# A Community Survey of Attitudes towards Autonomous Vehicles

Jodi Page-Smith[a], Amanda Northrop[b]

[a]Transport Accident Commission, [b]Amanda Northrop Consulting

## Abstract

As the availability of different vehicle technologies increases, the use of completely autonomous vehicles is no longer the stuff of science fiction. As part of a survey, looking at community engagement with, and social acceptability of, a variety of road safety related technologies and behaviours, the TAC sought to investigate Victorian community attitudes to autonomous vehicles. Using data from this survey, Bayesian Networks were used to identify the variables that have the highest effect on Willingness to Use (WTU) autonomous vehicles. Finally, it was found that individuals who are more "normalised" with mobile phone use and the internet, along with individuals who believe that reducing Victoria's road deaths to zero is achievable have much higher WTU autonomous vehicles.

## Background

For the last 30 years, the Transport Accident Commission (TAC) has been working to shift the attitudes of road users in Victoria toward a number of road safety behaviours including drink driving, speeding and restraint wearing, as well as the importance of vehicle safety. The TAC's efforts have contributed to a shift over that time in the community's social norms, particularly in relation to drink driving behaviour.

Over the last five years, 1,316 people were killed and many thousands more injured in road crashes in Victoria (TAC, 2017). Autonomous cars have the potential to reduce the number of people killed and seriously injured on our roads (LaFranche, 2015; Rosekind, 2016). More in-car technologies are becoming widely available and vehicles are getting closer to being completely autonomous (Rosekind, 2016; BITRE, 2017). In addition to determining the 'legality' of an automated vehicle, and the consequential development of a legislative framework for the operation of self-driving vehicles in both in Australia and internationally (NTC, 2016); there are still a number of obstacles to the idea of partially self-driving or fully autonomous vehicles being accepted by the community. The Community Engagement and Social Acceptability Research (CESAR) aimed to explore the nature of these concerns.

This study used Bayesian Networks to identify variables that have an impact on the willingness of the Victorian community to use self-driving vehicles using the 2016 survey data.

## Method

### *Community Engagement and Social Acceptability Research (CESAR)*

The TAC developed a survey to help quantify and rank levels of social acceptability and unacceptability of a range of human behaviours including behaviours specifically related to driving. A range of non-driving related human behaviours were included so as to position the level of community acceptance of various driving behaviours relative to these other behaviours. These behaviours and their relative levels of acceptance can be found in Appendix 1.

In 2014 and 2016, this research was broadened to enable the TAC to understand community acceptance of a number of in-vehicle road safety related technological advancements including speed limiting technologies, self-driving cars, and alcohol interlocks, as well as their level of interest in a selection of other technologies. Respondents were also asked their opinion of other relevant road safety issues.

### *Participants*

A total of 1,017 Victorian participants aged between 16 and 75 were recruited via an online panel (hosted by I-view) to complete the Community Engagement and Social Acceptability Research (CESAR) survey in 2016.

To allow for analysis between sub-groups, participant data was weighted using ABS 2011 Census data to be representative of the distribution of Victorians aged from 16 to 75 years old. Participant data was also weighted on the basis of licence status, employment, and family make-up to ensure that the sample was as representative of the Victorian population as possible. The weighted vs. unweighted population figures are compared in Table 1 below.

***Table 1 Victorian participant profile***

| | % (unweighted) | % (weighted) | n |
|---|---|---|---|
| **Location** | | | |
| Melbourne | 75 | 76 | 759 |
| Rest of VIC | 25 | 24 | 258 |
| **Gender** | | | |
| Male | 49 | 49 | 499 |
| Female | 51 | 51 | 518 |
| **Age** | | | |
| 18-25 | 23 | 15 | 237 |
| 26-39 | 40 | 28 | 403 |
| 40+ | 37 | 57 | 377 |

### *Materials*

The TAC worked with IPSOS in 2014 to develop an online quantitative survey to address the specific research objectives outlined above. This study was replicated in 2016. This survey asked respondents to assess a variety of human behaviours as being acceptable or unacceptable. In addition, the survey also asked participants to report on their actual attitudes and behaviours in relation to a selection of road safety related behaviours (not discussed in this report) and asked respondents opinions regarding a number of road safety technologies.

### *Procedure*

The 2016 iteration of this research asked participants to assess 49 human behaviours covering a range of acceptable and unacceptable behaviours (as expected in an Australian society), as well as some neutral behaviours. (A full list of the behaviours assessed in 2016, and their relative acceptability can be found in Appendix 1). Both lawful and unlawful behaviours were included in the questionnaire. Each statement was prefaced by "How would you judge

another person's behaviour if they…" Respondents were given a 7-point symmetric scale from 'very unacceptable' to 'very acceptable' with a neutral mid-point.

The first six behaviours were offered in the same order for all participants, and the behaviours were chosen to introduce participants to the questionnaire and gain their interest, without revealing the road safety focus of the research. Subsequent behaviours were randomised to reduce order bias.

Of the 49 human behaviours in the questionnaire, ten specifically related to driving behaviours. Five dealt with driving in excess of the speed limit - for example "How would you judge another person's behaviour if they drove 60km/h in a 50km/h zone?" The other five statements dealt with clear infringements of road rules - for example "How would you judge another person's behaviour if they sent a text message while driving?"

As part of this survey, participants were asked about their opinions and concerns about a variety of vehicle related technologies that can be expected to improve road safety. These technologies included speed advisory technology, alcohol interlocks, and self-driving cars. This paper focuses on opinions and concerns about self-driving cars.

Participants were then given two sets of questions to determine their attitudes and opinions about self-driving cars – the first set asked respondents to give their opinion about a number of statements relating to self-driving cars using a five point strongly agree to strongly disagree scale. The participants were asked:

"*To what extent do you agree or disagree with the following statements…?"*

- I would like a car that would park itself but not do other driving tasks
- I would like a car that can take care of some aspects of the driving process but not all
- I would be comfortable in a car that could completely drive itself
- A self-driving car would be good for older drivers

The second set of questions asked participants to identify from a short list, the factors that would concern them about driving a self-driving car (participants could give a yes/no response to all that applied ). The participants were asked:

*"Which of the following would concern you about driving a self-driving car....?"*

- The technology failing (e.g. GPS issues, the computer crashing, car not stopping in time)
- Losing driving skills
- Having a collision
- I would not feel safe in a car where I was not in control
- Nothing would concern me, it's no different to being a passenger

Participants were also given the option to state any other concerns they may have that weren't included in the provided list. Most of these responses filtered back into the original response frame; however, some participants' reservations did not fit within this framework. These additional reservations mostly related to loss of personal freedoms, legislative concerns, and the actions of other drivers.

Responses were then analysed for differences between sub groups in the community (i.e. age, location etc.). Where statistical differences were found, these are statistically significant at 95% level of confidence. Where significance testing occurred between pairs such as males vs. females, this has been undertaken as an independent samples test. However, where significance testing has occurred between more than two categories within a group (e.g. 18-25 year-olds, 26-39 year-olds; and 40+ year olds), the significance testing used tests one category against the average of the others that are not in that category combined (i.e. 18-25 vs. those aged 26-39 and 40+ combined). This reduces the likelihood of displaying a significance difference where one does not exist.

***Bayesian Networks and Willingness to Use (WTU)***

Bayesian Networks were utilised in this study to model and predict the respondents' Willingness to Use (WTU) autonomous vehicles.

Bayesian Networks, or probabilistic directed acyclic graphs, are highly complex statistical models that model and represent variables and their dependencies. Bayesian Networks represent a particular variable in the dataset as a "node". The probabilistic dependencies between the nodes are represented with an arc (Pearl, 2014). They are useful when modelling a complex system that involves a large amount of uncertainty (Koller & Friedman, 2009:2). They have been used successfully to model and predict a number of things across a variety of disciplines. Some notable examples are genetic microarrays (Zou, & Conzen, 2004) and risk assessment and decommissioning in engineering (Faber, Kroon, Kragh, Bayly, & Decosemaeker, 2002). Papers using Bayesian Networks are increasing at an exponential rate (Aguilera, Fernández, Fernández, Rumí, & Salmerón, 2011).

There have been numerous road safety studies where Bayesian network algorithms have been used successfully to better describe and model the dependencies in data. Examples include using it to predict road traffic incidents on arterial roads (Zhang, & Taylor, 2006) and to classify traffic accidents according to their injury severity (de Oña, Mujalli, & Calvo, 2011). Gregoriades and Mouskos (2011) used Bayesian Networks successfully to identify "black spots", locations where crashes have been concentrated in the past.

Bayesian networks were chosen for modelling WTU, using the question from the survey "I would be comfortable in a car that could completely drive itself" as the target variable. This variable was on a 5 point scale from "Strongly Disagree" to "Strongly Agree".

Bayesialab, a commercially available package, was used to identify any interesting relationships between the survey variables and the target variable. Bayesialab can handle both categorical and continuous data, and can find relationships regardless. We chose the augmented naïve Bayes algorithm (Friedman, Geiger, & Goldszmidt, 1997) to model the observed data. The metric used in Bayesialab to select the most predictive model is the Minimum Description Length (MDL). MDL trades off goodness-of-fit on the observed data with complexity (Grünwald, 2007:xxv). We used mutual information as the measure of association between two variables. That is, the expected amount of information gained about a variable B, by observing the value of A (Cheng, Greiner, Kelly, Bell, & Liu, 2002). Knowledge of the mutual information can help us realize the dependencies, and strength of dependencies, between the questions asked in the survey.

*Identifying Significant Relationships* - The mutual information of two variables was determined by the Kulback-Leibler GKL test.

*Validation* – Model results were validated by k-folds cross validation (Kohavi, 1995). We chose this to mitigate sampling effects in a one-off test set. The validated model was then extracted and used as the final model. We chose K=10, therefore a total of 10 networks were created and each test set was evaluated and compared.

## Results

### *CESAR*

Participants were presented with the following statement in relation to self-driving cars:

> *The next step forward in new car development would be for the car to have full control of driving in favourable weather and traffic conditions, or for taxis and delivery vans to become automated and travel along set routes.*
>
> *Mercedes, BMW and Tesla have already released cars with some ability to drive themselves; with regulation one of the only barriers to completely autonomous vehicles taking to the roads. Self-driving cars could completely eliminate human error as a cause of collisions.*

A summary of their responses can be seen in Figure 1.

When asked about their attitudes toward self-driving cars, most respondents were comfortable with the idea of the car taking on some aspects of driving, but not all (59% either strongly or somewhat agreed). However, only a minority (24% strongly or somewhat agreed) stated they would be comfortable in a car that completely drove itself. Just over half (54%) the respondents agreed they thought a self-driving car would be good for older drivers.

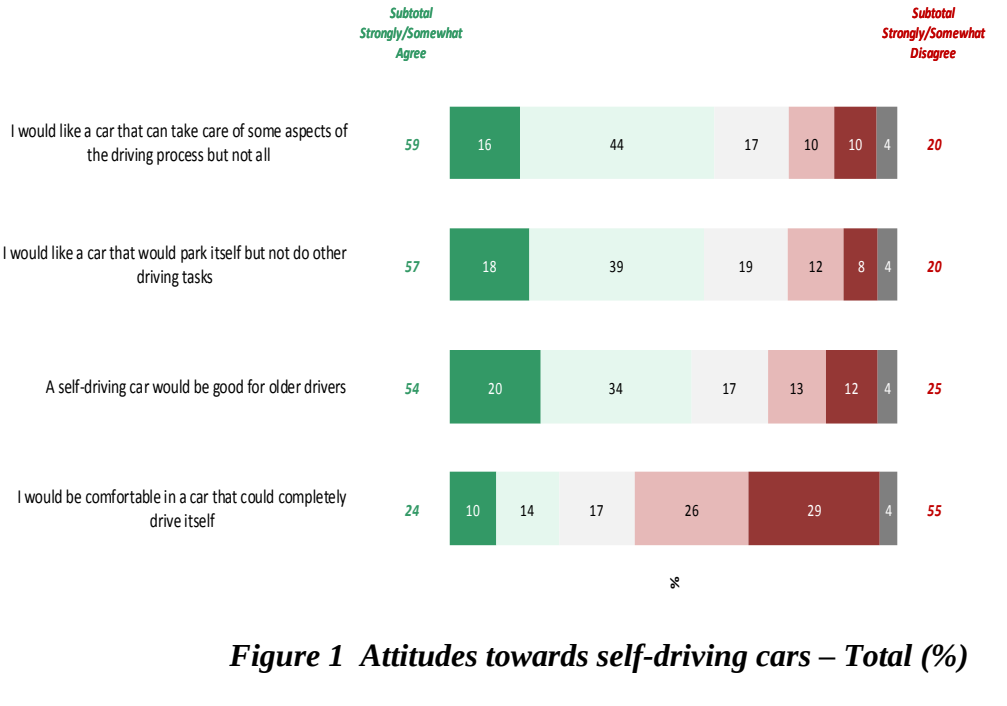



***Figure 1 Attitudes towards self-driving cars – Total (%)***

While there were no significant differences between genders, there were quite significant differences between age groups – with younger participants being significantly more likely to agree about almost all concepts considered in this research. Acceptance of the concept of a

"self-parking" car was constant across all ages and genders; and interestingly, the proposal that self-driving cars would be good for older drivers was more significantly more acceptable for younger participants (aged 18-25), with seven in ten (70%) thinking a self-driving car was good for older drivers, compared to only 45% of those drivers aged over 40. Acceptance of this concept declined still further for those respondents aged 60+ (36% of drivers aged 60-75 strongly or somewhat agreed) and 70+ where only one in four (25%) participants thought self-driving vehicles were a good idea for older drivers.

Younger respondents (aged 18-25) were twice as likely to agree they would be comfortable in a car that could completely drive itself compared to those respondents aged over 40 (38% v 19% of older participants). In addition, drivers in Melbourne were significantly more likely to state they would be comfortable in a completely self-driving car (26% compared to 19% in regional Victoria). Learner and probationary drivers were more accepting (41%) of completely autonomous vehicles compared to full licence holders (21%), and heavy vehicle licence holders (11%). This is most likely because learner (67%) and probationary drivers (83%) are primarily aged 18-25.

***Table 2 Attitudes towards self-driving cars - %strongly/somewhat agree by gender and age***

| % | Age | | | Gender | |
|---|---|---|---|---|---|
| | 18-25 | 26-39 | 40-75 | Male | Female |
| *n=* | *237* | *403* | *377* | *499* | *518* |
| I would like a car that would park itself but not do other driving tasks | 58 | 56 | 57 | 55 | 58 |
| I would like a car that can take care of some aspects of the driving process but not all | 72 ↑ | 64 | 54 ↓ | 58 | 60 |
| I would be comfortable in a car that could completely drive itself | 38 ↑ | 27 | 19 ↓ | 25 | 23 |
| A self-driving car would be good for older drivers | 70 ↑ | 63 ↑ | 45 ↓ | 53 | 55 |

[1]

Surprisingly, people who commuted regularly (at least once a week) by driving a car were less likely to agree they would be comfortable in a car that could completely drive itself (24% strongly or somewhat agreed, compared to around four in ten 'passive' commuters – those that commuted as passengers in a car, train or tram)

In addition to asking about the aspects of self-driving cars they liked, respondents were also asked what would worry them the most about a self-driving car. Only around half (51%) of all respondents were concerned about having a crash in a self-driving car, however, almost three quarters (74%) strongly or somewhat agreed they were concerned about the technology failing. Comparing results from the 2014 survey suggests that while the respondents were less concerned about the idea of a self-driving car, they were generally not significantly less concerned (there was a slightly but significantly lower degree of concern about losing driving skills).

[1] Statistically significant differences ($\rho$ <0.05) within tables are displayed by green and red figures and arrows. Green figures indicate the figure reported is statistically higher; red indicate the figure is statistically lower than those not in that category.

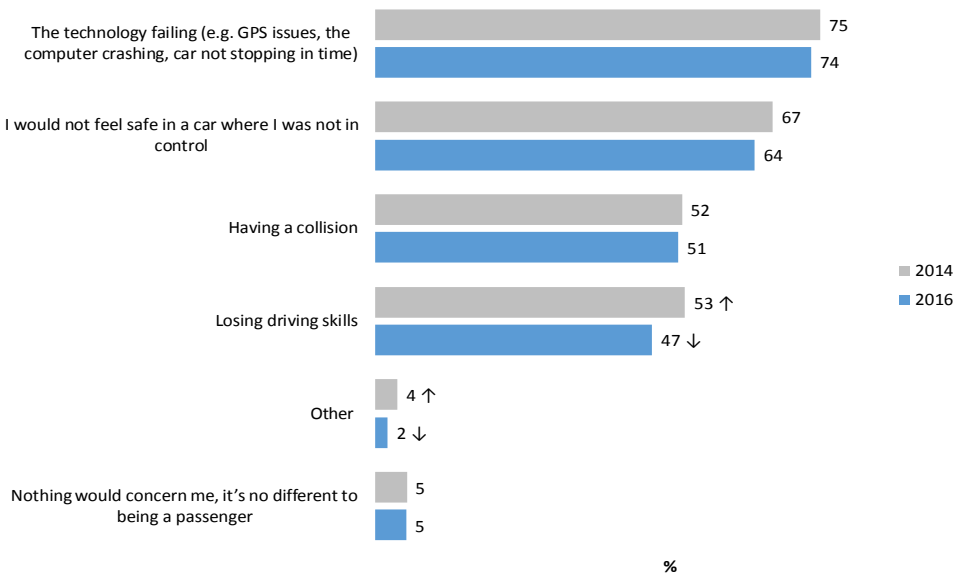



***Figure 2 Concerns about self-driving cars - total (%) 2014v2016***

Whether participants were located in Metro or Regional Victoria had no impact on their level of concern, Older drivers (aged 40-75) were more likely to be concerned about technology failing (77% compared to 68% of 26-39 year olds), and not being in control (69% compared to 51% of 18-25) than other age groups.

***Table 3 Concerns about self-driving cars by gender and age (%)***

| % | Age | | | Gender | |
|---|---|---|---|---|---|
| | 18-25 | 26-39 | 40-75 | Male | Female |
| *n=* | *237* | *403* | *377* | *499* | *518* |
| The technology failing (e.g. GPS issues, the computer crashing, car not stopping in time) | 73 | 68 ↓ | 77 ↑ | 71 | 76 |
| I would not feel safe in a car where I was not in control | 51 ↓ | 63 | 69 ↑ | 62 | 66 |
| Having a collision | 53 | 52 | 51 | 52 | 51 |
| Losing driving skills | 46 | 42 | 49 | 48 | 46 |
| Other | 2 | 1 | 3 | 2 | 2 |
| Nothing would concern me, it's no different to being a passenger | 7 | 6 | 5 | 6 | 5 |

Heavy vehicle drivers are also more likely to agree they wouldn't feel safe if they weren't in control (84% compared to 68% car drivers); and people who commute short distances (<5km) were more likely to be concerned about technology failure than those who commuted longer distances (80% v 70%).

Interestingly, when drivers were presented with a list of in-vehicle technologies that are currently or becoming available, older drivers (aged 40+) generally were much more interested in purchasing vehicles with the individual safety technologies than younger drivers (aged under 40), despite being significantly less comfortable with the idea of a car that could take control of part or all of the driving processes.

***Table 4 Purchase intentions related to other car safety technologies - Very Interested by gender and age (%)***

| % | Age | | | Gender | |
|---|---|---|---|---|---|
| | 18-25 | 26-39 | 40-75 | Male | Female |
| *n=* | *237* | *403* | *377* | *499* | *518* |
| Adaptive cruise control | 43 | 38 ↓ | 46 | 46 | 40 |
| Lane departure warning systems | 34 ↓ | 35 ↓ | 46 ↑ | 46 ↑ | 37 ↓ |
| Vehicle to vehicle communication | 35 | 32 | 34 | 35 | 32 |
| E-Call | 52 | 48 | 55 | 50 | 56 |
| Fatigue detection systems | 36 | 35 ↓ | 47 ↑ | 43 | 41 |

*Willingness to Use*

The final, validated model had an overall ROC index of 68.29%. Survey variables with the highest amount of mutual information with the target variable are presented in Appendix 2. A graphical representation of the model can be found in Appendix 3.

There were a few broad categories into which the variables fell:

*Autonomous Technology*: As expected, a higher rating for believing a self-driving car would be good for older drivers resulted in a higher WTU. Similarly, whether they would like a car that would take care of some parts of the driving but not all also had a positive impact on WTU fully autonomous vehicles. Interest in technology such as vehicle to vehicle technology, cruise control, and autonomous parking were all positively related with a person's WTU autonomous vehicles. Those that were concerned about not being in control in a self-driving car and being in a self-driving car that caused a collision had lower WTU autonomous vehicles.

*Belief in zero deaths*: The survey variable "Do you believe the idea of zero deaths on Victorian roads is achievable" had high mutual information with the respondents' WTU autonomous vehicles. Individuals that believed reducing road deaths in Victoria was achievable had a significantly higher WTU autonomous vehicles.

*Technology related questions not related to road safety:* Whether the respondents would judge a person who asked someone to stop using their mobile phone in the cinema had high mutual information with WTU fully autonomous vehicles. Those individuals that thought it unacceptable to stop someone from using their phone had a significantly higher WTU autonomous vehicles. The other variable with high mutual information with WTU fully autonomous vehicles was whether they would judge someone if they used a younger picture of themselves on a dating profile. Those that thought it acceptable had a higher WTU autonomous vehicles than those who did not.

*Drink driving*: A high level of concern about being caught drink-driving, and getting demerit points or going to jail had a high level of mutual information with WTU fully autonomous vehicles. Those individuals that highlighted this as a concern had a higher WTU autonomous vehicles. Additionally, individuals who believed the alcohol limit should be dropped from 0.05 to 0.02 also had a higher WTU autonomous vehicles. Finally, whether they believed an alcohol interlock should be made compulsory for all drivers had a strong positive relationship with their WTU fully autonomous vehicles.

*Age:* As discussed in the CESAR component of this research, age was again found to be a strong predictor of WTU autonomous vehicles, with younger drivers more willing to use partially or fully autonomous vehicles.

**Discussion**

This research found that younger drivers not only have greater WTU self-driving vehicles, but they are also more comfortable with the idea of a car that can completely drive itself. Older drivers express the lowest level of agreement that they are comfortable with a car that can completely drive itself; however, compared to younger drivers, they are most accepting of and interested in the individual technologies that will be found in completely autonomous vehicles of the future.

When respondents were asked whether or not they believed that no deaths on Victorian roads was achievable, around three quarters (74%) of respondents stated they did not think it was at all achievable. Of this group, the vast majority (83%) stated 'people' were the main reason this was impossible. Of the people who believe a future where nobody dies on Victorian roads is possible, their main reason for believing this is at all possible was 'technology' and 'safer cars'. This was also reflected in the respondents' degree of WTU a fully autonomous car. Individuals who believed the idea of no deaths on Victorian roads was achievable had significantly higher WTU autonomous vehicles.

Bayesian modelling gave us insight into variables that had not previously considered to be related with WTU autonomous vehicle. Bayesialab was especially useful as it finds relationships between variables of all types (categorical and continuous). This was particularly evident in determining a relationship between the key variable and other variables that are not normally considered in conjunction with each other (for example, confirming the link between willingness to use autonomous vehicles and the belief that improvements in technology will lead to zero deaths on Victorian roads.)

Interestingly, one of the reservations expressed by respondents related to discomfort with the idea of "drink drivers" using autonomous vehicles; however, drivers who were concerned about "punishments" for drink driving were more willing to use autonomous vehicles.

There are some limitations to the CESAR research as the respondents were all selected from a proprietary research panel made up of people who had chosen to be on that panel. It would be interesting to conduct the research using general population; however, it is harder to recruit non-drivers without using recruitment techniques such as panel providers. Panel members are generally quite computer literate and comfortable with the use of technology. As WTU autonomous vehicles was linked to "normalisation" of internet and mobile phone use, this could have influenced the results in a more positive direction than had the research been conducted with general public. This research could be replicated with a sample drawn from general population to determine whether there is a difference in WTU autonomous vehicles between the two groups.

Limitations with using self-complete data for research are that participants can 'straight line' (give the same answer to each question), or give what they consider to be socially acceptable responses, particularly when asked about illegal behaviours. Because the survey instrument in this study asks people to judge others behaviours, and asks their personal opinions about a number of technologies, there are no "right" or "wrong" answers or opinions. Therefore, in this survey, the responses are likely to be an accurate reflection of the respondents' beliefs.

## Conclusions

This research found that age was the strongest predictor of WTU autonomous vehicles, along with younger (aged 18-25) respondents significantly more willing than older (aged 40+) that older Victorians (aged 40+) were significantly less likely to be willing to use an autonomous vehicle, but were more interested in the individual technologies that will contribute to the level of automation in vehicles.

This research invites further investigation with older drivers to further understand the point at which there are too many technologies for them to be comfortable with the level of autonomy in their vehicle. In addition, replicating the research with sample drawn from the general public rather than using a research panel may give further insight into willingness to use autonomous vehicles in the future.

## References

Aguilera, P. A., Fernández, A., Fernández, R., Rumí, R., & Salmerón, A. (2011). Bayesian networks in environmental modelling. *Environmental Modelling & Software*, *26*(12), 1376-1388.

Bureau of Infrastructure, Transport and Regional Economics (BITRE), (2017), Costs and benefits of emerging road transport technologies, Report 146, BITRE, Canberra ACT.

Cheng, J., Greiner, R., Kelly, J., Bell, D. & Liu, W. (2002). Learning Bayesian networks from data: An information-theory based approach. *Artificial Intelligence*, *137*, 43-90.

de Oña, J., Mujalli, R. O., & Calvo, F. J. (2011). Analysis of traffic accident injury severity on Spanish rural highways using Bayesian networks. *Accident Analysis & Prevention*, *43*(1), 402-411.

Faber, M. H., Kroon, I. B., Kragh, E., Bayly, D., & Decosemaeker, P. (2002). Risk assessment of decommissioning options using Bayesian networks. *TRANSACTIONS-AMERICAN SOCIETY OF MECHANICAL ENGINEERS JOURNAL OF OFFSHORE MECHANICS AND ARCTIC ENGINEERING*, *124*(4), 231-238.

Friedman, Nir, Dan Geiger, and Moises Goldszmidt. "Bayesian network classifiers." *Machine learning* 29.2-3 (1997): 131-163.

Gregoriades, A., & Mouskos, K. C. (2013). Black spots identification through a Bayesian Networks quantification of accident risk index. *Transportation Research part C: emerging technologies*, *28*, 28-43.

Grünwald, P. D. (2007). *The minimum description length principle*. MIT press.

Kohavi, R. (1995, August). A study of cross-validation and bootstrap for accuracy estimation and model selection. In *Ijcai* (Vol. 14, No. 2, pp. 1137-1145).

Koller, D and Friedman, N. 2009. *Probabilistic Graphical Models*. MIT Press

LaFrance A., (2015). 'Self-Driving cars could save 300,000 lives per decade in America' The Atlantic September 29, 2015 accessed 11 July 2017

Pearl, J. (2014). *Probabilistic reasoning in intelligent systems: networks of plausible inference*. Morgan Kaufmann.

Rosekind M.R., (2016). 'Remarks at California DMV Autonomous Vehicles Workshop' Retrieved from https://www.nhtsa.gov/speeches-presentations/remarks-california-dmv-autonomous-vehicles-workshop

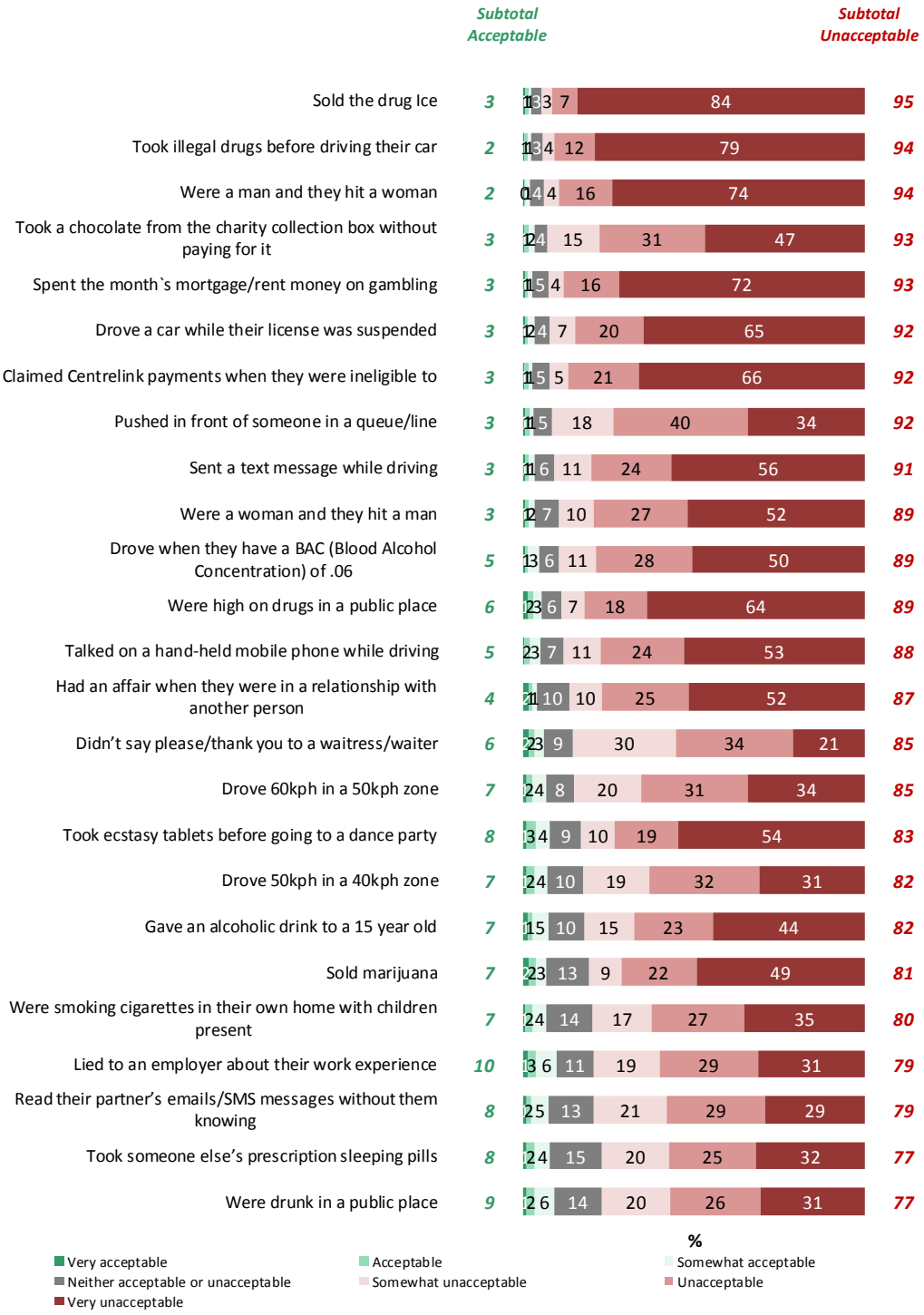
Transport Accident Commission (TAC), (2017). TAC Fatal Diary – Fatalities from 2012-2016. Retrieved from http://www.tac.vic.gov.au/road-safety/statistics/online-crash-database

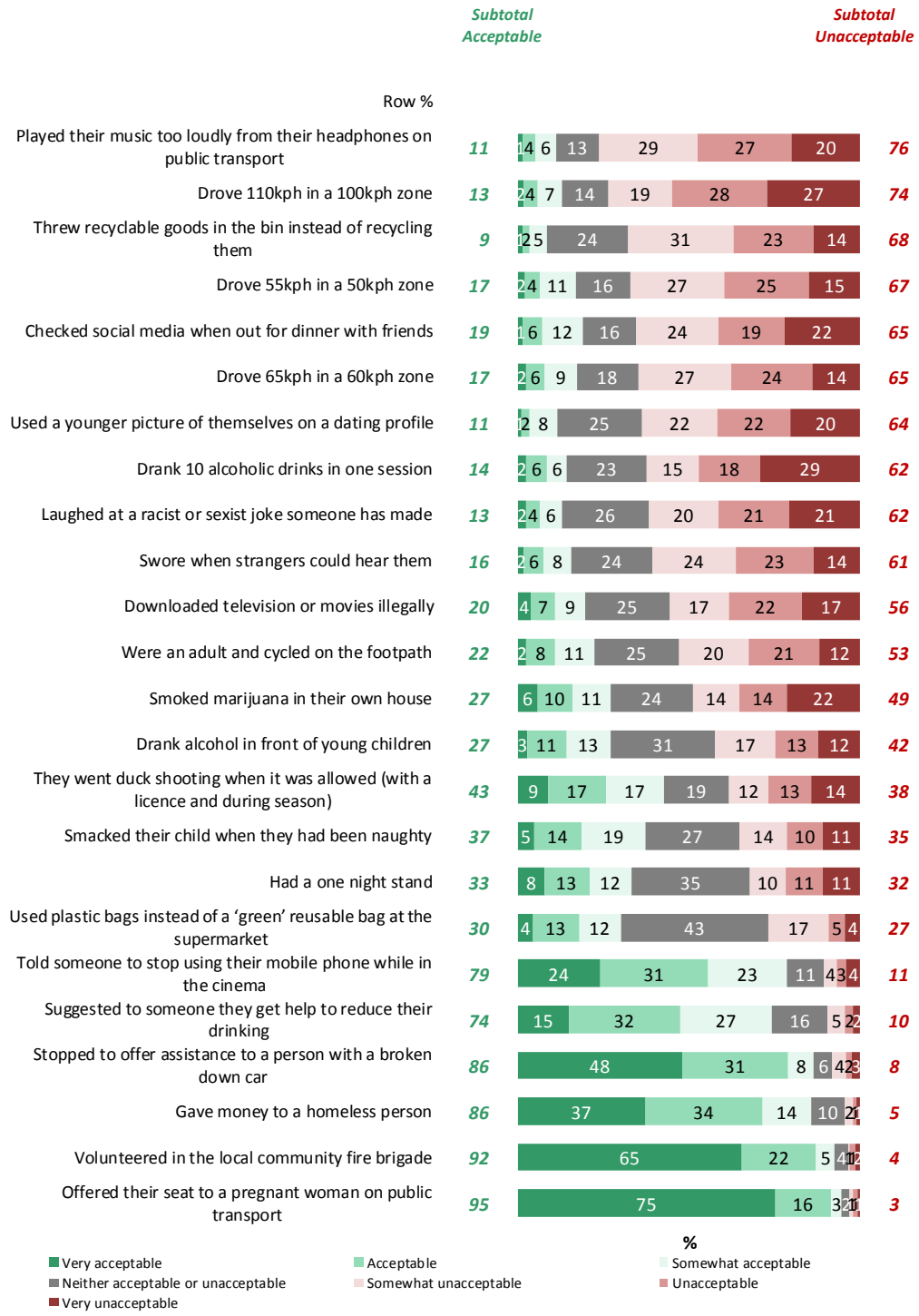
Zhang, K., & Taylor, M. A. (2006). Effective arterial road incident detection: a Bayesian network based algorithm. *Transportation Research Part C: Emerging Technologies*, *14*(6), 403-417.

Zou, M., & Conzen, S. D. (2004). A new dynamic Bayesian network (DBN) approach for identifying gene regulatory networks from time course microarray data. *Bioinformatics*, *21*(1), 71-79.

# APPENDIX 1

Attitudes towards behaviours – highest unacceptability to lowest unacceptability (%)




Subtotal Acceptable
Subtotal Unacceptable
Row %
Played their music too loudly from their headphones on public transport 11 1 4 6 13 29 27 20 76
Drove 110kph in a 100kph zone 13 2 4 7 14 19 28 27 74
Threw recyclable goods in the bin instead of recycling them 9 1 2 5 24 31 23 14 68
Drove 55kph in a 50kph zone 17 2 4 11 16 27 25 15 67
Checked social media when out for dinner with friends 19 1 6 12 16 24 19 22 65
Drove 65kph in a 60kph zone 17 2 6 9 18 27 24 14 65
Used a younger picture of themselves on a dating profile 11 1 2 8 25 22 22 20 64
Drank 10 alcoholic drinks in one session 14 2 6 6 23 15 18 29 62
Laughed at a racist or sexist joke someone has made 13 2 4 6 26 20 21 21 62
Swore when strangers could hear them 16 2 6 8 24 24 23 14 61
Downloaded television or movies illegally 20 4 7 9 25 17 22 17 56
Were an adult and cycled on the footpath 22 2 8 11 25 20 21 12 53
Smoked marijuana in their own house 27 6 10 11 24 14 14 22 49
Drank alcohol in front of young children 27 3 11 13 31 17 13 12 42
They went duck shooting when it was allowed (with a licence and during season) 43 9 17 17 19 12 13 14 38
Smacked their child when they had been naughty 37 5 14 19 27 14 10 11 35
Had a one night stand 33 8 13 12 35 10 11 11 32
Used plastic bags instead of a 'green' reusable bag at the supermarket 30 4 13 12 43 17 5 4 27
Told someone to stop using their mobile phone while in the cinema 79 24 31 23 11 4 3 4 11
Suggested to someone they get help to reduce their drinking 74 15 32 27 16 5 2 2 10
Stopped to offer assistance to a person with a broken down car 86 48 31 8 6 4 2 3 8
Gave money to a homeless person 86 37 34 14 10 2 1 5
Volunteered in the local community fire brigade 92 65 22 5 4 1 1 4
Offered their seat to a pregnant woman on public transport 95 75 16 3 2 1 3
%
Very acceptable
Acceptable
Somewhat acceptable
Neither acceptable or unacceptable
Somewhat unacceptable
Unacceptable
Very unacceptable

## APPENDIX 2

### Top 18 variables that have the highest mutual information with the target variable "I would be comfortable in a car that completely drives itself

| Node | Comment | Mutual information | Normalized Mutual Information (%) | Relative significance | Mean Value | G-test | Degrees of Freedom | p-value |
|---|---|---|---|---|---|---|---|---|
| Q15_4 | Q15.A self-driving car would be good for older drivers | 0.2683 | 17.34% | 1 | 3.4145 | 316.1073 | 9 | 0.00% |
| Q16_4 | Q16. Concerns about driving a self-driving car? - I would not feel safe in a car where I was not in control | 0.1622 | 10.50% | 0.6048 | 0.6489 | 191.1729 | 3 | 0.00% |
| Q15_2 | Q15.I would like a car that can take care of some aspects of the driving process but not all | 0.1578 | 10.19% | 0.5881 | 3.4844 | 185.9117 | 9 | 0.00% |
| Q48_6 | Q48. Drink driving worry? - Getting demerit points | 0.0765 | 4.95% | 0.2853 | 3.5883 | 90.1876 | 12 | 0.00% |
| Q20_3 | Q20.Interest Vehicle to vehicle communication | 0.0647 | 4.18% | 0.241 | 3.8206 | 76.1873 | 9 | 0.00% |
| Q20_1 | Q20.Interest Adaptive cruise control | 0.0555 | 3.59% | 0.2069 | 4.0721 | 65.4091 | 9 | 0.00% |
| Q29_A | Q29_A. Do you believe the idea of no deaths on Victorian roads is achievable? | 0.0503 | 3.25% | 0.1875 | 5.1136 | 59.2606 | 15 | 0.00% |
| Q15_1 | Q15.I would like a car that would park itself but not do other driving tasks | 0.0485 | 3.14% | 0.1807 | 3.4575 | 57.1145 | 9 | 0.00% |
| Q20_7 | Q20. Interest Autonomous Emergency Braking | 0.0428 | 2.77% | 0.1595 | 4.1757 | 50.4286 | 9 | 0.00% |
| Q48_7 | Q48. Drink driving worry? - Going to jail /prison | 0.0368 | 2.38% | 0.1371 | 3.6791 | 43.3496 | 12 | 0.00% |
| Q5_51 | Q5.Judge if Told someone to stop using their mobile phone while in the cinema | 0.0355 | 2.30% | 0.1323 | 5.3956 | 41.8354 | 6 | 0.00% |
| Q47_10 | Q47. Overspeed limit worry? - Other drivers behaviour and actions around me | 0.0354 | 2.29% | 0.132 | 3.5643 | 41.7336 | 12 | 0.00% |
| Q14_1 | Q14. The legal blood alcohol limit should be lowered from 0.05 to 0.02 for all full licence holders | 0.0352 | 2.29% | 0.1314 | 2.7663 | 41.5226 | 9 | 0.00% |
| Q5_46 | Q5.Judge if Used a younger picture of themselves on a dating profile | 0.0347 | 2.24% | 0.1293 | 2.9085 | 40.8764 | 6 | 0.00% |
| Q16_3 | Q16. Concerns about driving a self-driving car? - Having a collision | 0.0347 | 2.24% | 0.1292 | 0.5272 | 40.8519 | 3 | 0.00% |
| Q1 | Q1. Age | 0.0342 | 2.21% | 0.1273 | 43.7472 | 40.2499 | 6 | 0.00% |
| Q33A_3 | Q33A. Forms transport for your commute? - Tram | 0.0328 | 2.12% | 0.1222 | 6.1137 | 38.6343 | 6 | 0.00% |
| Q13_1 | Q13. Alcohol Interlock the government should make this technology compulsory for - `All drivers all vehicles` | 0.0324 | 2.10% | 0.1209 | 2.7809 | 38.2236 | 9 | 0.00% |

## APPENDIX 3

Augmented Naïve Bayes Probabilistic Graphical Model for target variable “I would be comfortable in a car that completely drives itself”