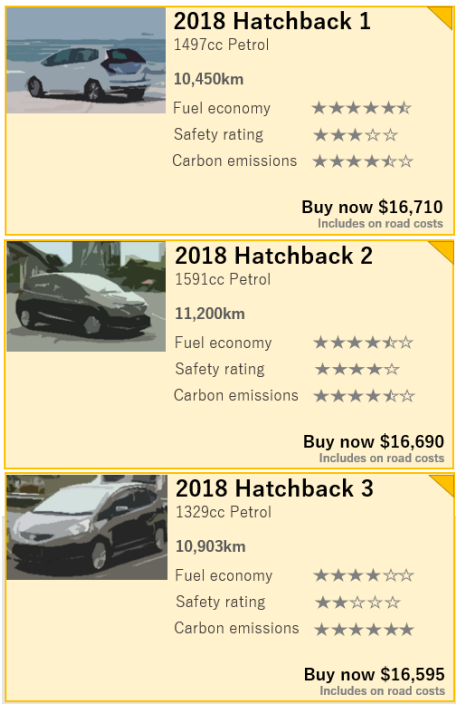
[Displayed for respondents who selected 'Purchase or running costs' on previous page.]

Please read the following scenario and think of yourself in this situation.

You've received $5,000 from a prize draw and have decided to buy a car.
You are searching for a second-hand car on a popular purchasing site.

The following cars are displayed based on your search. Take a look at each option and answer the questions below.

[Respondents will be shown one of the below images (1/3 per image):]



Based on the information provided, rank the cars in order of 1st, 2nd, and 3rd choice.

☰ Hatchback 1
☰ Hatchback 2
☰ Hatchback 3

For the car you ranked first, why did you choose this car?

_____

- - - - - - - - - - -

[Displayed for those who did not select 'Purchase or running costs'.]

Please read the following scenario and think of yourself in this situation, as though you are planning to buy a car.

Imagine you are searching for a second-hand car on a popular purchasing site. Based only on the options below, which vehicle are you **more likely** to spend your money on.

For your next vehicle, which style would you be more likely to choose?

◯ Hatchback (less than $5,000)
◯ Ute (less than $10,000)
◯ Hatchback (more than $15,000)
◯ SUV (more than $20,000)

Based on your selection, you will be presented with different vehicle options.

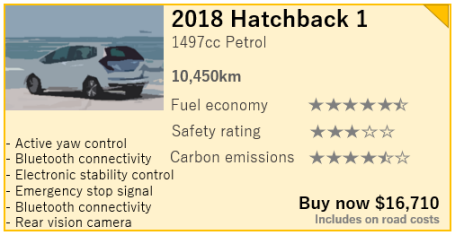
- - - - - - - - - - -

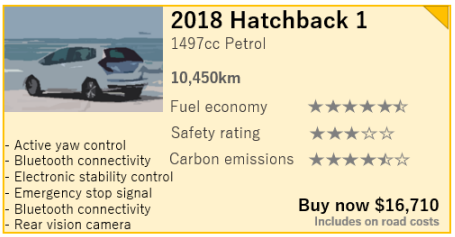
[If 'Hatchback (less than $5,000)' was selected.]

Hatchback (less than $5,000)

The following cars are displayed based on your search. Take a look at each option and answer the questions below.

[Respondents will be shown one of the below images (1/3 per image):]





Based on the information provided, rank the cars in order of 1st, 2nd, and 3rd choice.

☰ Hatchback 1
☰ Hatchback 2
☰ Hatchback 3

For the car you ranked first, why did you choose this car?

_____

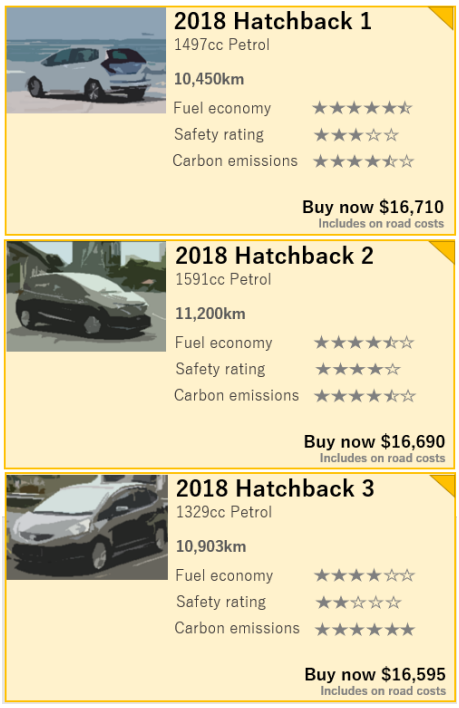
- - - - - - - - - - -

[If 'Hatchback (more than $15,000)' was selected.]

Hatchback (more than $15,000)

The following cars are displayed based on your search. Take a look at each option and answer the questions below.

[Respondents will be shown one of the below images (1/3 per image):]



Based on the information provided, rank the cars in order of 1st, 2nd, and 3rd choice.

☰ Hatchback 1
☰ Hatchback 2
☰ Hatchback 3

For the car you ranked first, why did you choose this car?

_____

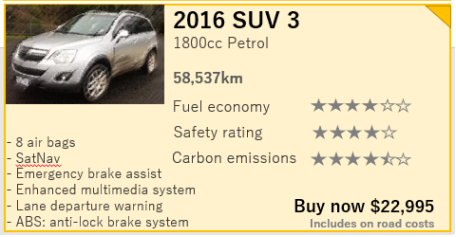
- - - - - - - - - - -

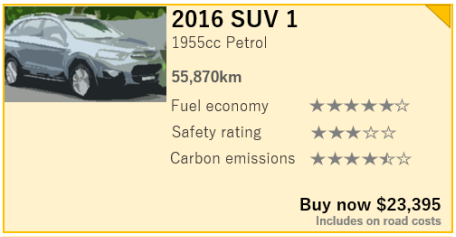
[If 'SUV (more than $20,000)' was selected.]

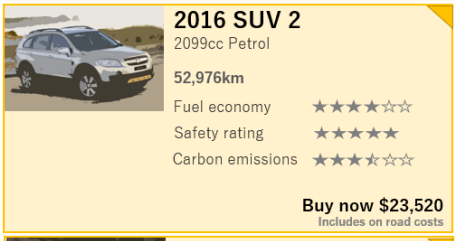
SUV

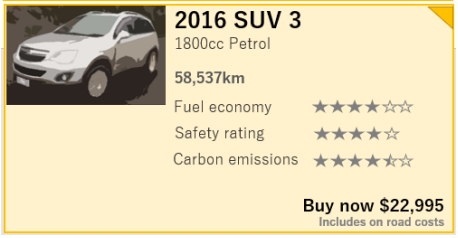
The following cars are displayed based on your search. Take a look at each option and answer the questions below.

[Respondents will be shown one of the below images (1/3 per image):]









Based on the information provided, rank the cars in order of 1st, 2nd, and 3rd choice.

☰ SUV 1
☰ SUV 2
☰ SUV 3

For the car you ranked first, why did you choose this car?

_____

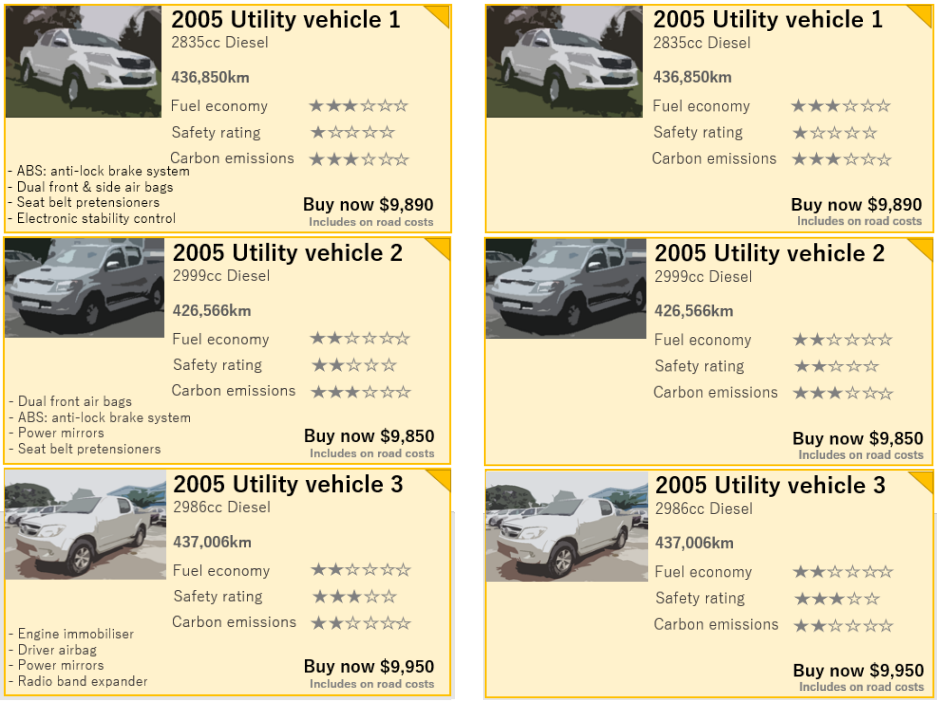
- - - - - - - - - - -

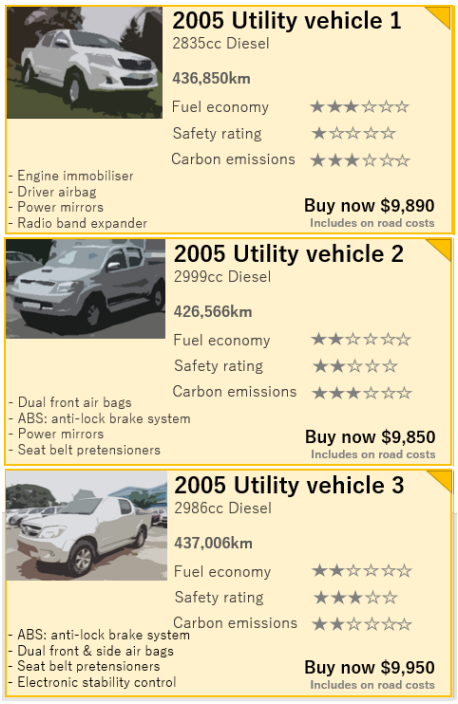
[If 'Ute (less than $10,000)' was selected.]

Ute

The following cars are displayed based on your search. Take a look at each option and answer the questions below.

[Respondents will be shown one of the below images (1/3 per image):]





Based on the information provided, rank the cars in order of 1st, 2nd, and 3rd choice.

☰ Ute 1
☰ Ute 2
☰ Ute 3

For the car you ranked first, why did you choose this car?

_____

- - - - - - - - - - -

How much do you agree with this statement?

You are less likely to be injured in a road accident when using public transport than when travelling by car

◯ Strongly disagree
◯ Disagree
◯ Neither agree nor disagree
◯ Agree
◯ Strongly agree
◯ Not sure

You are more than twice as likely to die or be seriously injured in a crash in a 1-star than in a 5-star vehicle.

In car-to-car collisions, cars with three or four stars were found to be approximately 30% safer when compared with two-star cars.

Based on these facts, would you consider changing your car?

◯ No, I would not change my car
◯ No, I am concerned about safety but this does not change my mind

◯ No, I already have a safe car
◯ Possibly, this has made me think about my car choice
◯ Yes, based on this information I would change to a safer car

How important are the following features to your car selection?

	I do not know what this feature is	Not at all important	Somewhat unimportant	Neither important or unimportant	Somewhat important	Very important
Air bags	◯	◯	◯	◯	◯	◯
Anti-lock brake system (ABS)	◯	◯	◯	◯	◯	◯
Blind spot monitor (BSM)	◯	◯	◯	◯	◯	◯
Adaptive cruise control (ACC)	◯	◯	◯	◯	◯	◯
Traffic sign recognition	◯	◯	◯	◯	◯	◯
Pedestrian detection	◯	◯	◯	◯	◯	◯
Reversing camera	◯	◯	◯	◯	◯	◯
Electronic stability control (ESC)	◯	◯	◯	◯	◯	◯
Lane departure warning (LDW)	◯	◯	◯	◯	◯	◯
Automatic emergency braking (AEB)	◯	◯	◯	◯	◯	◯
Lane keeping assist (LKA)	◯	◯	◯	◯	◯	◯
Forward collision	◯	◯	◯	◯	◯	◯

warning (FCW)						

When considering car safety in general, please rank these in order of largest to smallest contribution to vehicle safety:

☰ Used car safety rating (star rating)
☰ New car safety rating (star rating)
☰ Vehicle safety features e.g. airbags, electronic stability control (ESC), anti-lock brake system (ABS)
☰ Driver support features e.g. blind spot monitoring (BSM), lane keeping assist (LKA), reversing camera
☰ Age of vehicle
☰ Size of vehicle
☰ Driver skill or behaviour

What would motivate or encourage you to move out of an unsafe car?

☐ Incentive to scrap my car rather than sell
☐ Trade-in offers
☐ Increased understanding of car safety ratings
☐ Change in lifestyle e.g. new child
☐ Change in income
☐ Increased understanding of which vehicle features impact my safety
☐ Family/friends advice
☐ Nothing, my car is already safe
☐ Other (please specify): _____

- - - - - - - - - - -

About you

What is your age?

◯ Under 20
◯ 20-24
◯ 25-29
◯ 30-39
◯ 40-49
◯ 50-59
◯ 60-64
◯ 65-69
◯ 70-74
◯ 75-79
◯ 80 or older
◯ I prefer not to say

What is your gender?

◯ Female
◯ Male
◯ Other gender
◯ I prefer not to say

Which ethnic group do you belong to? (Select all that apply).

- ☐ New Zealand European
- ☐ Other European
- ☐ Māori
- ☐ Samoan
- ☐ Cook Islands Māori
- ☐ Tongan
- ☐ Niuean
- ☐ Chinese
- ☐ Indian
- ☐ Middle Eastern / Latin American / African
- ☐ Pacific peoples
- ☐ Asian
- ☐ Other (please specify): _____

Where are you located?

- ◯ Northland, Te Tai Tokerau
- ◯ Auckland, Tāmaki-makaurau
- ◯ Waikato
- ◯ Bay of Plenty, Te Moana-a-Toi
- ◯ Gisborne, Te Tai Rāwhiti
- ◯ Hawke's Bay, Te Matau-a-Māui
- ◯ Taranaki
- ◯ Manawatu-Wanganui, Manawatū-Whanganui
- ◯ Wellington, Te Whanga-nui-a-Tara
- ◯ Tasman, Te Tai-o-Aorere
- ◯ Nelson, Whakatū
- ◯ Marlborough, Te Tauihu-o-te-waka
- ◯ West Coast, Te Tai Poutini
- ◯ Canterbury, Waitaha
- ◯ Otago, Ōtākou
- ◯ Southland, Murihiku

What is your household income?

- ◯ $50,000 or less
- ◯ $50,001 to $100,000
- ◯ $100,001 to $150,000
- ◯ $150,001 or more
- ◯ Prefer not to say

What is your **main** employment type?

- ◯ Full-time employment (30 hours or more per week)
- ◯ Part-time employment (less than 30 hours per week)
- ◯ Retired
- ◯ Student
- ◯ Unable to work
- ◯ Out of work but looking for work

◯ Out of work and currently not looking for work
◯ Other (please specify): _____

What is your current living situation/household make up?

◯ Living alone
◯ Couple - no children
◯ Household - with young children
◯ Household - with teenage or adult children
◯ Household - with children of mixed aged groups
◯ Living with parent
◯ Living with extended family
◯ Flatting or sharing
◯ Other (please specify): _____

Please indicate the drivers' licence you currently hold.

◯ Learners
◯ Restricted
◯ Full
◯ I do not hold a current driver's licence

- - - - - - - - - - -

Thank you

Thank you for your time. If you have any additional questions or comments you can contact WSP research with the subject line Vehicle safety.

Appendix C: Demographic characteristics of survey respondents

Characteristic	Category	Group 1 (*n*)	Group 1 (%)	Group 2 (*n*)	Group 2 (%)	Group 3 (*n*)	Group 3 (%)
Gender	Female	5,570	45.6	473	36.4	567	55.7
	Male	6,452	52.8	806	62.0	402	39.5
	Other gender	41	0.3	1	0.1	27	2.7
	Prefer not to say	157	1.3	21	1.6	22	2.2
Licence held	Learner	225	1.8	7	0.5	502	49.5
	Restricted	740	6.0	49	3.7	211	20.8
	Full	11,253	91.9	1,249	95.6	0	0
	No licence	27	0.2	2	0.2	301	29.7
Age group	< 20	178	1.5	8	0.6	269	26.7
	20–24	729	6.0	45	3.5	249	24.8
	25–29	1,181	9.8	89	6.9	175	17.4
	30–39	2,353	19.5	251	19.5	234	23.3
	40–49	2,013	16.7	283	22.0	58	5.8
	50–59	2,458	20.4	255	19.8	8	0.8
	60–64	1,083	9.0	113	8.8	1	0.1
	65–69	841	7.0	109	8.5	0	0
	70–74	631	5.2	71	5.5	0	0
	75–79	332	2.8	39	3.0	0	0
	80 or older	191	1.6%	16	1.2	0	0
	Prefer not to say	65	0.5	7	0.5	12	1.2
Ethnicity	New Zealand European	8,711	63.7	935	65.0	587	46.5
	Other European	794	5.8	99	6.9	46	3.6
	Māori	1,578	11.5	159	11.0	250	19.8
	Samoan	161	1.2	22	1.5	55	4.4
	Cook Islands Māori	111	0.8	14	1.0	27	2.1%
	Tongan	65	0.5	6	0.4	20	1.6
	Niuean	39	0.3	5	0.3	17	1.3
	Chinese	296	2.2	30	2.1	60	4.8
	Indian	409	3.0	33	2.3	55	4.4
	Middle Eastern/Latin American/African	167	1.2	13	0.9	18	1.4

Characteristic	Category	Group 1 (*n*)	Group 1 (%)	Group 2 (*n*)	Group 2 (%)	Group 3 (*n*)	Group 3 (%)
	Pacific peoples	128	0.9	6	0.4	24	1.9
	Asian	520	3.8	50	3.5	78	6.2
	Other	693	5.1	67	4.7	26	2.1
Location	Northland, Te Tai Tokerau	552	4.6	54	4.2	32	3.4
	Auckland, Tāmaki-makau-rau	3,315	27.9	380	29.7	346	36.5
	Waikato	1,217	10.2	144	11.3	108	11.4
	Bay of Plenty, Te Moana-a-Toi	773	6.5	99	7.7	60	6.3
	Gisborne, Te Tai Rāwhiti	85	0.7	13	1.0	26	2.7
	Hawke's Bay, Te Matau-a-Māui	425	3.6	43	3.4	38	4.0
	Taranaki	299	2.5	32	2.5	25	2.6
	Manawatū-Whanganui	707	6.0	57	4.5	40	4.2
	Wellington, Te Whanga-nui-a-Tara	1,308	11.0	134	10.5	115	12.1
	Tasman, Te Tai-o-Aorere	153	1.3	20	1.6	7	0.7
	Nelson, Whakatū	179	1.5	16	1.3	12	1.3
	Marlborough, Te Tauihu-o-te-waka	153	1.3	13	1.0	3	0.3
	West Coast, Te Tai Poutini	101	0.9	12	0.9	4	0.4
	Canterbury, Waitaha	1,729	14.6	168	13.1	82	8.6
	Otago, Ōtākou	619	5.2	67	5.2	40	4.2
	Southland, Murihiku	263	2.2	26	2.0	10	1.1
Town, city or rural	Town	4,776	39.1	527	40.5	–	–
	City	4,852	39.8	501	38.5	–	–
	Rural	2,574	21.1	274	21.0	–	–
Household income	$50,000 or less	3,062	25.1	273	20.9	260	25.7
	$50,001–$100,000	3,955	32.4	365	28.0	267	26.4
	$101,000–$150,000	1,998	16.4	242	18.6	144	14.3
	$151,000 or more	1,336	11.0	226	17.3	93	9.2
	Prefer not to say	1,848	15.1	198	15.2	246	24.4
Employment status	Full-time employment	7,631	62.5	859	66.0	346	34.5
	Part-time employment	1,245	10.2	120	9.2	186	18.5

Characteristic	Category	Group 1 (*n*)	Group 1 (%)	Group 2 (*n*)	Group 2 (%)	Group 3 (*n*)	Group 3 (%)
	Retired	1,646	13.5	199	15.3	4	0.4
	Student	413	3.4	22	1.7	278	27.7
	Unable to work	321	2.6	24	1.8	37	3.7
	Out of work but looking for work	306	2.5	24	1.8	86	8.6
	Out of work and currently not looking for work	139	1.1	15	1.2	30	3.0
	Other	511	4.2	39	3.0	37	3.7
Household make-up	Living alone	1,668	13.7	156	12.0	108	10.7
	Couple – no children	3,661	30.0	374	28.7	95	9.4
	Household – with young children	1,686	13.8	242	18.6	189	18.8
	Household – with teenage or adult children	2,062	16.9	238	18.3	102	10.1
	Household – with children of mixed age groups	761	6.2	106	8.1	65	6.5
	Living with parent	486	4.0	43	3.3	282	28.0
	Living with extended family	319	2.6	23	1.8	49	4.9
	Flatting or sharing	1,247	10.2	89	6.8	99	9.8
	Other	305	2.5	30	2.3	18	1.8