People's Perception and Expectation of Moral Settings in Autonomous Vehicles: An Australian Case

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Abstract

While Autonomous Vehicles (AVs) can handle the majority of driving situations with relative ease, it is indeed challenging to design a system whose safety performance will fit every situation. Technology errors, misaligned sensors, malicious actors and bad weather can all contribute to imminent collisions. If we assume that the wide-spread use and adoption of AVs is a necessary condition of the many societal benefits that these vehicles have promised to offer, then it is quite clear that any reasonable ethics policy should also consider the various user expectations with which they interact, and the larger societies in which they are implemented. In this paper we aim to evaluate Australian's perception and expectation on personal AVs relating to various ethical settings. We do this using a survey questionnaire, where the participants are shown 6 dilemma situations involving an AV, and are asked to decide which outcome is the most acceptable to them. We have designed the survey questions with consideration for previous research and have excluded any selection criteria which we believed were biased or redundant in nature. We enhanced our questionnaire by informing participants about the legal implications of each crash scenario. We also provided participants with a randomised choice which we named an Objective Decision System (ODS). If selected, the AV would consider all possible outcomes for a given crash scenario and choose one at random. The randomised decision is non-weighted, which means that all possible outcomes are treated equally. We will use the survey analysis, to list and prioritise Australian's preferences on personal AVs when dealing with an ethical dilemma, that can help manufacturers in programming and governments in developing AV policies. Finally, we make some recommendations for further researchers as we believe such questionnaires can help arouse people's curiosity in the various ways that an AV could be programmed to deal with a dilemma situation and would encourage AV adoption.

Keywords: autonomous vehicle, AI ethics, crash-algorithms, trolley problem, self-driving cars, ethical dilemma.

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1. Introduction

Autonomous vehicles (AVs) are capable of handling the vast majority of driving scenarios with relative ease; nonetheless, it is extremely challenging to design a system whose safety performance will fit every situation (Campbell, Egerstedt, How, & Murray, 2010). For example, recognition of humans and other objects on the road is both critical and more difficult for AVs than for human drivers (Dalal & Triggs, 2005; Farhadi, Endres, Hoiem, & Forsyth, 2009; The Economist, 2012). A person on the road may be small or large, standing, walking, sitting, lying down, riding a bicycle, or partially obscured, which complicates AV sensor detection. Poor weather conditions, such as fog and snow, and reflecting road surfaces resulting from rain and ice present additional obstacles for sensors and driving operations (Fagnant & Kockelman, 2015).

Accordingly, in future AVs, crash-avoidance features alone will not be enough. In the realm of physics, it may not be possible to avoid an accident, especially as AVs make their way onto city streets and avenues, a more dynamic environment than highways. Technology errors, misaligned sensors, malicious actors, bad weather, and bad luck can also contribute to imminent collisions (Fraichard, 2014; Gomez, Szybalski, Thrun, Nemec, & Urmson, 2014; Hern, 2014).

Considering the risks associated with a fully autonomous vehicle, it should not come as a surprise that it requires a set of principles to govern its utility. Additionally, for individuals to have trust in their applications, we would require the vehicle's design to align with ethical and inclusive values. This has sparked a global response as nations attempt to address the emerging ethical issues surrounding AI enabled technologies. Germany for example, has delved into the ethics of automated vehicles, rolling out the most comprehensive government-led ethical guidance available on their development (Luetge, 2017). New York has put in place an automated decisions task force, to review key systems used by government agencies for accountability and fairness (New York City Town Hall, 2018). The UK has a number of government advisory bodies, notably the Centre for Data Ethics and Innovation. The European Union has explicitly highlighted ethical AI development as a source of competitive advantage (Cath, Wachter, Mittelstadt, Taddeo, & Floridi, 2018).

The major challenge however, is not just the question of ethical dilemmas. If we assume that the wide-spread use and adoption of AVs is a necessary condition of the many societal benefits these vehicles are purported to provide (Bonnefon, Shariff, & Rahwan, 2016), then it is quite clear that any reasonable ethics policy should also consider the various expectation of users with which they interact, and the larger societies in which they are implemented. Expectations can themselves have morally significant impacts, such that it can be ethically right (on the basis of standard principles like consent, reciprocity, fairness, etc.) to conform to certain types of reasonable expectations (Breakey, 2022). This constraint equates to ensuring user satisfaction and safety, as well as other critical design values such as trust, accountability, and transparency (IEEE, 2016). Furthermore, ethical theories and people's expectations often overlap, even if they will always be at least somewhat in tension. Therefore, it appears that an ideal ethics policy must, to some extent, resolve the inherent tension between these two factions by striking a balance between public acceptability and moral requirement. In other words, it must be just acceptable enough to gain trust and adoption from human users while remaining moral enough to avoid echoing the most despicable of human tendencies (Shahriari & Shahriari, 2017).

Whatever answer to an ethical dilemma that industry might lean towards, it will not be satisfying to everyone. Ethics and expectations are challenges common to all automotive manufacturers and tier-one suppliers who want to play in this emerging field, not just particular companies. That is the role of ethics in innovation policy: it can pave the way for a better future, while enabling beneficial technologies (Maurer, Gerdes, Lenz, & Winner, 2016).

Some scholars have utilised polling and surveys to learn what people think, about some of these moral issues (Awad et al., 2018; Bonnefon et al., 2016). It is worthwhile to note that such experiments show people's preferences in ethical decisions and not necessarily how AVs should be programmed. Furthermore, poll results are simply one component of the decision-making puzzle, and they may have a minor impact on public policies (Brettschneider, 1985). In other words, they can be used to assist in the development of moral algorithms, but they cannot be used to mandate their implementation. That should be left up to the experts (Bonnefon, Shariff, & Rahwan, 2015). This is due to the fact that laypeople can only base their opinions on information they have gained through personal knowledge and rationally based perception. Of course, what constitutes personal knowledge can be quite broad as laypeople can voice their opinion to an array of various matters. Experts on the other hand, have the training, skills, experience and specialized knowledge about the subject matter to draw conclusions. For these reasons, experts are also subjected to stricter scrutiny. Nonetheless consensus is required and the important ethical decisions cannot be left solely to either the engineers or the ethicists, since algorithms that go against the moral expectations of citizens (or against the preferences or consumers) are likely to impair the smooth adoption of AVs. Whatever solution they come up with in programming moral dilemmas in AVs, should not discourage potential AV buyers or the public at large.

This paper aims to evaluate Australian's perception and expectation on personal AVs relating to various ethical settings. The second section contains the definitions and considerations which will be used throughout the paper. The third section, presents a critique of 'The Moral Machine' experiment conducted in 2018, which was an attempt to establish a global representation of people's moral preference in various dilemma situations involving an AV. We evaluate the paper and discuss why some of the dilemma scenarios and the choices provided to participants should be excluded from similar future studies. This includes the choice between saving a human life versus an animal life, and the choice to save humans based on such preferences as age, sex, social status or fitness level, which we believe are discriminatory in nature. We explain why randomisation was included as an option in designing the survey questionnaire in section four. In section five, we provide an overview of the research design, including the research questions that we have included in our study, with consideration for the points raised in section three and four. The data analysis and findings are presented in section six, followed by the discussion in section seven. In section eight, we offer a conclusion based on our findings in what appears to be a publicly acceptable and morally sound ethical paradigm for programming AVs, including some recommendation for future studies.

2. Definitions and Considerations

There are a wide range of AVs, which supplement or replace human drivers with artificial intelligence. Meaning that a human driver either has limited responsibility or does not need to be present at all. The definition of 'autonomous car' used in this paper follows philosopher Patrick Lin, where the term *"refer(s) primarily to future vehicles that may have the ability to operate without human intervention for extended periods of time and to perform a broad range of actions"* (Lin, 2016). The terms 'autonomous cars' and 'self-driving cars' are used interchangeably. As of 2018, the Society of Automotive Engineers (SAE) defines 6 levels of automation that apply to automotive vehicles. Levels range from 0 to 5, with vehicles at level 0 possessing no automation that control the vehicle (just issuing warnings to the human driver), and level 5 representing vehicles that would possess full automation. Levels 0–3 require that human drivers take control of various vehicle operations under certain conditions, and levels 4 and 5 have no such requirements (Shadrin & Ivanova, 2019). In this paper, AVs refers to autonomous vehicles at stage 4 or 5 of driving automation, as defined by the SAE. These are vehicles where no driver is ever needed, or they might be an option for human override but not a requirement. While technological advances are occurring at a fast pace, the current versions of autonomous cars possess limited capacities of autonomy. Tesla and

GM, for instance, both produce autonomous cars capable of limited self-parking and highway driving. These are vehicles with Advanced Driver Assistance Systems (ADAS) which control both steering and acceleration/deceleration. The automation falls short of self-driving as a human input is still required in case of an emergency, hence making them level 2.

3. Research Question Design

Manufacturers and regulators will need to consider certain objectives in designing and programming ethics settings for their AVs, which are technically viable (having the technology to implement the decision making algorithm) and would make them ethically acceptable and fair. There were 6 dilemma situations shown in our survey questionnaire involving an AV, and the participants were asked to decide which outcome was the most acceptable to them. The purpose of the survey questionnaire was to evaluate respondent's perception and expectation on personal AVs relating to various ethical settings (Appendix A).

We had designed the survey questionnaire in such a way, as to encourage participants to make an evaluation with consideration for the following factors that were embedded in each crash scenario,

- Trade-off between equal number of lives lost with consideration for any legal implications.
- Trade-off between unequal number of lives lost, with consideration for any legal implications.
- Trade-off between serious injury and death, with consideration for any legal implications.

We also proposed and included a theoretical solution, called the Objective Decision System (ODS). If selected by a participant, the AV would consider all possible outcomes for a given crash scenario and choose one at random. The randomised decision is non-weighted, which means that all possible outcomes are treated equally. In the questionnaire, we asked participants 5 demographic questions including; gender, age, education level, their perceived consumer adopter category and whether they currently own a Level 2 AV.

Adopter categories divide consumers into segments based on their willingness to try out a new innovation or product. The key to adoption is that the person must perceive the idea, behavior, or product as new or innovative. There are five established adopter categories:

1. Innovators: Innovators are risk takers and they seek changes. They are the first one to buy a new product. They try the product in its initial introduction phase.

2. Early adopters: This group is not unlike innovators in how quickly they take on new technologies and ideas but are more concerned about their reputation as being ahead of the curve.

3. Early majority: If an idea or other innovation enters this group, it tends to be widely adopted before long. This group makes decisions based on utility and practical benefits over coolness.

4. Late majority: The late majority shares some traits with the early majority but is more cautious before committing, needing more hand-holding as they adopt.

5. Laggards: This group is slow to adapt to new ideas or technology. They tend to adopt only when they are forced to or because everyone else has already.

While the majority of the general population tends to fall in the middle categories, it is still necessary to understand the characteristics of the target population.

Using the survey responses and the demographic variables, we then compared people's preferences towards a pre-determined outcome based on the different crash scenarios.

3.1 Exclusion Criteria

The Moral Machine Experiment (MM), surveyed people across hundreds of countries to gauge moral preferences in AVs and what priorities they should have in the event of an unavoidable accident. The researchers used an online survey to get over 39 million responses to hypothetical ethical dilemmas for AVs (Awad et al., 2018).

The strongest preferences were for sparing human lives over animal lives, sparing more lives, and sparing young lives. There was a general indication by the results, that there was more preference for sparing children's lives, rather than those of adults. Notably people from different parts of the world had dissimilar beliefs on how AVs should make such life and death decisions. The analysis identified three distinct 'moral clusters' of countries. The first cluster (Western) contained North America as well as many European countries of Protestant, Catholic, and Orthodox Christian cultural groups. The second cluster (Eastern) contained many of the far eastern countries such as Japan and Taiwan that belong to the Confucianist cultural group, and Islamic countries such as Indonesia, Pakistan and Saudi Arabia. The third cluster (Southern) mainly consisted of the Latin American countries of Central and South America. In Eastern cultures, young lives and fit people were not given the same preference for protection as in Western cultures, while pedestrians were given extra weight. Southern cultures expressed a stronger preference for protecting women.

3.1.1 Human Life vs Animal Life Decisions. One of the many crash scenarios in the MM experiment involving an AV, was a situation where the participants had to choose between saving a human life or an animal. Generally, when an animal appears directly in front of a vehicle and there is not enough time to brake (road conditions also plays a part) or to swerve around it, then the safest way would be to continue ahead and strike the animal (Curtis & Hedlund, 2005). Experts believe that deer cause more than a million car accidents in the United States each year, despite the fact that data is unreliable and under-reported (Hedlund, Curtis, Curtis, & Williams, 2004). Currently drivers are not legally liable if they hit a wild animal. Wild animals would include deer, elk, and other smaller animals. We can therefore assume that the same would apply to AVs.

Additionally, the German Ethical Rule number 7 unambiguously states that in dilemma situations, the protection of human life should enjoy top priority over the protection of other animal life. This rule is also in clear agreement with social expectations assessed through the MM experiment (Luetge, 2017). Consequently, we have excluded similar scenarios from our study as it seems apparent that in case of an imminent crash where an AV has to make a decision between saving an animal life or a human life, the human life should take precedence.

3.1.2 Discriminatory and Immoral Decisions. One of the other crash scenarios in the MM experiment, was a situation where the AV heading for an imminent crash and the participants had to make a choice between saving an elderly or a young person. Even though the author of the MM experiment cited that *"opinion should only serve as a guide in deciding the type of ethics the machines should use during life and death scenarios"*, we have excluded such comparisons from our study for the following reasons;

Firstly, there is no ethical rule that always places safety before freedom, as stated in the German Ethics Commission (Luetge, 2017). Rule 9 of the German Federal Ministry of Transport and Digital Infrastructure's Ethics Commission's 2017 report states, *"In the event of unavoidable accident situations, any distinction based on personal features (age, gender, physical or mental constitution) is strictly prohibited. It is also prohibited to offset victims against one another. General programming to reduce the number of personal injuries may be justifiable. Those parties involved in the generation of mobility risks must not sacrifice non-involved parties"* (Luetge, 2017). In contrast, while the United States has passed various laws related to autonomous cars, there are currently no laws that pertain to discrimination.

For instance, it would be wrong to violate an older person's rights if they were involved in a dilemma situation in which the AV was instructed to drive over them instead of a young person because they were older. They would be aware that their life is seen as less valuable than any younger member of society. Therefore, an individual's value of life should not vary with their characteristics and differentiating factors like sex, age, fitness levels and social status. Thus the premise of the MM experiment is questionable, as it assumes that it is morally relevant and acceptable to select an ethical outcome based on gender, weight or social status (Etienne, 2020).

Secondly, providing relevant reasons to justify discrimination is a crucial point for analysing trolley-problem-like AV crash scenarios. Philosopher James Rachels (2012) has aptly distinguished between non-arbitrary and arbitrary discrimination (Rachels & Rachels, 2012). Non-arbitrary discrimination is made on account of a morally relevant reason, which makes it legitimate. The hiring criteria for an air traffic control employee that discriminates against blind applicants is an example of non-arbitrary discrimination used by Rachels (2012). The safety of the passengers on airlines depends on the visual acuity and attention of air traffic control employees. It would be impossible for a blind air-traffic control employee to perform her duties. Such non-arbitrary discrimination is therefore morally justified. Conversely, arbitrary discrimination is not made on account of a morally relevant reason for its support, and it is therefore illegitimate. To return to Rachels' original example, arbitrary discrimination would be committed if the air traffic control hiring criteria excluded persons who are older than 40, or black, or Jewish, or women. Being older than 40, black, Jewish, or a woman has nothing to do with being qualified for the job. Discrimination based on these reasons is arbitrary and therefore unjust. In accordance with the above argument, Lin (2013) concludes that, *"Discriminating on the basis of age in our crash scenario would seem to be the same evil as discriminating on the basis of race, religion, gender, disability, national origin, and so on, even if we can invent reasons to prefer one such group over another"* (Lin, 2013).

Additionally, liberal democracies strive to treat and assure that people are treated equally, to promote equality before the law, and to establish this feeling of equality as a cultural/social standard. While ordinary citizens can respond to many differences between people, the law supports key conceptions of justice by insisting that in high-stakes activities (getting a job, getting fired, etc.), some types of distinctions (race, gender, age, etc.) are deemed irrelevant. Rather than being a general moral norm, insisting on nondiscrimination based on age could be defended as a suitable political norm for liberal democracies. Richard

Arneson expresses this view as follows; *"All humans have an equal basic moral status. They possess the same fundamental rights, and the comparable interests of each person should count the same in calculations that determine social policy. Neither supposed racial differences, nor skin color, sex, sexual orientation, ethnicity, intelligence, nor any other differences among humans negate their fundamental equal worth and dignity"* (Arneson, 1999).

Finally, similar discriminatory considerations like age, assume that AVs would be able to identify and accurately determine the likely victim's age, in a fraction of second that it would take before an unavoidable crash. Sensors will allow an AV to collect information about its environment, and are classifiable according to their physical measuring principle. The automobile sector mainly uses radar (radio detection and ranging), lidar (light detection and ranging), near and far infrared, ultrasound sensors, and cameras. Machine perception and interpretation of complex traffic situations continues to present development engineers with considerable technical challenges. These include detecting static and dynamic objects, physically measuring them as accurately as possible, and allocating the correct semantic meaning to the detected objects. Light and weather conditions such as sun, backlight, wet road surface, spray/splashing water, icing/contamination of windshield/sensors, road markings only partially visible, add another layer of complexity to the equation (Winkle, 2016).

Therefore, we have excluded similar discriminatory scenarios from our study. This is especially relevant because any judgement based on such variable as age may not be as clear amongst persons, especially if the AV has to consider other criteria like their health condition, quality of life, and life expectancy.

3.2 Inclusion Criteria

3.2.1 Legal Implications. The MM experiment which was explicitly presented as an applied trolley problem deriving from Thompsons's case, also only focused on the question of moral responsibility and ignored the legal issues which would have significantly impacted the participant's decisions and constrains rights to action (Etienne, 2020). Moral theories which are used to judge the permissibility of an activity, may not explain why some death causing actions are permissible and others are not. Furthermore, as has been observed in other experiments (Francis et al., 2017), real conditions may alter participant's decisions. People frequently alter their minds about moral decisions, which are highly and adversely connected with the amount of information and careful thought involved. The same people may argue that if they had more information, they would have changed their answer (Noothigattu et al., 2018). As a result, we presented the legal ramifications of each of the 6 situations for participants to consider.

4. Why Randomisation (ODS)

In this section we will discuss why we have included randomisation as a possible solution in our survey questionnaire and how this method of programming AVs would be advantageous in dealing with moral dilemmas where a serious injury or loss of human life is imminent and there appears to be no other way of discovering the correct course of action.

Lotteries are used broadly for social decision making. Examples include selecting jurors, settling sporting matters, tax inspection of a citizen, and administration of vaccines and other drugs (Duxbury, 1999). Within political philosophy, there are several models, studies, and recommendations for using lottery as a decision-making method. Scholars in a variety of disciplines agree that lotteries should play an expanded role in future political and social decision making (Stone, 2009).

Randomization will sometimes be the best method by which to assign scarce indivisible resources, a good method by which to select a cross-section of a particular community, and a highly effective regulatory strategy. Lotteries take many forms. They may be constructed or natural. They may be simple or complex. They may accord even chances or they may be (deliberately or naturally) biased. They may operate in isolation or in combination with other modes of decision-making. Certain lotteries we choose to enter; others are imposed upon us [1].

Some may reason that human lives are too valuable to be left to chance; however, where no decision making parameter exists and the alternative of not making a decision has been rejected, randomness is seen as the best solution to solve undecidable conflicts (Rescher, 1960). First, every reasonable agent would agree that his own interests can be served by a random decision making mechanism that is aware of the concept of equality. Secondly, the randomness of a lottery also assures that a decision between legally equal goals is not made by an agent based on principles that are either morally unacceptable (racist, sexist, etc.) or illegal (Dworkin et al., 2011). Thirdly, the fact that the car makes a random decision and automatically acts on it removes any risk of manipulation, both in the choice and implementation of the solution. Therefore, the victim will know that all outcomes are considered equally, and his faith is resting in the hand of an objective force (Coca-Vila, 2018). Duxbury (1999) also argues that a decision made by lot, offers a fair way of dealing with many uncomfortable, or even inherently unfair, dilemmas. A non-weighted lottery will be unbiased, and so above corruption (Duxbury, 1999).

Finally, the decisions reached by lot lack an element of human agency, which implies that the responsibility for making troublesome decisions can be removed from the shoulders of particular people or groups, resulting in a fair outcome for all parties involved and eliminating any apparent discrimination against them (Duxbury, 1999).

[1] The issue of how to set up an ODS and whether a weighted or non-weighted lottery is better, are beyond the scope of this paper. However, similar to Duxbury (1999), Coca-Vila (2016) has also argued for a non-weighted lottery. For example, in conflicts where human lives are at stake and it is possible to save the lives of two pedestrians to the detriment of one motorcyclist, he does not believe that we are axiologically obliged to resort to a weighted lottery system that gives a 2/3 probability of escaping unharmed from a dangerous situation to two pedestrians together (Coca Vila et al., 2016).

5. Data Collection Method

In this research a descriptive survey design was used. A survey is used to collect original data for describing a population too large to observe directly (A, 1996). A survey obtains information from a sample of people by means of self-report, that is, the people respond to a series of questions posed by the investigator (Polit, Hungler, et al., 1993). A descriptive survey was selected because it provides an accurate portrayal or account of the characteristics, for example behaviour, opinions, abilities, beliefs and knowledge of a particular individual, situation or group. This design was chosen to meet the objectives of the study, namely to assess respondent's perception and expectation on personal AVs relating to various ethical settings (Dulock, 1993).

5.1 Participation Pool and Site Selection

Target participants were the general population over the age of 18, from Australia. This location was chosen based on its location and convenience. Furthermore, Australia has the world's eighth largest immigrant population, with immigrants accounting for thirty percent of the total population. A proportion greater than any other nation with a population of over 10 million (Australian Bureau of Statistics, 2021a). Therefore, we can assume that the participation pool includes individuals who were born outside of Australia. This provided the variety needed for our sample to be representative of the Australian population with consideration for those who may have a different ethical preference and moral values.

Australian population was 25 million as of 31 December 2020 (Australian Bureau of Statistics, 2021b). Our aim was to collect at least 500 surveys from the general population over the age of 18, that would be representative of the Australian population, with a weighted sample collected from each age category (Figure C1).

SurveyMonkey was used to collect survey responses from the target population that met our eligibility criteria from each of the age categories. These people are representative of a diverse online population that voluntarily joined the program to take surveys. The survey responses were stored online on SurveyMoneky servers. The data was then analysed using the SPSS statistical software platform.

5.2 Ethical Consideration

The conducting of research requires not only expertise and diligence, but also honesty and integrity. This is done to recognise and protect the rights and human subjects. To render the study ethical, the rights to self-determination, anonymity, confidentiality and informed consent were observed. Participant's consent was obtained before they completed the survey questionnaire. Burns and Grove (2001), define informed consent as to prospective subject's agreement to participate voluntarily in a study, which is reached after assimilation of essential information about the study. The participants were informed of their rights to voluntarily consent or decline to participate and to withdraw at any time without penalty (Byrne, 2001).

The ethical aspects of this study has been approved by the Griffith University Human Research Ethics Committee, in accordance with the National Statement on Ethical Conduct in Human Research.

6. Data Analysis and Findings

The statistical methods used to investigate the research questions was the chi-square analysis of variance, with a confidence level set at ninety-five percent. To perform this analysis, we used the cross tabulation feature in SPSS under Descriptive Statistics. This also created a contingency table showing both frequencies and column percentages. The complete statistical analysis, including charts are shown in the supplementary information at the end of the paper (Appendix B).

Multiple analyses on the same dependent variable raise the risk of making a Type I error, which increases the chance of a significant finding by chance. A Bonferroni correction was used to adjust for or guard against Type I errors. This kind of error is the mistaken rejection of a null hypothesis as a result of a test procedure, otherwise known as a false positive or error of the first kind (Dekking, Kraaikamp, Lopuhaä, & Meester, 2005).

6.1 Survey Responses

516 surveys were completed and submitted online via SurveyMonkey between August and October 2021. (Figure C2) displays the sample population and percentage of the total number of participants for the current study according to their demographic information including, gender, age, education level, their perceived consumer adopter category and whether they currently own a Level 2 AV.

In this chapter the results of the data analysis are presented. The data was collected and then processed in response to the variables outlined in the previous section. We will discuss the data analysis and findings from the 11 questionnaires completed by Australian respondents. The purpose of this study was to evaluate people's perception and expectation on personal AVs relating to various ethical settings. We have divided the survey analysis and results in to three sections;

First, we will compare the popularity of the ODS among participants in each of the crash scenarios to other alternative options, such as risking the lives of other passengers, bystanders, or other road users. Following that, we analyse the participant's other preferences by removing the ODS from the equation. We will then examine whether there were any statistically significant variations between respondent's responses to a specific crash scenario and their underlying demographic factors. Finally, we will examine the survey results, highlight methods to improve the questionnaire for future research, and make some suggestions for AV makers and regulators in establishing and programming ethics settings in their AVs.

6.2 Overall Preferences

Overall, the ODS was the most popular among participants (Figure C3). It was chosen as the preferred outcome by participants in 5 or 83% of the dilemma situations provided.

The sole collision scenario in which the ODS did not obtain the most votes was question 3, where the majority chose for the AV to swerve to the left, striking and seriously wounding the biker wearing a helmet. As a result, we can deduce that the participants preferred for the AV to cause serious injury, when the only other alternative was to sacrifice a human life. We feel that this was a deciding factor in why a participant would not choose the ODS.

6.3 Other Preferences

Participant's other preferences are listed below when ODS was removed from the analysis. The complete statistical analysis, including charts for Participant's other preferences are shown in the supplementary information at the end of the paper (Appendix B).

Q1) Passenger vs Bystander (1 to 1 ratio). In question 1 (n=233), 66.5% of the participants thought that it would be more acceptable for the AV to drive off the cliff killing the passenger as opposed to hitting the innocent bystander who was not responsible for the dilemma situation (p=<.001).

Q2) Pedestrian vs Road user (>1 to 1 ratio). In question 2 (n=237), 58.2% of the participants thought that it would be acceptable for the AV to drive through the intersection resulting in the AV killing one or more of the people crossing the road illegally, as opposed to hitting and killing the one cyclist (p=.011).

Q3) Serious injury vs Death (1 to 1 ratio). In question 3 (n=324), 67% of the participants thought that it would be more acceptable for the AV to hit and severely injure the motorcyclist wearing a helmet as opposed to risking the lives of the AV passengers or the motorcyclist without a helmet, even though not wearing a helmet is deemed illegal (p=<.001).

Q4) Pedestrian vs Road user (1 to 1 ratio). In question 4 (n=274), 83.2% of the participants thought that it would be more acceptable for the AV to slam the brakes to save the pedestrian illegally crossing the road as opposed to hitting the pedestrian to save the life of the motorcyclist who was following too closely, even though both the pedestrian and the motorcyclist were equally at fault (p=<.001).

Q5) Pedestrians vs Passengers (>1 to >1 ratio). In question 4 (n=228), there was no significant difference between those participants that thought it would be more acceptable for the AV to go through the intersection, hitting and killing one or more of the pedestrians who were crossing legally as opposed to the AV swerving right to hit a wall, killing all 5 passengers on board thereby saving the 5 pedestrians (p=.185).

Q6) Pedestrian vs Passengers (1 to >1 ratio). In question 6 (n=219), there was no significant difference between those participants that thought it would be more acceptable for the AV to drive through the intersection, hitting and killing the pedestrian who was legally crossing to save all passengers, as opposed to swerving right towards a tree, which would kill all passengers on board (p=.735).

6.4 Interesting Observations

6.4.1 Question 1. There was a significant difference between education level and their preference to let the ODS system decide in question 1. People with high school education were more likely to choose ODS and people with a postgraduate degree were the least likely to select ODS as an outcome (62.4% to 40%).

There was a significant difference between customer adopter category and their preference to sacrifice the AV passenger instead of killing the bystander in question 1. Early majority were more likely to sacrifice the AV passenger instead of killing the bystander in question 1 and laggards were the least likely to sacrifice the AV passenger instead of killing the bystander in question 1 (38.9% to 14.6%).

There was a significant difference between a participant owning a level 2 AV and their preference to both sacrifice the bystander to save the passenger and to let the ODS system decide in question 1. People who own a level 2 AV were more likely to sacrifice the bystander to save the passenger and less likely to let the ODS system decide in question 1 (26.2% to

12.3% and 44.7% to 57.4% respectively).

6.4.2 Question 2. There was a significant difference between gender and their preference to let the ODS system decide in question 2. Females were more likely to choose the ODS system (59% to 49%).

There was also a significant difference between age categories and their preference to hit and kill the cyclist in question 2. People aged 25-34 and 35-44 were more likely to choose hitting the cyclist and people aged 55-64 and +65 were the least likely to hit the cyclist (27.9% and 30.9% to 5.2% and 8.5%).

There was a significant difference between education level and their preference to let the ODS system decide in question 2. People with high school education were more likely to choose ODS and people with a postgraduate degree were least likely to select ODS as an outcome (61.2% to 36.3%).

There was a significant difference between a participant owning a level 2 AV and their preference to save the pedestrians by hitting the cyclist in question 2. People who own a level 2 AV were more likely to save the pedestrians by hitting the cyclist (31.1% to 16.2%).

6.4.3 Question 3. There was a significant difference between age categories and their preference to let the ODS system decide in question 3. People aged 65+ were more likely to choose ODS and people aged 18-24 and 25-34 were the least likely to select ODS as an outcome (51.9% to 30.8% for 25-34 and 51.9% to 22.4% for 18-24 category).

There was a significant difference between a participant owning a level 2 AV and their preference to hit and severely injuring the motorcyclist with a helmet in question 3. People who own a level 2 AV were less likely to hit and severely injure the motorcyclist with a helmet (33% to 44.3%). Furthermore, participants who own a level 2 AV were more likely to both hit and kill the motorcyclist without a helmet and for the AV to continue on its path hitting the pallet which will result in the death of the passenger, than those who don't own a level 2 AV (19.4% to 11.9% and 14.6% to 5.6% respectively).

6.4.4 Question 4. Question 4 was the only question where the majority of the participants chose ODS and there was no significant difference between the participants based on their underlying demographic questions.

6.4.5 Question 5. There was a significant difference between age categories and their preference for the AV to swerve right hitting the wall, killing all 5 passengers but saving the 5 pedestrians crossing the road legally in question 5. People aged 25-34 were more likely to choose hitting the wall, killing all 5 passengers to save the 5 pedestrians crossing the road legally and those aged 65+ were the least likely to choose hitting the wall, killing all 5 passengers to save the 5 pedestrians crossing the road legally (27.9% to 10.4%). There was a significant difference between education level and their preference to let the ODS system decide in question 5. People with high school education were more likely to choose ODS and people with a postgraduate degree were least likely to select ODS as an outcome (62.9% to 43.8%). There was a significant difference between education level and their preference for the AV to swerve right hitting the wall, killing all 5 passengers but saving the 5 pedestrians crossing the road legally in question 5. People with an undergraduate degree were more likely to choose hitting the wall, killing all 5 passengers to save the 5 pedestrian crossing the road legally and people with a high school education were the least likely to swerve right hitting the wall, killing all 5 passengers but saving the 5 pedestrian crossing the road legally (28.9% to 15.2%).

6.4.6 Question 6. There was a significant difference between gender and their preference to let the ODS system decide in question 6. Females were more likely to choose the ODS system (63.6% to 51.4%). There was a significant difference between gender and their preference to hit and kill the pedestrian to save the 3 passengers in question 6. Males were more likely to hit and kill the pedestrian to save the 3 passengers in question (25.5% to 18%).

7. Discussion

Overall the ODS was the preferred outcome between all participants in question 1, however this preference was the least strong between those participants with a postgraduate degree. There has been studies that show correlation between critical thinking abilities and academic achievements (Taghva, Rezaei, Ghaderi, & Taghva, 2014). We could therefore make an assumption that some of the participants with a postgraduate degree took into account multiple variables, such as the legal implications, the innocence of the bystander and possibly the fact that unless the AV was not instructed to take a particular course of action, there would be a 50/50 chance of an innocent life being taken and hence thought that it would be more acceptable for the AV to continue on its path and fall off the cliff. Furthermore, there have been other work suggesting that university study does move people through the Kohlberg's moral development stages (Mcleod, 2013). Therefore, it is possible that they are more comfortable with reasoning about such topics, and more confident in their own views, so not leave it up to chance.

In question 2, only participants with a doctoral degree chose to save the five individuals crossing the street after ODS, despite the fact that they were doing so illegally. This indicates that this group favours utilitarianism (maximise utility, i.e. number of lives saved) over a deontological approach (doing the right thing regardless of the outcome).

Utilitarianism asserts that actions are right if they deliver good or optimal outcomes, and wrong if they create bad or suboptimal outcomes. The two main utilitarian theories are act and rule utilitarianism (Pojman, 1990). Act utilitarianism is the belief that an action is morally right when it produces the greatest overall sum-total happiness for people (and other sentient animals), while the rule utilitarianism holds that the moral correctness of an action depends on whether it conforms with a rule, where the rules are designed to deliver the greatest overall sum-total of happiness of people (and other sentient animals) (Feldman, 1978). Thus, both act and rule utilitarianism are similar in that they aim to maximise utility, but they differ in that the former is more concerned with the immediate consequences of an action, whereas the latter is focused on the long-term consequences of following a particular rule of conduct (Harsanyi, 1977).

Deontology on the other hand is informed by the judgement of an action's morality, considering how the said action adhere to a set of rules. This theory focuses on universal statements of right and wrong. In other words, the theory argues that a person has a duty to do what is right without having to consider the consequences of his/her action (Ho, 2007).

It appears those participants that already possess a level 2 AV are more likely to want to be saved as a passenger of an AV at level 4 and 5 of automation (Shadrin & Ivanova, 2019), compared to those who currently don't. They also are less likely to opt for an AV that is programmed to make a call based on the ODS, at least when there is an equal number of lives at stake, even if it means sacrificing an innocent life. This has also been echoed in other studies where the participants were generally more comfortable with Utilitarian AVs, programmed to minimise an accident's death toll as long as they were more people being saved and not just one. Also participants in that study generally supported others buying AVs programmed for utilitarian self-sacrifice, however they were less willing to buy such AVs themselves, even when the sacrifice would save ten pedestrians (Bonnefon et al., 2015). It is worth mentioning that the preference to sacrifice the bystander to save the passengers was still the least favourite between both groups, regardless of them owning a level 2 AV or not.

In question 3 most participants agreed that it would be best for the AV to swerve and hit the motorcyclist with the helmet, if it meant no life was lost. There were however some variances between different age categories. People aged +65 were more likely to choose ODS over other preferences and people aged 25-34 were the least likely to choose ODS as an outcome. This may be due to the fact the elderly also considered someone being injured as a significant event and assumed that an objective system deciding the faith of the involved parties would be the fairest way. With age we gain life experience and knowledge that guides our decision making (Taylor, 1975).

Age frequently has been said to contribute heavily to both the manner in which a decision is reached (Kirchner, 1958; Surwillo, 1964) and decision quality (Weir, 1964). It would appear from these studies that older decision makers are far more susceptible to the dysfunctional effects of information overload.

8. Conclusion

In our study the participants were given 6 dilemma scenarios involving an AV, and they were asked to decide which outcome was the most acceptable to them. The purpose of the survey questionnaire was to evaluate Australian's preferences towards personal AVs when dealing with an ethical dilemma. Despite the fact that ODS was the most popular option among participants, it was discovered that there was no clear consensus among the various demographic categories. As demonstrated by previous research (Awad et al., 2018), people hold divergent views on how AVs should make such life-and-death decisions; consequently, we can assume that this divergence of opinion will grow as more demographic variables and participants from other regions are included. Therefore, building crash algorithms that are acceptable in all parts of the world appears challenging at best.

However, we can use this study to list and prioritise Australian's preferences on personal AVs when dealing with an ethical dilemma which we believe would encourage AV adoption. Manufacturers and policymakers can then consider these preferences while developing, programming, and establishing policies to promote AV adoption, as it is a prerequisite for the numerous social advantages that these cars are expected to deliver (Bonnefon et al., 2016). These preferences are as follows:

- Preference for injury over sacrificing a human life where possible. The only crash scenario which did not receive the highest vote for the ODS, was question 3 where the majority of the participants opted for the AV to swerve to the left, hitting and severely injuring the motorcyclist with a helmet. Therefore, we can assume that the participants believed that it would be more acceptable for the AV to seriously injure someone, when the only other alternative was to sacrifice a human life. We feel that this was the only reason as why a participant would not choose the ODS.

- Overall, the Objective Decision System (ODS) received the most votes from participants (Table 2). It was chosen as the preferred outcome by participants in 5 or 83% of the dilemma situations provided. If we assume that AV crash algorithms must be predictable (meaning they should all use the same or similar operating principles), minimise public outrage and discrimination against a group of people, do not discourage AV buyers, and are sufficient and justifiable in the legal context, then the ODS should be given more serious consideration. Especially considering our technical limitations, time constraints, and the fact that all possible solutions in a dilemma situation will lead to at least a human death, as well as the reasons outlined previously above in section 4.

- Consideration for the legal implication of a decision made by the AV and to the extent that other road users have acted lawfully takes precedence over saving the greater number of people. Even though in other studies we have seen that most people opt for utilitarian AVs (Awad et al., 2018; Bonnefon et al., 2015), the survey results indicate that Australians view rule-breakers (like illegal jay-walkers) as more ethically liable to suffer harms, and they preferred measures that prevented death to innocents. This is indeed the very fact that appeared to be missing from previous studies, including the infamous Trolley problem (Thomson, 1976) [2].

- Avoid intentionally targeting/killing an unlawful road user to save another unlawful road user's life. Killing implies that you are directly responsible for the death of

[2] The classical dilemma involves a runaway trolley that is about to run over and kill five unaware people standing on the tracks. Looking at the scene from the outside, you find yourself standing next to a switch. You have the option to flip the switch, diverting the trolley onto the side track where it will kill one person. Alternatively, you can do nothing and allow the trolley to kill the five people on the main track. What is the right decision? The "correct" decision is still a source of contention in philosophy as both responses appear reasonable and defensible.

> another person and something that, for liability reasons, remains critically important to AV manufacturers. Allowing someone to die on the other hand, entails much less responsibility on your part, as there were some contributory factors already in motion that you did not initiate or otherwise control [3].

Research questionnaires like the one which we have carried out, are useful for removing unnecessary details and complications from a real-world problem in order to focus on the core issues (Pojman, 1990). They can help us stress test initial ideas on how AVs should be programmed since algorithms that go against the moral expectations of citizens (or against the preferences of consumers) are likely to impair the smooth adoption of AVs. Additionally, the important ethical decisions cannot be left solely to either the engineers or the ethicists and consensus is required as the solution to programming moral dilemmas in AVs should not discourage AV buyers. Furthermore, it can help to arouse people's curiosity and interest in the various ways that an AV could be programmed to deal with a dilemma situation (Nyholm, 2018).

It has indeed been observed that respondents' decisions change with the level of concreteness of the experiment (Francis et al., 2017). Our recommendation for future researchers in this field would be to use virtual reality where possible to create a more realistic crash scenario, where participants are shown different dilemma situations and they have to choose an outcome which they deem to be the most acceptable. Furthermore, we have illustrated the advantages of using ODS in AV programming. Despite our apprehensions about using lotteries to decide legal results, we should not reject the possibility of using ODS in AVs crash algorithms. Decision making by lot is likely to be simple, objective and inexpensive, and our research suggests that it is understandable and

[3] The question of whether it is worse to kill or to let die is also debated in philosophy, however we will only consider the proposition of the idea in this paper, as a final answer to that question is not required for our discussion. We refer interested readers to Cartwright (1996), who have discussed this topic in more details (Cartwright, 1996).

acceptable to many ordinary people. Therefore, we believe that lottery more than any other decision making device, demands more serious consideration by future researchers, AV manufacturers and policymakers.

One of the most difficult subjects in artificial intelligence today is the development of ethical autonomous machines. It is not only about working through ethical dilemmas. It is also important to set realistic expectations with users and the broader public, as this will have a significant impact on market acceptance and adoption. Ethics and expectations are challenges common to all automotive manufacturers who want to play in this emerging field, not just particular companies. AVs promise great benefits and unintended effects that are difficult to predict, and the technology is coming either way (Lin, 2016).

Now is the right time to discuss the ethical values and principles that are best suited to self-driving cars, as this will set the necessary ground for further improvements.

Appendix A

Appendix A

Griffith UNIVERSITY Queensland, Australia

Ethics Setting in Autonomous Vehicles - An Evaluation of people's perception and expectation

Ethics setting in Autonomous Vehicles

Aim of the study

You are invited to participate in a survey questionnaire. The purpose of this study is to evaluate respondent's perception and expectation on AVs relating to various ethical settings.

What you will be asked

If you decide to participate, you will be asked to answer 12 questions, which will include 6 ethical dilemma questions involving an AV and 6 demographic questions. The demographic questions will include aggregated information about participant's country, gender, age, education level, their perceived consumer adopter category and if they currently own a Level 2 AV. We estimate the time to complete the survey questionnaire is approximately 10 minutes.

Selection criteria

Target participants are the general population over the age of 18, from 8 English speaking countries selected by a random selection process. These countries include USA, UK, South Africa, Canada, Malaysia, Australia, HK and Singapore.

Expected benefits of the study

The study will help gauge people's moral preferences in AVs and the priorities they should have in the event of an unavoidable accident. This will inform manufacturers and policymakers in the construction and regulation of algorithms for these vehicles.

Risks to you

The participants are asked 6 random ethical dilemma questions involving an AV. As an observer nothing will happen to you, however you have control over what the car should do. You can express your choice by selecting your preferred outcome based on the available options. Note that each choice will drive a different outcome for the character/s involved, which may include death or serious injury.

If you think you might be vulnerable to stress or mental health issues, you should NOT participate in this study. Additionally, if you feel personal distress arising after participating in the study, you may contact Beyond Blue support service on 1300 22 4636 or https://online.beyondblue.org.au/email/#/send

Collecting personal information and how it will be used

No personal information will be collected as part of this study and no individual will be identified in any publication of the results. The data collected will be used for research purposes only and available to a few designated researchers.

During the course of the study the data will be stored on the SurveyMonkey servers and an external hard drive, which is password protected and is only accessible by the co-Investigator and their supervisor. All the research data will be kept for a period of 5 years (maximum), after which they will be deleted from the SurveyMoneky servers and any other device that may contain this data, including external hard drives.

Ethics approval

The ethical aspects of this study have been approved by the Griffith University Human Research Ethics Committee. The GU ethics reference number for the project is 2021/565. If you have any concerns or complaints about any ethical aspect of your participation in this research, you may contact the Manager, Research Ethics on 3735 4375 or research-ethics@griffith.edu.au

Feedback to you

The study may be made publicly available via research data bases. Alternatively, participants can request for a summary of the research results via email amir.rafiee@griffithuni.edu.au

Consent

By participating in the study you agree that you have read and understand the information. Furthermore, you agree to participate in this research, knowing that you can withdraw from further participation in the research at any time without consequence. Note that incomplete questionnaires will be treated as defective surveys and will be excluded from the study.

* 1. Do you agree to the above terms?

◯ Agree

◯ Disagree

Griffith UNIVERSITY Queensland, Australia

Ethics Setting in Autonomous Vehicles - An Evaluation of people's perception and expectation

Ethics setting in Autonomous Vehicles

The purpose of this survey questionnaire is to evaluate respondent's perception and expectation on personal autonomous vehicles relating to various ethical settings.

6 dilemma situations are shown, where the Autonomous Vehicle (AV) must choose one of the available outcomes. As a participant in the survey study, you will get to decide which outcome is the most acceptable.

Objective Decision System (ODS): If selected, the AV will perform a randomised decision based on all available scenarios and their possible outcomes.

* 2. **Question:** There is 1 x passenger in the AV and the brakes have stopped working. The AV can swerve right and hit the side of the mountain, where 1 x bystander will be hit and killed, saving the passenger.
Alternatively the AV can continue on its path, fall off the cliff which will result in the death of the 1 x passenger.

Legal Implications: The bystander had nothing to do with the danger in the emergency situation, nor is responsible for the car's mechanical failure. Legally the AV cannot save its passenger's life at the cost of the pedestrian.

Scenario-1

◯ AV to continue on its path, falling off the cliff, resulting in the death of the 1 x passenger.

◯ AV to swerve right to hit the side of the mountain, saving the passenger but killing the bystander as a result.

◯ Let the Objective Decision System (ODS) decide.

* 3. **Question:** 1 x passenger in the AV going through an intersection, 5 x people start crossing the road illegally (red light for them). The AV can swerve to the left, saving the 5 x people but on the left there is 1 x cyclist who will be killed instead. Alternatively it can go straight and 1 or more of the 5 people crossing will be hit and killed. The passenger will not be injured in any circumstance.

Legal Implications: The 5 people have neglectfully caused the conflict and their interests are not essentially more than the cyclist. The self driving car would not be breaking the law if it changed its path toward the people responsible for for causing the conflict (state of defensive emergency).

Scenario-2

- ◯ Drive straight through the intersection, resulting in the AV killing one or more of the people crossing.
- ◯ AV to swerve left, saving the 5 pedestrian crossing but the cyclist will be hit and killed as a result.
- ◯ Let the Objective Decision System (ODS) decide.

* 4. **Question:** 1 x passenger in the car on the highway, a pallet falls from the truck in front. The AV can continue on its path, hitting the pallet which will kill the passenger. Alternatively it can swerve to the right where a motorcyclist is riding without a helmet and will be killed or swerve to the left where a motorcyclist is riding will full gear in which case he will be severely injured but will live. The passenger will not be injured in the last 2 scenarios.

Legal Implications: The person not wearing the helmet is breaking the law, he will however die if he is hit. The other motorcyclist will suffer bone fracture and can claim for compensation. Question of saving of the greater interest (life) vs (loss of physical integrity).

Scenario-3

- ◯ AV to continue on its path, hitting the pallet resulting in the death of the passenger.
- ◯ AV to swerve to the right, hitting and killing the motorcyclist without a helmet.
- ◯ AV to swerve to the left, hitting and severely injuring the the motorcyclist with a helmet.
- ◯ Let the Objective Decision System (ODS) decide.

* 5. **Question:** 1 x passenger in the AV on the highway, a motorcyclist is following too closely. 1 x pedestrian suddenly runs in front of the car. The AV can brake and save the life of the pedestrian, however the motorcyclist following too closely will hit the back of the AV and will be killed. Alternatively the AV can continue on its path, hitting the pedestrian who will be killed to save the motorcyclist who is following too closely. The passenger will not be injured in any circumstance.

Legal implication: Both the person who suddenly runs in front of the car and the motorcyclist following too closely are being negligent and hence fully/partially at fault. Regardless of the outcome, the AV and it's passenger won't be legally responsible as the AV has taken reasonable steps to not cause foreseeable harm to another person or their property.

Scenario-4

◯ Slam the brakes to save the pedestrian, however the motorcyclist following the car too closely will be killed.

◯ Drive straight to save the motorcyclist following closely, however the pedestrian will be hit and killed.

◯ Let the Objective Decision System (ODS) decide.

* 6. **Question:** 5 x passengers in the an AV going through an intersection and 5 x pedestrians start crossing the road legally (green light for them). The AV has lost control and can swerve to the right hitting a wall saving the 5 x pedestrians crossing but the 5 passenger in the car will be killed. Instead it can go straight through the intersection, which will result in killing 1 or more of the 5 pedestrians crossing the road, but saving the 5 x passengers.

Legal implication: The 5 people crossing the road have not broken the law as the light was green for them.

Scenario-5

- ◯ AV to swerve right hitting he wall, killing all 5 passengers but saving the 5 pedestrian crossing the road.
- ◯ AV to go through the intersection, hitting and killing one or more of the pedestrian crossing the road.
- ◯ Let the Objective Decision System (ODS) decide.

* 7. **Question:** 3 x passengers in a car crossing an intersection and the AV has lost control. It can swerve to the right hitting a tree, killing all 3 x passengers or it can drive straight through the intersection, where a pedestrian is crossing the road on the zebra lines. He will be killed but the 3 x passengers would be saved instead.

Legal implication: The pedestrian crossing the road on zebra lines have not broken the law as it had the right of way over the vehicular traffic.

Scenario-6

- ◯ AV to swerve to the right, hitting the tree resulting in all 3 passengers being killed. The pedestrian will be saved.
- ◯ AV to drive through the intersection, hitting and killing the pedestrian. All 3 passengers will be saved.
- ◯ Let the Objective Decision System (ODS) decide.

* 8. In what country do you live?

* 9. What is your gender?

- ◯ Female
- ◯ Male
- ◯ Other (specify)

* 10. How old are you?

* 11. Highest level of education?

* 12. Which consumer adopter categories best describes you?

* 13. Do you currently own a Level 2 Autonomous Vehicle?

"In a Level 2 vehicle, the automation falls short of self-driving because a human sits in the driver's seat and can take control of the car at any time. Tesla Autopilot and Cadillac (General Motors) Super Cruise systems both qualify as Level 2"

- [ ] Yes
- [ ] No

Figure A1. Crash scenario 1

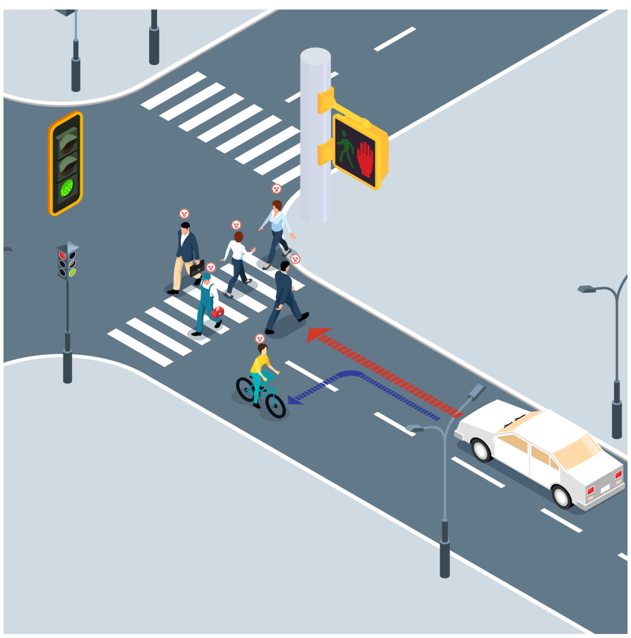


Figure A2. Crash scenario 2

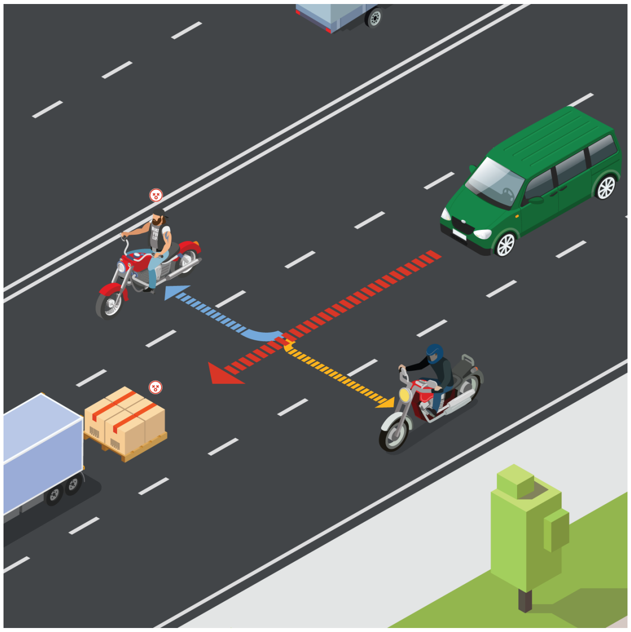


Figure A3. Crash scenario 3

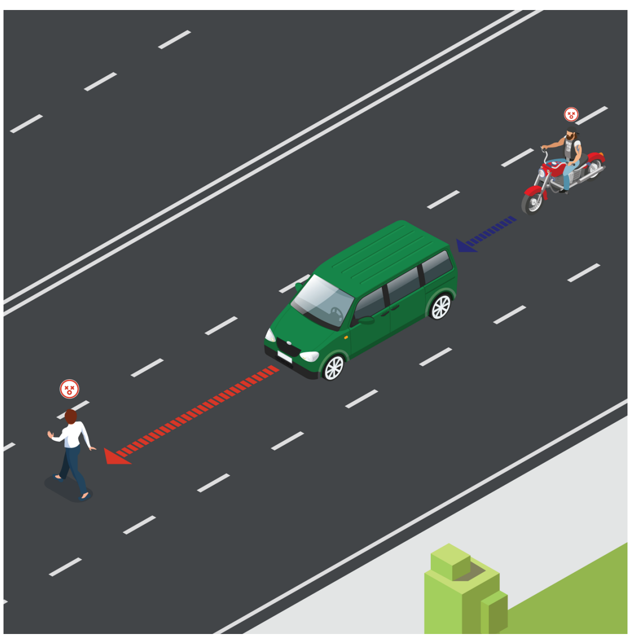


Figure A4. Crash scenario 4

Figure A5. Crash scenario 5

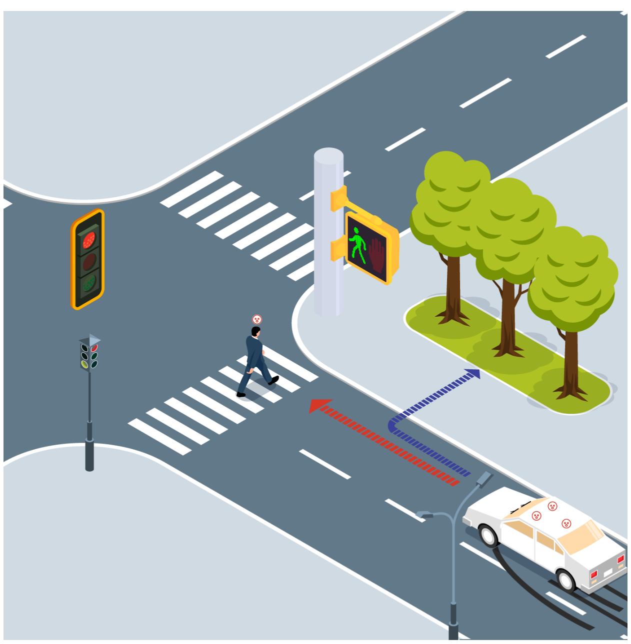


Figure A6. Crash scenario 6

Appendix B

Appendix B

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Q1 * Gender (Nominal)	516	100.0%	0	0.0%	516	100.0%
Q1 * Age Categories (Categorical)	516	100.0%	0	0.0%	516	100.0%
Q1 * Education Level (Ordinal)	516	100.0%	0	0.0%	516	100.0%
Q1 * Customer Adopter Category (Categorical)	516	100.0%	0	0.0%	516	100.0%
Q1 * Own Level 2 AV? (Nominal)	516	100.0%	0	0.0%	516	100.0%
Q2 * Gender (Nominal)	516	100.0%	0	0.0%	516	100.0%
Q2 * Age Categories (Categorical)	516	100.0%	0	0.0%	516	100.0%
Q2 * Education Level (Ordinal)	516	100.0%	0	0.0%	516	100.0%
Q2 * Customer Adopter Category (Categorical)	516	100.0%	0	0.0%	516	100.0%
Q2 * Own Level 2 AV? (Nominal)	516	100.0%	0	0.0%	516	100.0%
Q3 * Gender (Nominal)	516	100.0%	0	0.0%	516	100.0%
Q3 * Age Categories (Categorical)	516	100.0%	0	0.0%	516	100.0%
Q3 * Education Level (Ordinal)	516	100.0%	0	0.0%	516	100.0%
Q3 * Customer Adopter Category (Categorical)	516	100.0%	0	0.0%	516	100.0%
Q3 * Own Level 2 AV? (Nominal)	516	100.0%	0	0.0%	516	100.0%
Q4 * Gender (Nominal)	516	100.0%	0	0.0%	516	100.0%
Q4 * Age Categories (Categorical)	516	100.0%	0	0.0%	516	100.0%
Q4 * Education Level (Ordinal)	516	100.0%	0	0.0%	516	100.0%
Q4 * Customer Adopter Category (Categorical)	516	100.0%	0	0.0%	516	100.0%
Q4 * Own Level 2 AV?	516	100.0%	0	0.0%	516	100.0%

(Nominal)						
Q5 * Gender (Nominal)	516	100.0%	0	0.0%	516	100.0%
Q5 * Age Categories (Categorical)	516	100.0%	0	0.0%	516	100.0%
Q5 * Education Level (Ordinal)	516	100.0%	0	0.0%	516	100.0%
Q5 * Customer Adopter Category (Categorical)	516	100.0%	0	0.0%	516	100.0%
Q5 * Own Level 2 AV? (Nominal)	516	100.0%	0	0.0%	516	100.0%
Q6 * Gender (Nominal)	516	100.0%	0	0.0%	516	100.0%
Q6 * Age Categories (Categorical)	516	100.0%	0	0.0%	516	100.0%
Q6 * Education Level (Ordinal)	516	100.0%	0	0.0%	516	100.0%
Q6 * Customer Adopter Category (Categorical)	516	100.0%	0	0.0%	516	100.0%
Q6 * Own Level 2 AV? (Nominal)	516	100.0%	0	0.0%	516	100.0%

Q1 * Gender (Nominal)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.085[a]	2	.029
Likelihood Ratio	7.110	2	.029
Linear-by-Linear Association	.076	1	.783
N of Valid Cases	516		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 38.55.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.051	.025	2.016	.044
		Q1 Dependent	.000	.000	.[c]	.[c]
		Gender (Nominal) Dependent	.098	.046	2.016	.044
	Goodman and Kruskal tau	Q1 Dependent	.007	.006		.028[d]
		Gender (Nominal) Dependent	.014	.010		.029[d]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

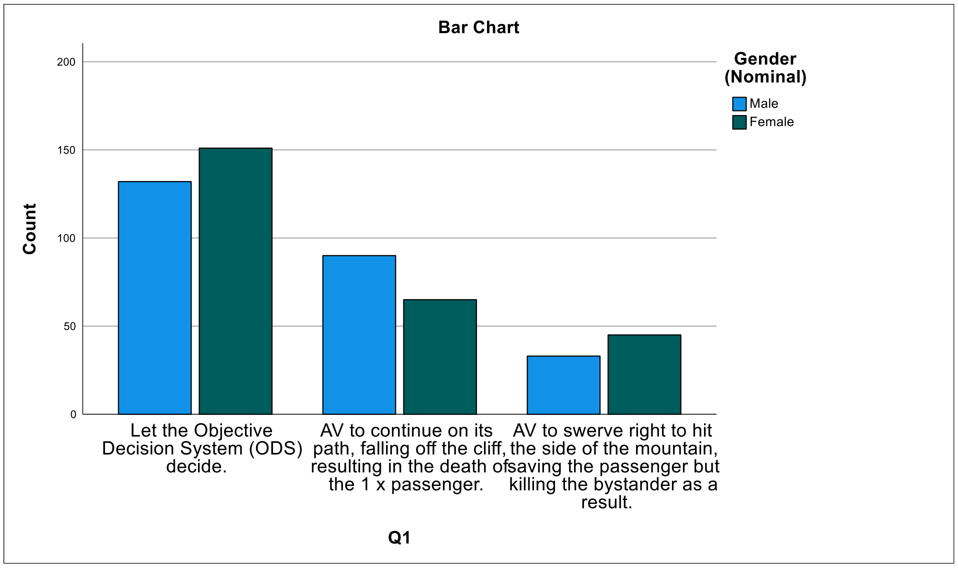
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.117			.029
	Cramer's V	.117			.029
	Contingency Coefficient	.116			.029
Ordinal by Ordinal	Gamma	-.055	.077	-.706	.480
	Spearman Correlation	-.031	.044	-.707	.480[c]
Interval by Interval	Pearson's R	-.012	.044	-.276	.783[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q1 * Age Categories (Categorical)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	20.086[a]	10	.028
Likelihood Ratio	20.411	10	.026
Linear-by-Linear Association	14.744	1	<.001
N of Valid Cases	516		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.77.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.044	.014	2.977	.003
		Q1 Dependent	.000	.000	.[c]	.[c]
		Age Categories (Categorical) Dependent	.068	.022	2.977	.003
	Goodman and Kruskal tau	Q1 Dependent	.024	.010		.007[d]
		Age Categories (Categorical) Dependent	.009	.004		.010[d]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

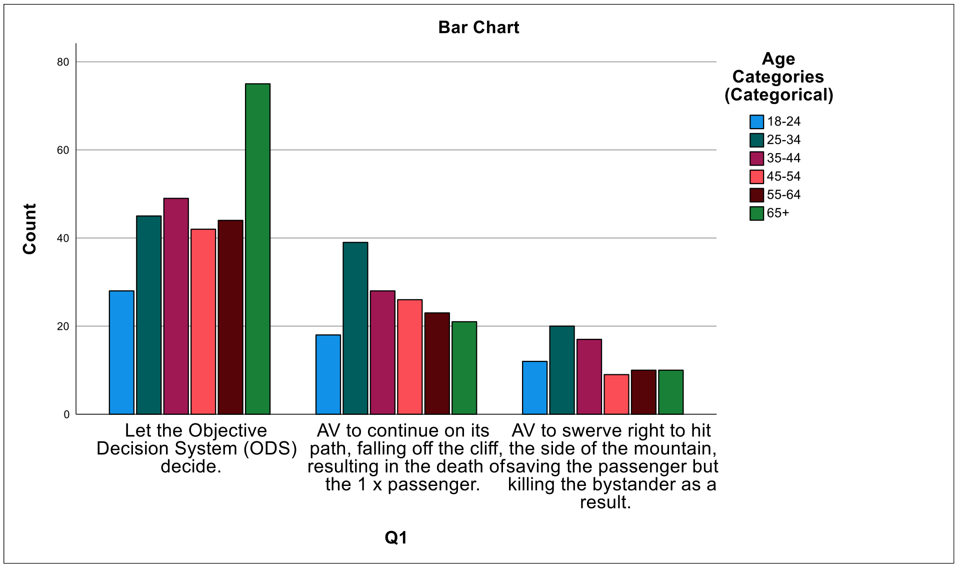
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.197			.028
	Cramer's V	.140			.028
	Contingency Coefficient	.194			.028
Ordinal by Ordinal	Gamma	-.211	.052	-4.047	<.001
	Spearman Correlation	-.174	.043	-4.010	<.001[c]
Interval by Interval	Pearson's R	-.169	.043	-3.892	<.001[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q1 * Education Level (Ordinal)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	17.976[a]	8	.021
Likelihood Ratio	18.765	8	.016
Linear-by-Linear Association	5.404	1	.020
N of Valid Cases	516		

a. 2 cells (13.3%) have expected count less than 5. The minimum expected count is 1.97.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.004	.018	.194	.846
		Q1 Dependent	.004	.035	.124	.901
		Education Level (Ordinal) Dependent	.003	.019	.156	.876
	Goodman and Kruskal tau	Q1 Dependent	.021	.010		.005[c]
		Education Level (Ordinal) Dependent	.009	.005		.019[c]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on chi-square approximation

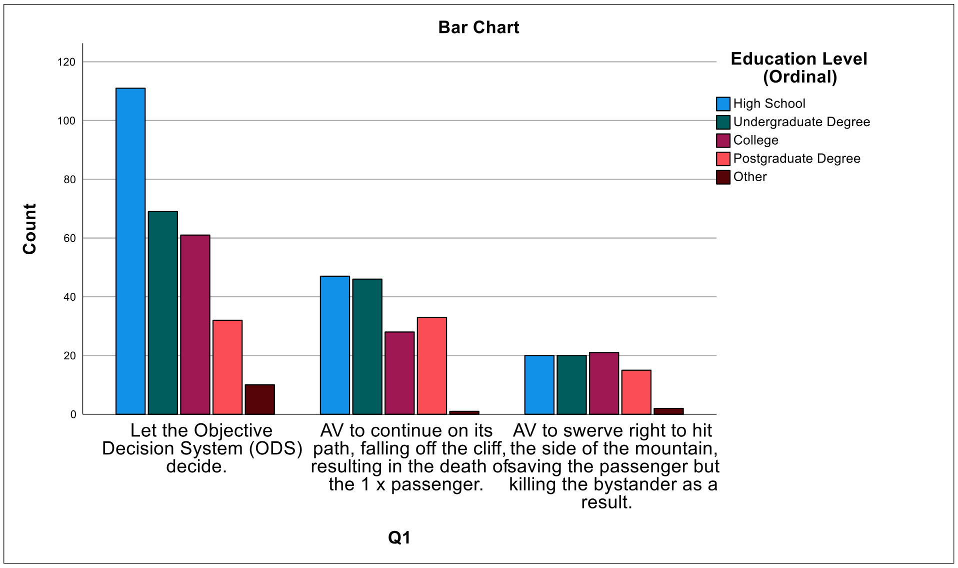
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.187			.021
	Cramer's V	.132			.021
	Contingency Coefficient	.183			.021
Ordinal by Ordinal	Gamma	.146	.056	2.563	.010
	Spearman Correlation	.112	.043	2.545	.011[c]
Interval by Interval	Pearson's R	.102	.044	2.335	.020[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q1 * Customer Adopter Category (Categorical)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	21.665[a]	10	.017
Likelihood Ratio	22.775	10	.012
Linear-by-Linear Association	.037	1	.848
N of Valid Cases	516		

a. 3 cells (16.7%) have expected count less than 5. The minimum expected count is .60.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.024	.018	1.325	.185
		Q1 Dependent	.000	.000	.[c]	.[c]
		Customer Adopter Category (Categorical) Dependent	.040	.030	1.325	.185
	Goodman and Kruskal tau	Q1 Dependent	.021	.009		.018[d]
		Customer Adopter Category (Categorical) Dependent	.010	.005		.004[d]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

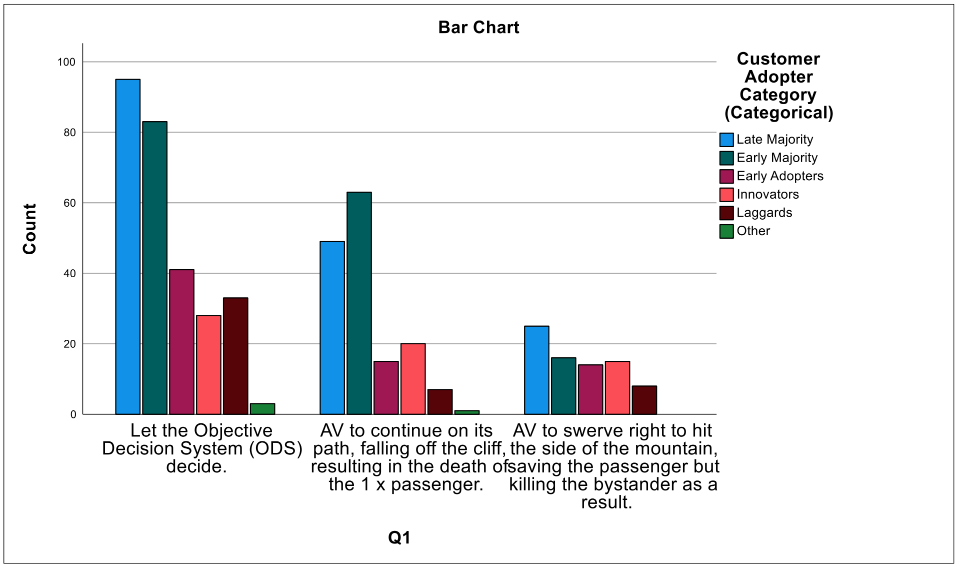
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.205			.017
	Cramer's V	.145			.017
	Contingency Coefficient	.201			.017
Ordinal by Ordinal	Gamma	.009	.059	.150	.881
	Spearman Correlation	.006	.045	.138	.890[c]
Interval by Interval	Pearson's R	.008	.045	.192	.848[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q1 * Own Level 2 AV? (Nominal)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	12.954[a]	2	.002
Likelihood Ratio	11.696	2	.003
Linear-by-Linear Association	10.737	1	.001
N of Valid Cases	516		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 15.57.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.000	.000	.[b]	.[b]
		Q1 Dependent	.000	.000	.[b]	.[b]
		Own Level 2 AV? (Nominal) Dependent	.000	.000	.[b]	.[b]
	Goodman and Kruskal tau	Q1 Dependent	.010	.006		.007[c]
		Own Level 2 AV? (Nominal) Dependent	.025	.016		.002[c]

a. Not assuming the null hypothesis.

b. Cannot be computed because the asymptotic standard error equals zero.

c. Based on chi-square approximation

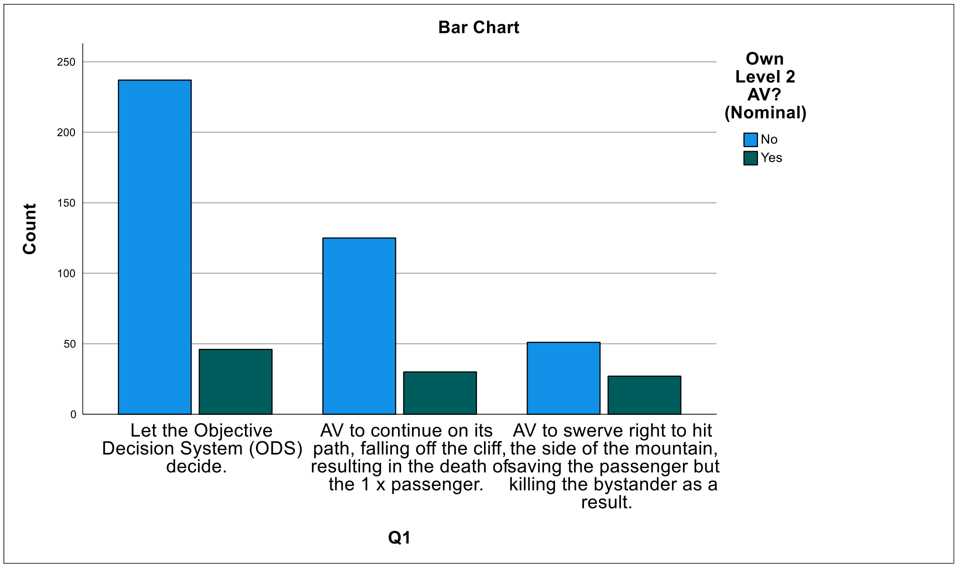
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.158			.002
	Cramer's V	.158			.002
	Contingency Coefficient	.156			.002
Ordinal by Ordinal	Gamma	.274	.089	2.804	.005
	Spearman Correlation	.132	.046	3.012	.003[c]
Interval by Interval	Pearson's R	.144	.047	3.308	.001[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q2 * Gender (Nominal)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.184[a]	2	.075
Likelihood Ratio	5.192	2	.075
Linear-by-Linear Association	4.083	1	.043
N of Valid Cases	516		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 48.92.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.047	.030	1.497	.134
		Q2 Dependent	.000	.000	.[c]	.[c]
		Gender (Nominal) Dependent	.090	.058	1.497	.134
	Goodman and Kruskal tau	Q2 Dependent	.006	.006		.038[d]
		Gender (Nominal) Dependent	.010	.009		.075[d]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

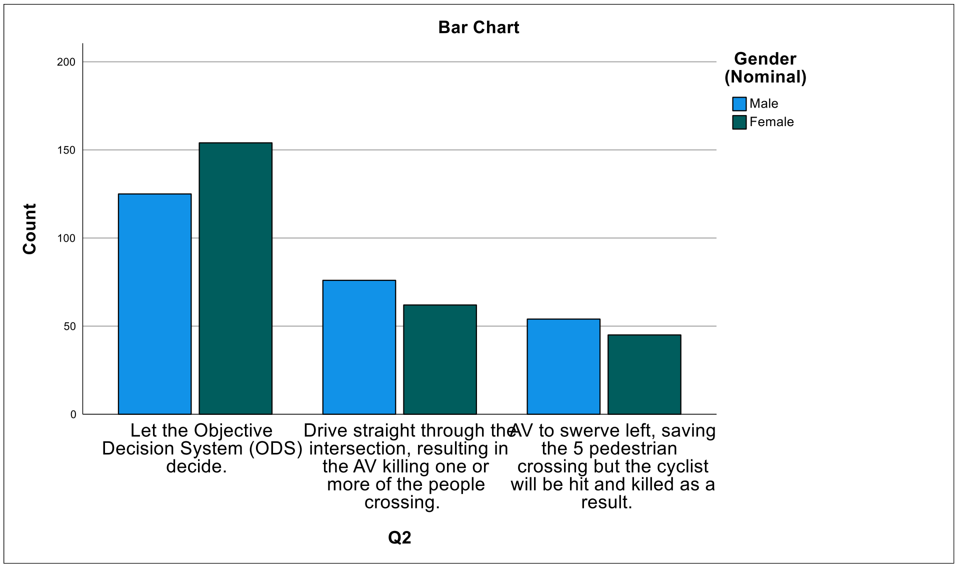
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.100			.075
	Cramer's V	.100			.075
	Contingency Coefficient	.100			.075
Ordinal by Ordinal	Gamma	-.164	.075	-2.161	.031
	Spearman Correlation	-.095	.044	-2.156	.032[c]
Interval by Interval	Pearson's R	-.089	.044	-2.027	.043[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q2 * Age Categories (Categorical)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	33.866[a]	10	<.001
Likelihood Ratio	37.116	10	<.001
Linear-by-Linear Association	18.336	1	<.001
N of Valid Cases	516		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.13.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.031	.009	3.278	.001
		Q2 Dependent	.000	.000	.[c]	.[c]
		Age Categories (Categorical) Dependent	.049	.015	3.278	.001
	Goodman and Kruskal tau	Q2 Dependent	.030	.010		<.001[d]
		Age Categories (Categorical) Dependent	.014	.004		<.001[d]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

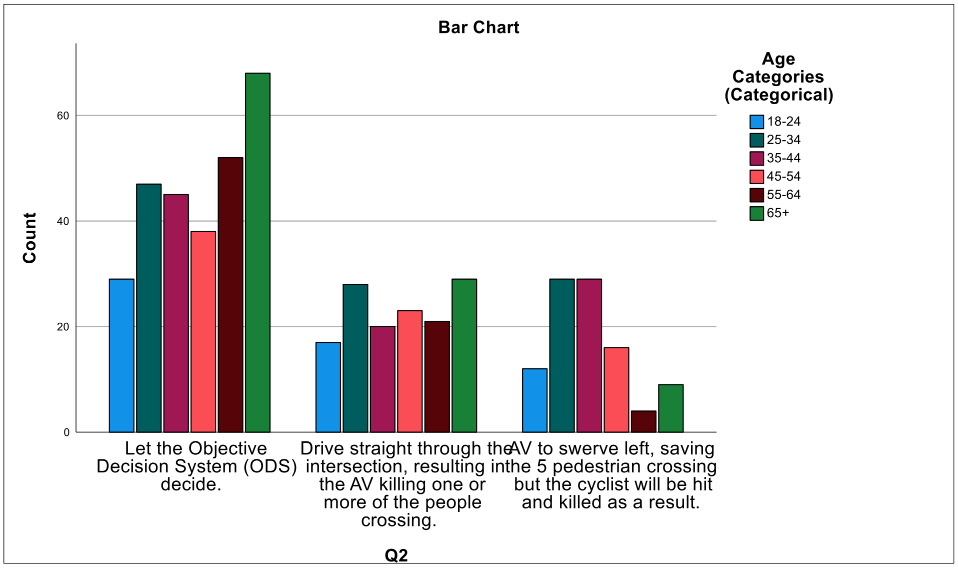
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.256			<.001
	Cramer's V	.181			<.001
	Contingency Coefficient	.248			<.001
Ordinal by Ordinal	Gamma	-.209	.049	-4.230	<.001
	Spearman Correlation	-.176	.042	-4.056	<.001[c]
Interval by Interval	Pearson's R	-.189	.040	-4.356	<.001[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q2 * Education Level (Ordinal)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	24.627[a]	8	.002
Likelihood Ratio	24.365	8	.002
Linear-by-Linear Association	5.834	1	.016
N of Valid Cases	516		

a. 2 cells (13.3%) have expected count less than 5. The minimum expected count is 2.49.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.000	.000	.[b]	.[b]
		Q2 Dependent	.000	.000	.[b]	.[b]
		Education Level (Ordinal) Dependent	.000	.000	.[b]	.[b]
	Goodman and Kruskal tau	Q2 Dependent	.024	.010		.001[c]
		Education Level (Ordinal) Dependent	.012	.005		.001[c]

a. Not assuming the null hypothesis.

b. Cannot be computed because the asymptotic standard error equals zero.

c. Based on chi-square approximation

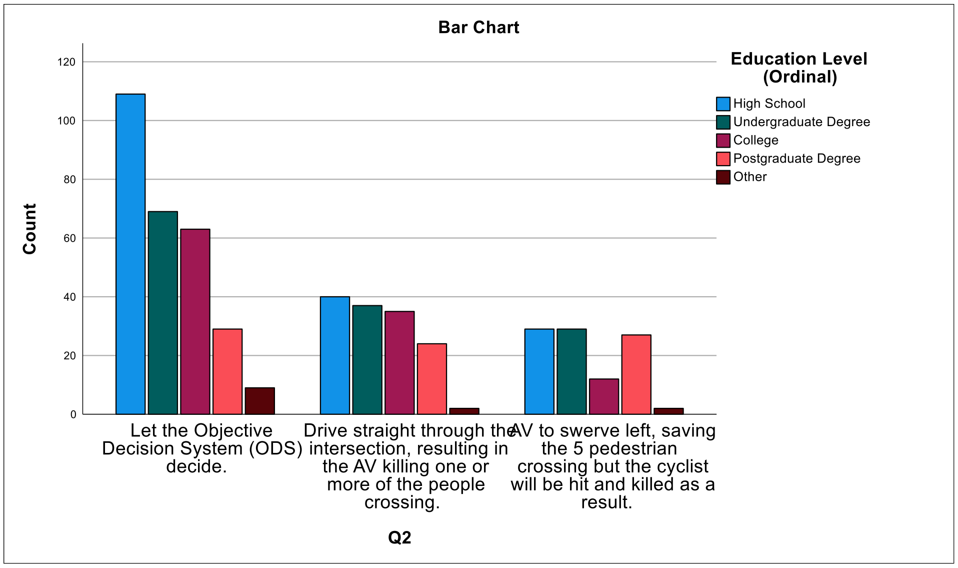
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.218			.002
	Cramer's V	.154			.002
	Contingency Coefficient	.213			.002
Ordinal by Ordinal	Gamma	.145	.057	2.516	.012
	Spearman Correlation	.112	.044	2.548	.011[c]
Interval by Interval	Pearson's R	.106	.045	2.427	.016[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q2 * Customer Adopter Category (Categorical)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.922[a]	10	.177
Likelihood Ratio	14.262	10	.161
Linear-by-Linear Association	.093	1	.760
N of Valid Cases	516		

a. 3 cells (16.7%) have expected count less than 5. The minimum expected count is .77.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.024	.021	1.137	.256
		Q2 Dependent	.000	.000	.[c]	.[c]
		Customer Adopter Category (Categorical) Dependent	.040	.035	1.137	.256
	Goodman and Kruskal tau	Q2 Dependent	.014	.008		.168[d]
		Customer Adopter Category (Categorical) Dependent	.006	.004		.109[d]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

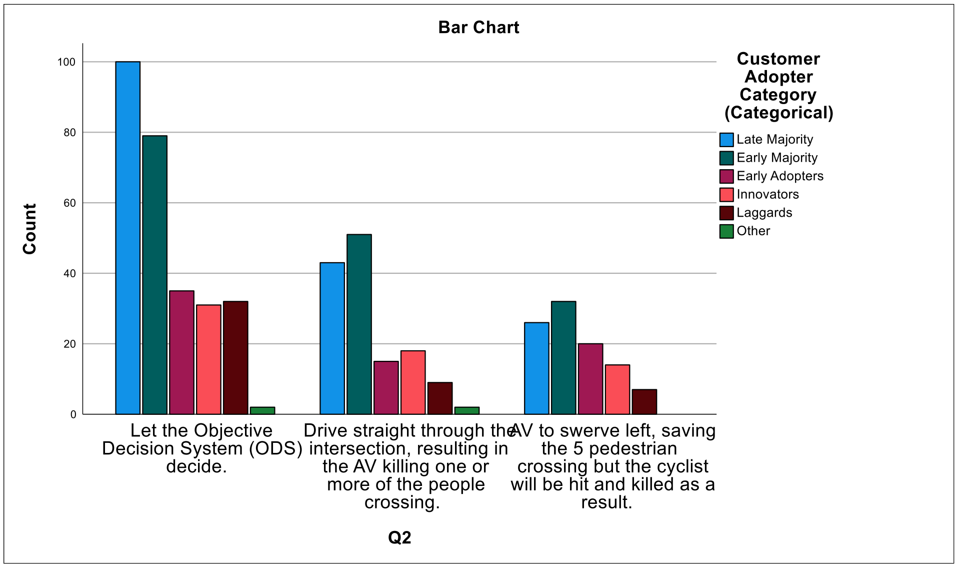
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.164			.177
	Cramer's V	.116			.177
	Contingency Coefficient	.162			.177
Ordinal by Ordinal	Gamma	.048	.056	.857	.391
	Spearman Correlation	.036	.044	.827	.409[c]
Interval by Interval	Pearson's R	.013	.043	.305	.761[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q2 * Own Level 2 AV? (Nominal)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	11.734[a]	2	.003
Likelihood Ratio	10.724	2	.005
Linear-by-Linear Association	7.872	1	.005
N of Valid Cases	516		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 19.76.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.000	.000	.[b]	.[b]
		Q2 Dependent	.000	.000	.[b]	.[b]
		Own Level 2 AV? (Nominal) Dependent	.000	.000	.[b]	.[b]
	Goodman and Kruskal tau	Q2 Dependent	.009	.006		.010[c]
		Own Level 2 AV? (Nominal) Dependent	.023	.015		.003[c]

a. Not assuming the null hypothesis.

b. Cannot be computed because the asymptotic standard error equals zero.

c. Based on chi-square approximation

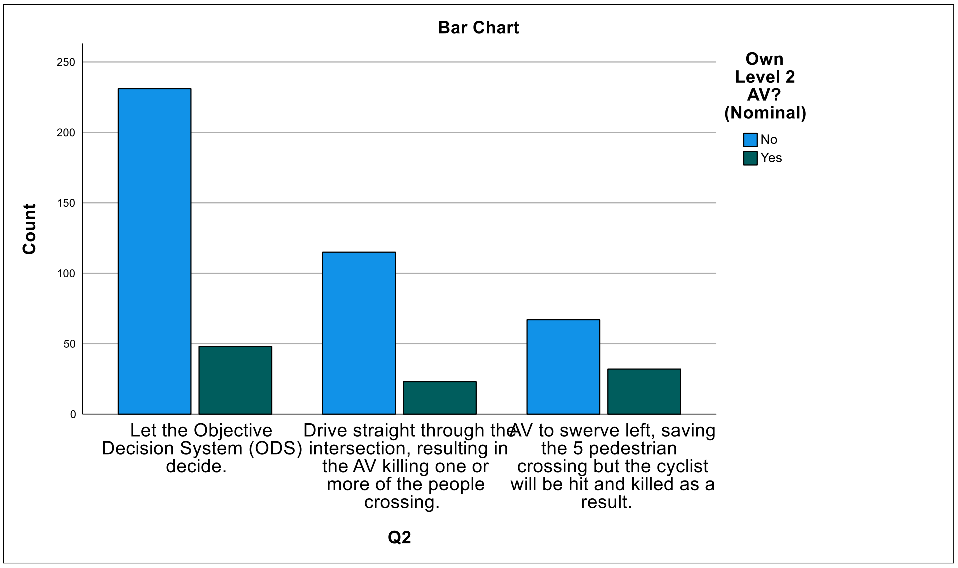
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.151			.003
	Cramer's V	.151			.003
	Contingency Coefficient	.149			.003
Ordinal by Ordinal	Gamma	.229	.091	2.340	.019
	Spearman Correlation	.110	.047	2.511	.012[c]
Interval by Interval	Pearson's R	.124	.047	2.825	.005[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q3 * Gender (Nominal)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.291[a]	3	.349
Likelihood Ratio	3.305	3	.347
Linear-by-Linear Association	1.045	1	.307
N of Valid Cases	516		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 18.78.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.025	.027	.924	.356
		Q3 Dependent	.000	.000	.[c]	.[c]
		Gender (Nominal) Dependent	.055	.058	.924	.356
	Goodman and Kruskal tau	Q3 Dependent	.002	.002		.472[d]
		Gender (Nominal) Dependent	.006	.007		.350[d]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

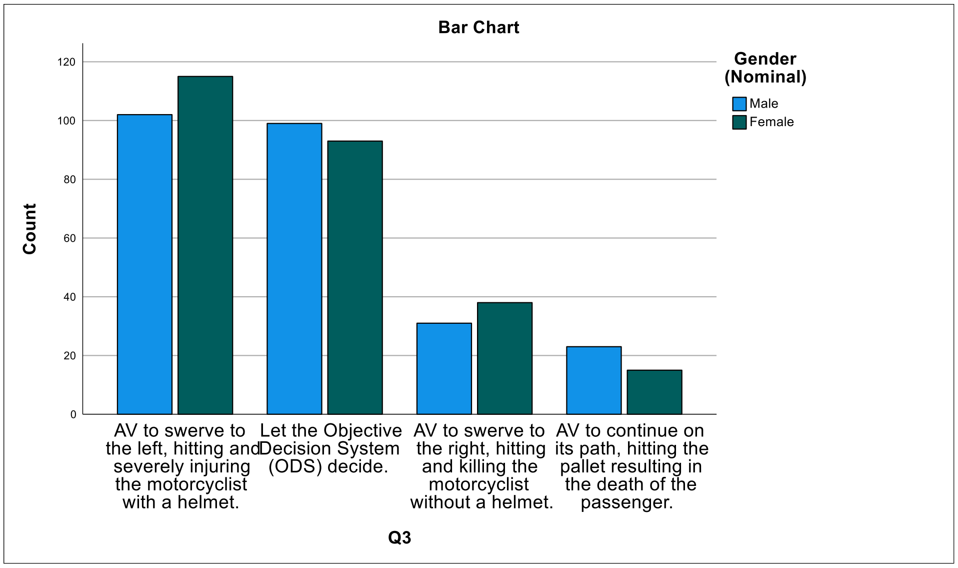
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.080			.349
	Cramer's V	.080			.349
	Contingency Coefficient	.080			.349
Ordinal by Ordinal	Gamma	-.065	.071	-.915	.360
	Spearman Correlation	-.040	.044	-.913	.362[c]
Interval by Interval	Pearson's R	-.045	.044	-1.022	.307[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q3 * Age Categories (Categorical)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	31.091[a]	15	.009
Likelihood Ratio	28.911	15	.017
Linear-by-Linear Association	.187	1	.665
N of Valid Cases	516		

a. 1 cells (4.2%) have expected count less than 5. The minimum expected count is 4.27.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.076	.026	2.877	.004
		Q3 Dependent	.084	.040	2.016	.044
		Age Categories (Categorical) Dependent	.071	.027	2.550	.011
	Goodman and Kruskal tau	Q3 Dependent	.023	.009		.002[c]
		Age Categories (Categorical) Dependent	.012	.005		.010[c]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on chi-square approximation

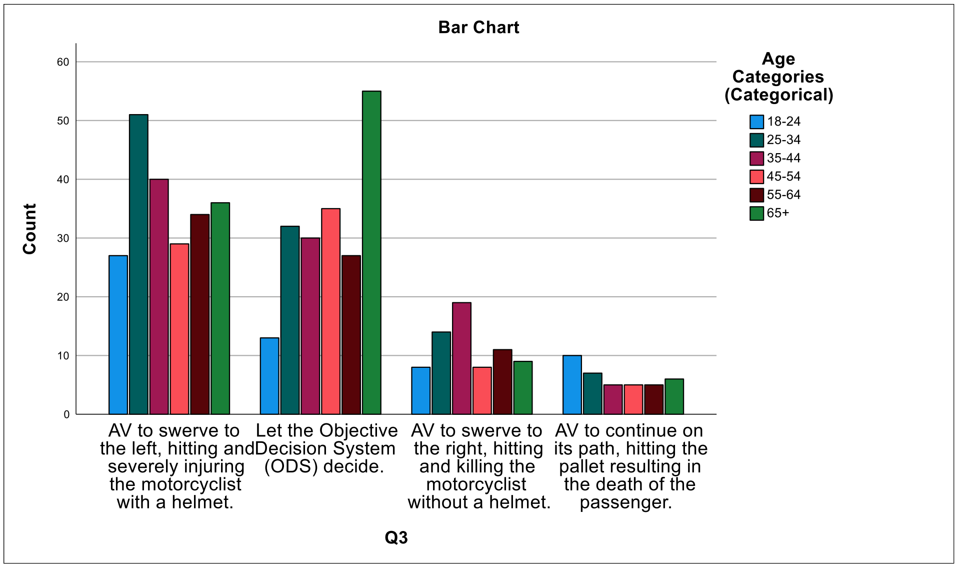
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.245			.009
	Cramer's V	.142			.009
	Contingency Coefficient	.238			.009
Ordinal by Ordinal	Gamma	.022	.050	.442	.659
	Spearman Correlation	.020	.045	.457	.648[c]
Interval by Interval	Pearson's R	-.019	.045	-.432	.666[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q3 * Education Level (Ordinal)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	12.281[a]	12	.423
Likelihood Ratio	14.612	12	.263
Linear-by-Linear Association	.024	1	.877
N of Valid Cases	516		

a. 3 cells (15.0%) have expected count less than 5. The minimum expected count is .96.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.011	.011	.962	.336
		Q3 Dependent	.010	.012	.833	.405
		Education Level (Ordinal) Dependent	.012	.019	.633	.527
	Goodman and Kruskal tau	Q3 Dependent	.008	.005		.411[c]
		Education Level (Ordinal) Dependent	.005	.003		.608[c]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on chi-square approximation

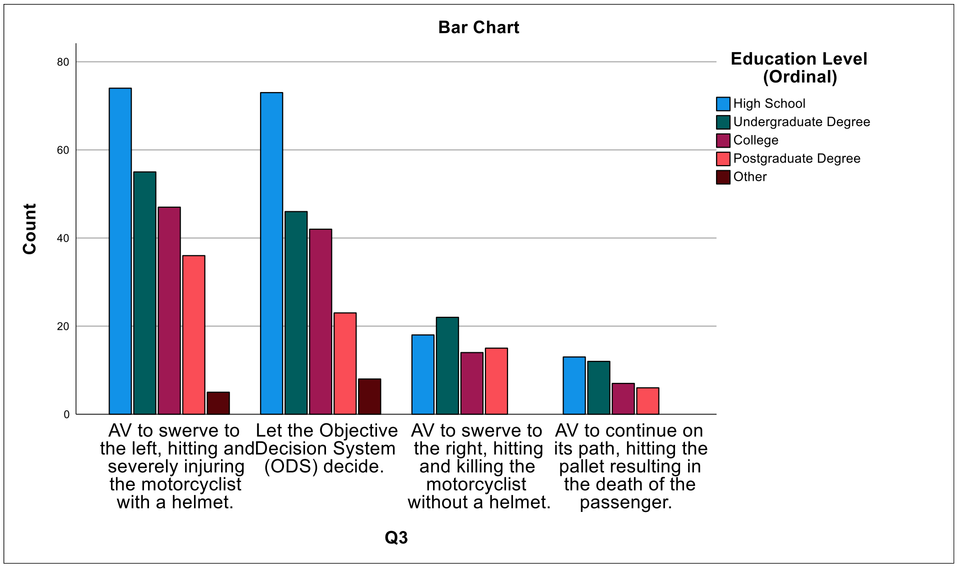
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.154			.423
	Cramer's V	.089			.423
	Contingency Coefficient	.152			.423
Ordinal by Ordinal	Gamma	-.002	.053	-.044	.965
	Spearman Correlation	-.002	.043	-.044	.965[c]
Interval by Interval	Pearson's R	-.007	.042	-.155	.877[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q3 * Customer Adopter Category (Categorical)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	17.042[a]	15	.316
Likelihood Ratio	16.307	15	.362
Linear-by-Linear Association	.529	1	.467
N of Valid Cases	516		

a. 6 cells (25.0%) have expected count less than 5. The minimum expected count is .29.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.040	.033	1.206	.228
		Q3 Dependent	.037	.044	.827	.408
		Customer Adopter Category (Categorical) Dependent	.043	.036	1.184	.237
	Goodman and Kruskal tau	Q3 Dependent	.010	.006		.421[c]
		Customer Adopter Category (Categorical) Dependent	.008	.005		.135[c]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on chi-square approximation

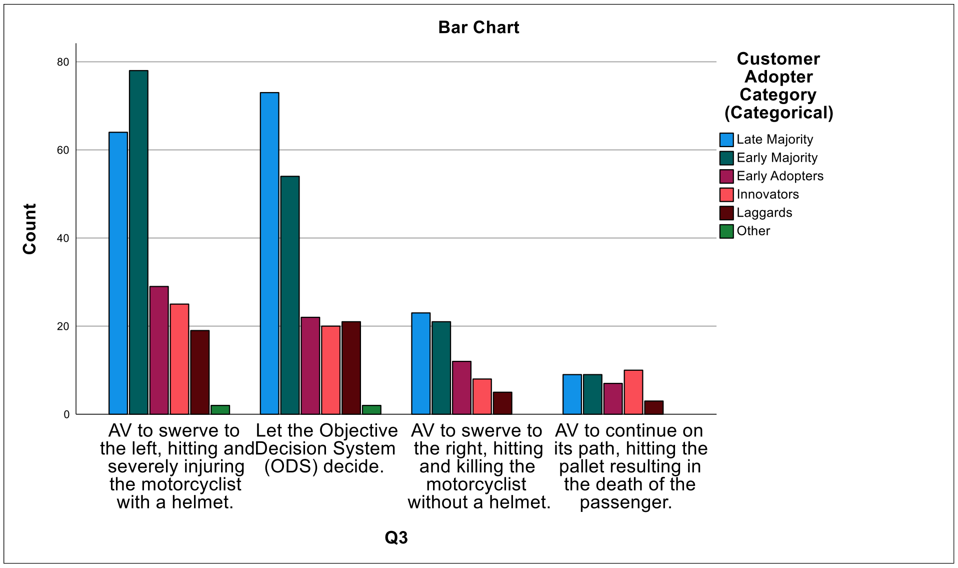
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.182			.316
	Cramer's V	.105			.316
	Contingency Coefficient	.179			.316
Ordinal by Ordinal	Gamma	.012	.052	.239	.811
	Spearman Correlation	.011	.043	.248	.804[c]
Interval by Interval	Pearson's R	.032	.043	.727	.468[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q3 * Own Level 2 AV? (Nominal)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15.686[a]	3	.001
Likelihood Ratio	14.082	3	.003
Linear-by-Linear Association	13.466	1	<.001
N of Valid Cases	516		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.59.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.000	.000	.[b]	.[b]
		Q3 Dependent	.000	.000	.[b]	.[b]
		Own Level 2 AV? (Nominal) Dependent	.000	.000	.[b]	.[b]
	Goodman and Kruskal tau	Q3 Dependent	.007	.004		.012[c]
		Own Level 2 AV? (Nominal) Dependent	.030	.017		.001[c]

a. Not assuming the null hypothesis.

b. Cannot be computed because the asymptotic standard error equals zero.

c. Based on chi-square approximation

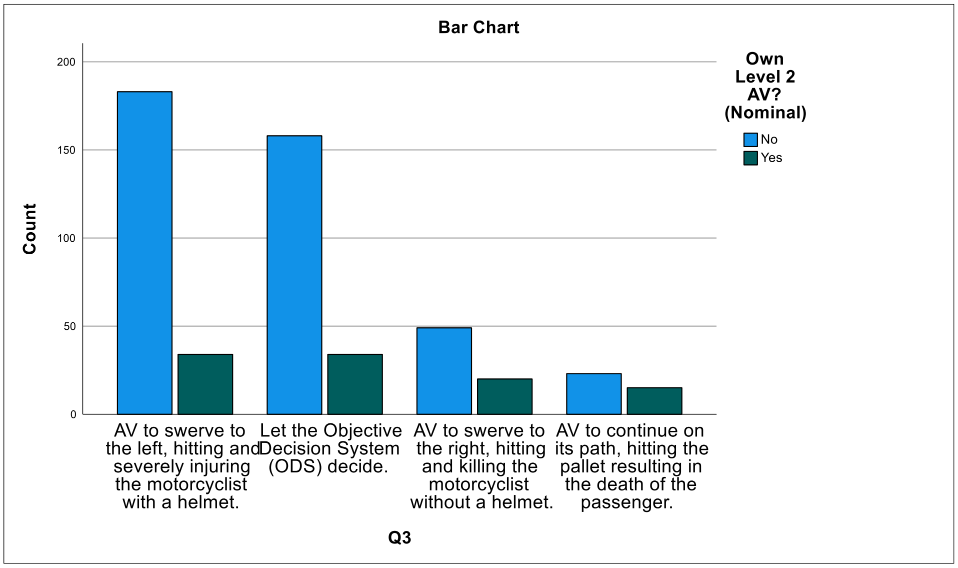
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.174			.001
	Cramer's V	.174			.001
	Contingency Coefficient	.172			.001
Ordinal by Ordinal	Gamma	.276	.084	3.044	.002
	Spearman Correlation	.142	.046	3.260	.001[c]
Interval by Interval	Pearson's R	.162	.048	3.715	<.001[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q4 * Gender (Nominal)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2.216[a]	2	.330
Likelihood Ratio	2.217	2	.330
Linear-by-Linear Association	.880	1	.348
N of Valid Cases	516		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 22.73.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.043	.049	.868	.385
		Q4 Dependent	.033	.055	.590	.555
		Gender (Nominal) Dependent	.055	.058	.928	.353
	Goodman and Kruskal tau	Q4 Dependent	.003	.004		.181[c]
		Gender (Nominal) Dependent	.004	.006		.331[c]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on chi-square approximation

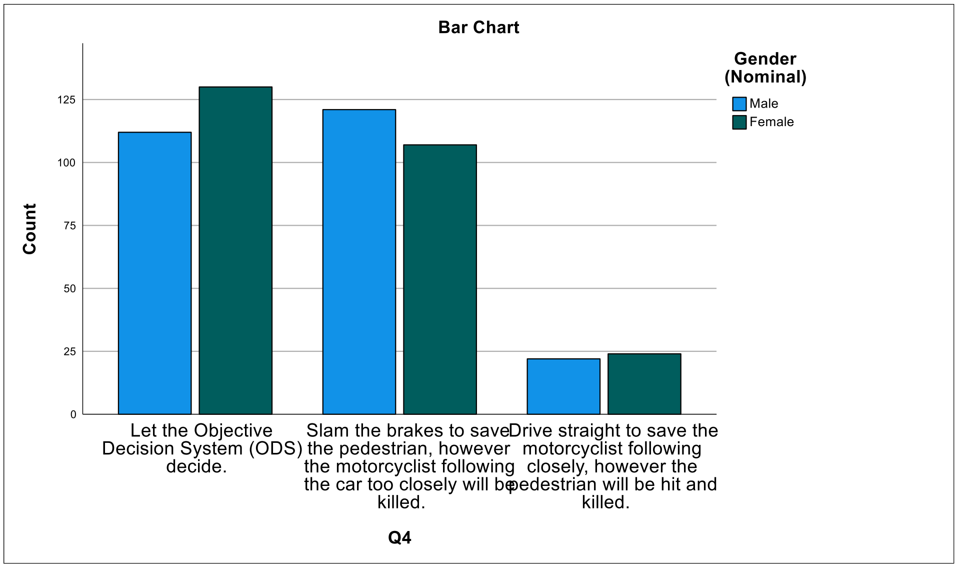
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.066			.330
	Cramer's V	.066			.330
	Contingency Coefficient	.065			.330
Ordinal by Ordinal	Gamma	-.087	.079	-1.107	.268
	Spearman Correlation	-.049	.044	-1.105	.270[c]
Interval by Interval	Pearson's R	-.041	.044	-.938	.349[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q4 * Age Categories (Categorical)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	11.833[a]	10	.296
Likelihood Ratio	11.798	10	.299
Linear-by-Linear Association	7.843	1	.005
N of Valid Cases	516		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.17.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.047	.030	1.550	.121
		Q4 Dependent	.066	.052	1.232	.218
		Age Categories (Categorical) Dependent	.034	.026	1.313	.189
	Goodman and Kruskal tau	Q4 Dependent	.012	.008		.260[c]
		Age Categories (Categorical) Dependent	.005	.003		.266[c]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on chi-square approximation

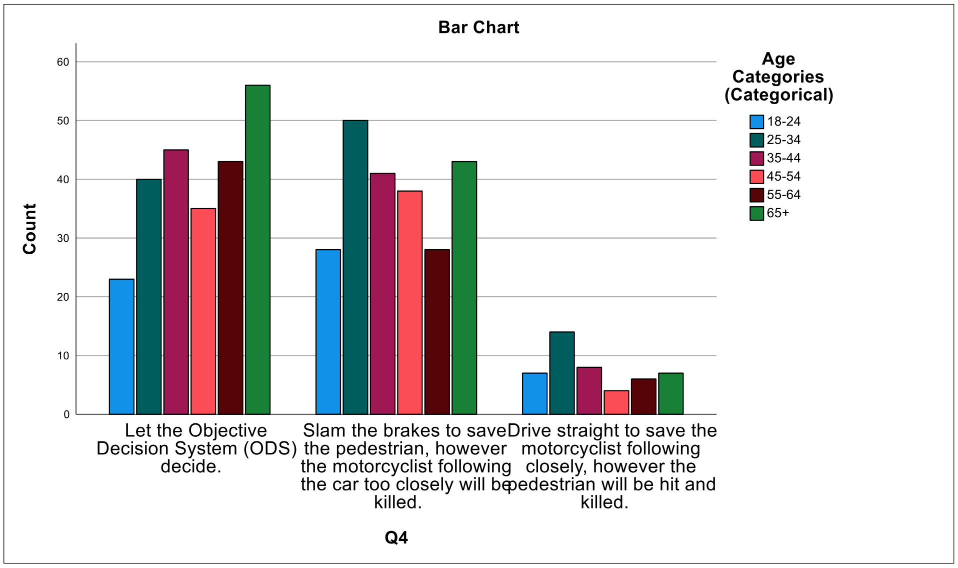
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.151			.296
	Cramer's V	.107			.296
	Contingency Coefficient	.150			.296
Ordinal by Ordinal	Gamma	-.152	.054	-2.801	.005
	Spearman Correlation	-.123	.044	-2.804	.005[c]
Interval by Interval	Pearson's R	-.123	.044	-2.819	.005[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q4 * Education Level (Ordinal)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.013[a]	8	.341
Likelihood Ratio	9.644	8	.291
Linear-by-Linear Association	2.884	1	.089
N of Valid Cases	516		

a. 1 cells (6.7%) have expected count less than 5. The minimum expected count is 1.16.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.020	.023	.837	.403
		Q4 Dependent	.044	.051	.837	.403
		Education Level (Ordinal) Dependent	.000	.000	.[c]	.[c]
	Goodman and Kruskal tau	Q4 Dependent	.007	.006		.508[d]
		Education Level (Ordinal) Dependent	.004	.004		.326[d]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

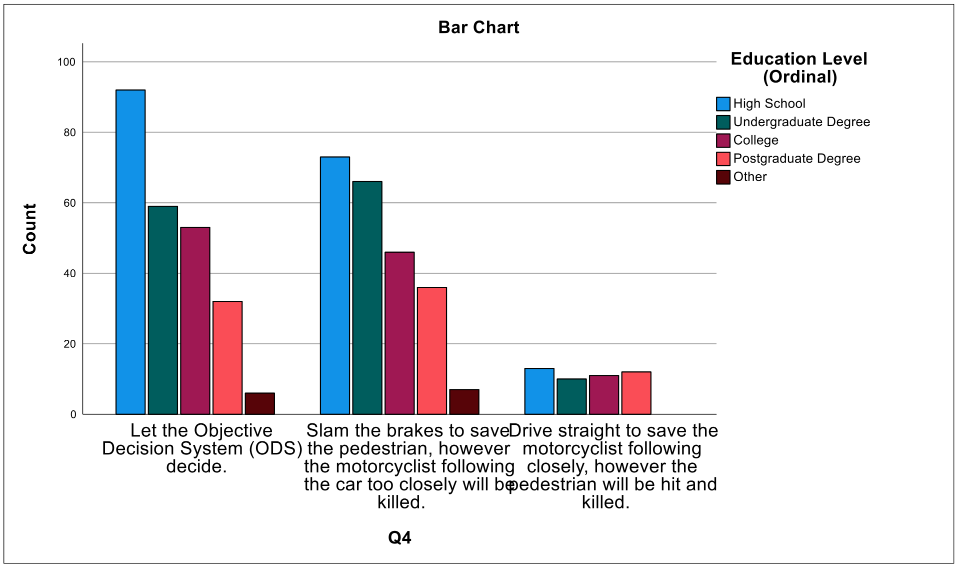
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.132			.341
	Cramer's V	.093			.341
	Contingency Coefficient	.131			.341
Ordinal by Ordinal	Gamma	.101	.059	1.700	.089
	Spearman Correlation	.075	.044	1.708	.088[c]
Interval by Interval	Pearson's R	.075	.044	1.701	.090[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q4 * Customer Adopter Category (Categorical)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16.167[a]	10	.095
Likelihood Ratio	15.857	10	.104
Linear-by-Linear Association	.066	1	.797
N of Valid Cases	516		

a. 4 cells (22.2%) have expected count less than 5. The minimum expected count is .36.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.072	.036	1.968	.049
		Q4 Dependent	.099	.050	1.892	.058
		Customer Adopter Category (Categorical) Dependent	.052	.035	1.463	.143
	Goodman and Kruskal tau	Q4 Dependent	.018	.010		.052[c]
		Customer Adopter Category (Categorical) Dependent	.008	.004		.034[c]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on chi-square approximation

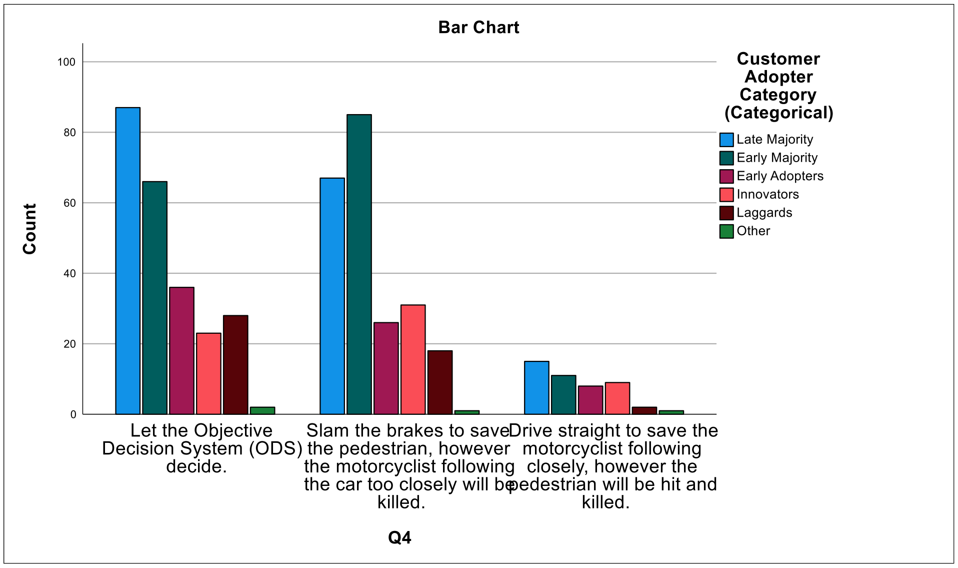
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.177			.095
	Cramer's V	.125			.095
	Contingency Coefficient	.174			.095
Ordinal by Ordinal	Gamma	.033	.059	.553	.580
	Spearman Correlation	.025	.045	.557	.578[c]
Interval by Interval	Pearson's R	.011	.045	.257	.797[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q4 * Own Level 2 AV? (Nominal)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.621[a]	2	.445
Likelihood Ratio	1.560	2	.458
Linear-by-Linear Association	1.485	1	.223
N of Valid Cases	516		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.18.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.008	.025	.315	.753
		Q4 Dependent	.011	.035	.315	.753
		Own Level 2 AV? (Nominal) Dependent	.000	.000	.[c]	.[c]
	Goodman and Kruskal tau	Q4 Dependent	.001	.002		.548[d]
		Own Level 2 AV? (Nominal) Dependent	.003	.005		.445[d]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

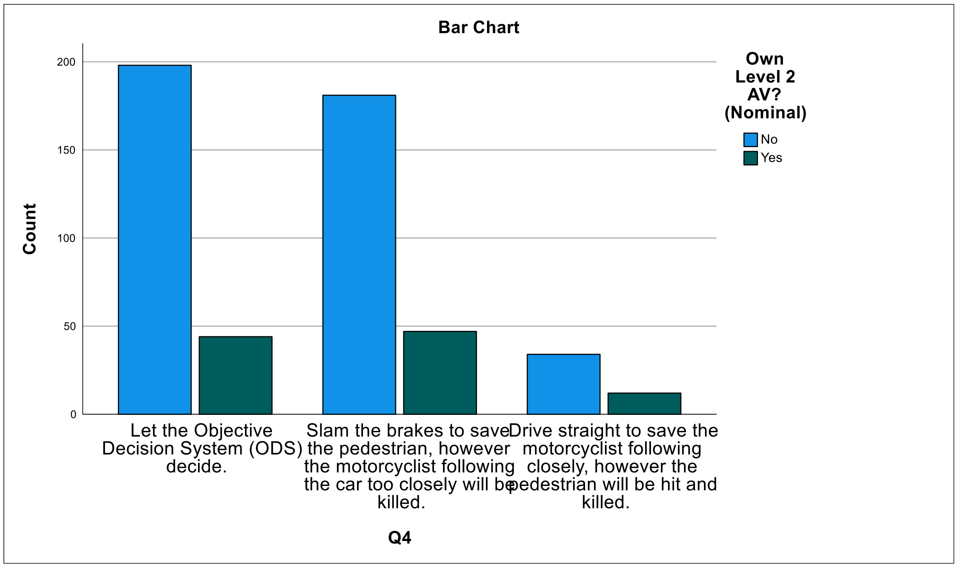
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.056			.445
	Cramer's V	.056			.445
	Contingency Coefficient	.056			.445
Ordinal by Ordinal	Gamma	.112	.098	1.130	.258
	Spearman Correlation	.051	.045	1.148	.252[c]
Interval by Interval	Pearson's R	.054	.045	1.219	.223[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q5 * Gender (Nominal)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2.675[a]	2	.263
Likelihood Ratio	2.678	2	.262
Linear-by-Linear Association	.588	1	.443
N of Valid Cases	516		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 51.40.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.029	.023	1.259	.208
		Q5 Dependent	.000	.000	.[c]	.[c]
		Gender (Nominal) Dependent	.055	.042	1.259	.208
	Goodman and Kruskal tau	Q5 Dependent	.003	.004		.226[d]
		Gender (Nominal) Dependent	.005	.006		.263[d]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

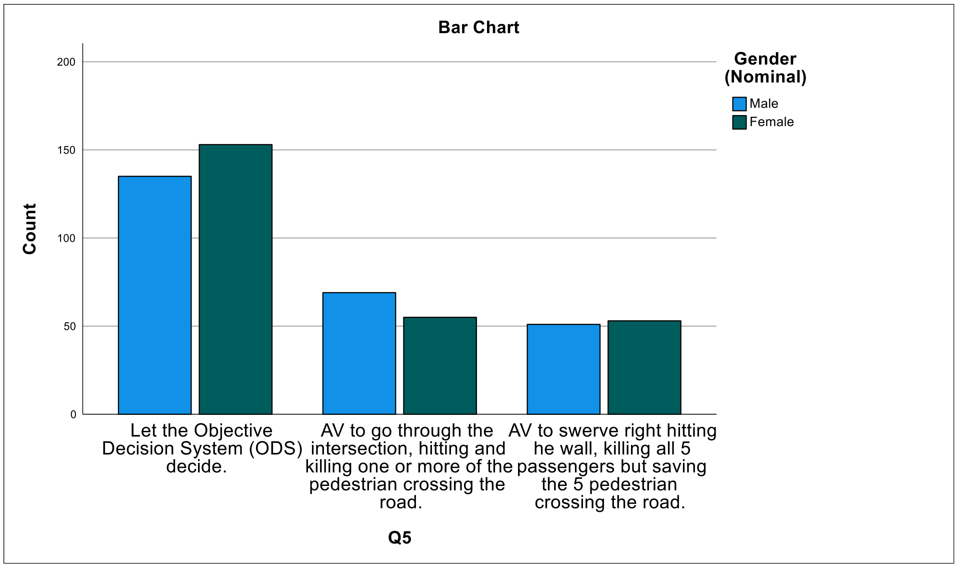
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.072			.263
	Cramer's V	.072			.263
	Contingency Coefficient	.072			.263
Ordinal by Ordinal	Gamma	-.074	.077	-.965	.334
	Spearman Correlation	-.042	.044	-.964	.335[c]
Interval by Interval	Pearson's R	-.034	.044	-.766	.444[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q5 * Age Categories (Categorical)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.928[a]	10	.176
Likelihood Ratio	14.703	10	.143
Linear-by-Linear Association	8.855	1	.003
N of Valid Cases	516		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.69.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.028	.010	2.869	.004
		Q5 Dependent	.000	.000	.[c]	.[c]
		Age Categories (Categorical) Dependent	.044	.015	2.869	.004
	Goodman and Kruskal tau	Q5 Dependent	.013	.007		.195[d]
		Age Categories (Categorical) Dependent	.006	.003		.098[d]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

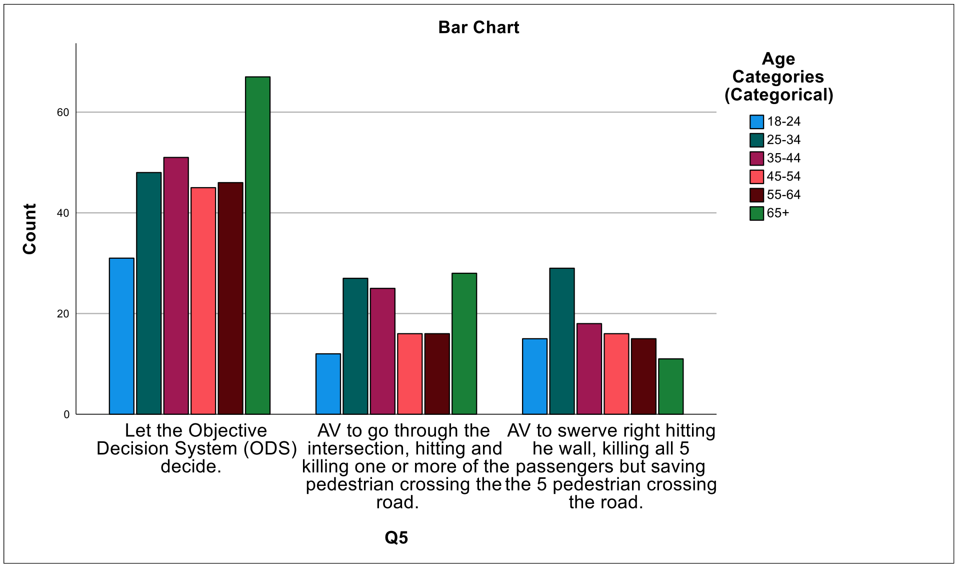
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.164			.176
	Cramer's V	.116			.176
	Contingency Coefficient	.162			.176
Ordinal by Ordinal	Gamma	-.151	.051	-2.905	.004
	Spearman Correlation	-.125	.043	-2.864	.004[c]
Interval by Interval	Pearson's R	-.131	.043	-2.999	.003[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q5 * Education Level (Ordinal)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	19.138[a]	8	.014
Likelihood Ratio	19.090	8	.014
Linear-by-Linear Association	1.628	1	.202
N of Valid Cases	516		

a. 2 cells (13.3%) have expected count less than 5. The minimum expected count is 2.62.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.021	.014	1.480	.139
		Q5 Dependent	.000	.000	.[c]	.[c]
		Education Level (Ordinal) Dependent	.036	.024	1.480	.139
	Goodman and Kruskal tau	Q5 Dependent	.021	.010		.007[d]
		Education Level (Ordinal) Dependent	.012	.006		.003[d]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

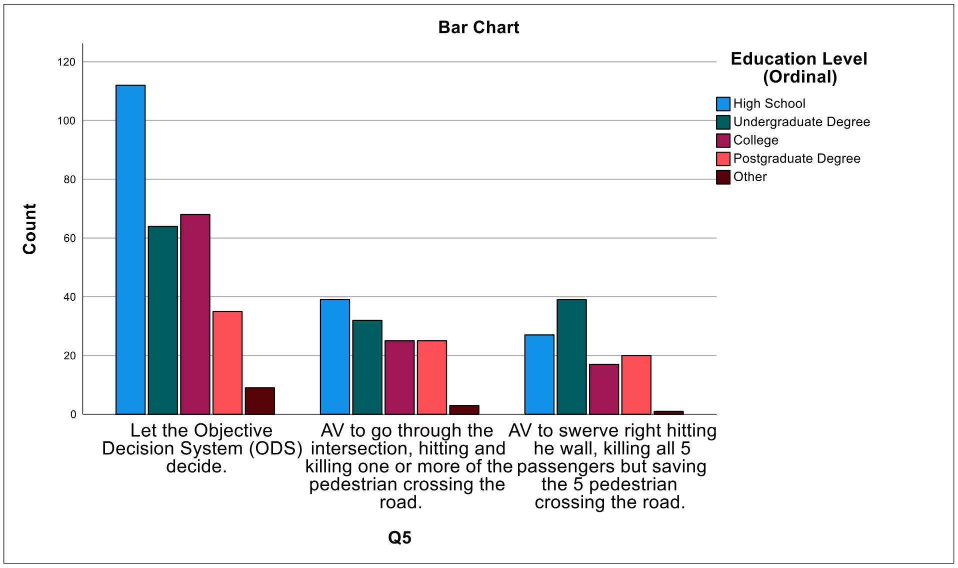
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.193			.014
	Cramer's V	.136			.014
	Contingency Coefficient	.189			.014
Ordinal by Ordinal	Gamma	.093	.055	1.676	.094
	Spearman Correlation	.072	.043	1.637	.102[c]
Interval by Interval	Pearson's R	.056	.043	1.277	.202[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q5 * Customer Adopter Category (Categorical)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	30.908[a]	10	<.001
Likelihood Ratio	30.923	10	<.001
Linear-by-Linear Association	.005	1	.944
N of Valid Cases	516		

a. 3 cells (16.7%) have expected count less than 5. The minimum expected count is .81.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.035	.015	2.337	.019
		Q5 Dependent	.000	.000	.[c]	.[c]
		Customer Adopter Category (Categorical) Dependent	.058	.024	2.337	.019
	Goodman and Kruskal tau	Q5 Dependent	.031	.011		<.001[d]
		Customer Adopter Category (Categorical) Dependent	.015	.006		<.001[d]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

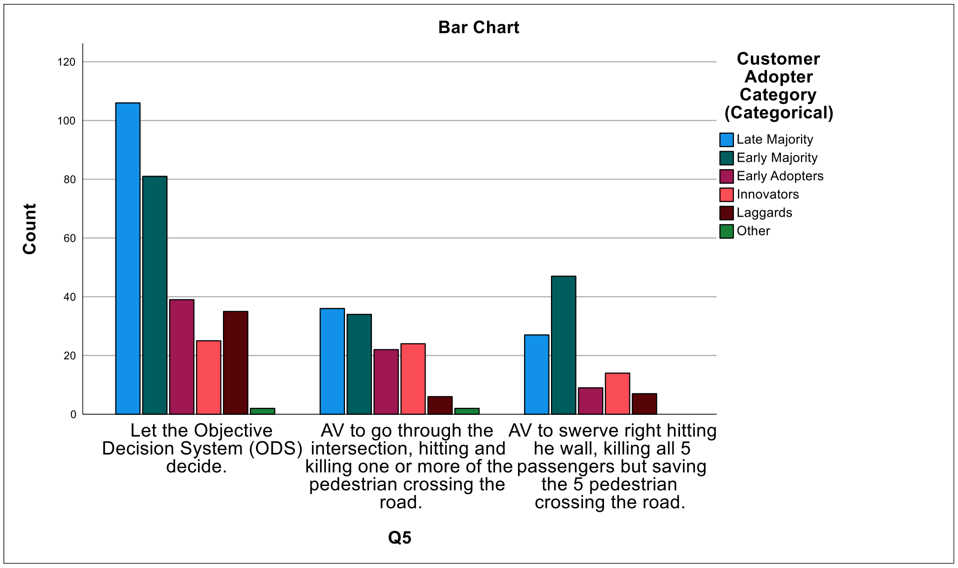
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.245			<.001
	Cramer's V	.173			<.001
	Contingency Coefficient	.238			<.001
Ordinal by Ordinal	Gamma	.049	.055	.887	.375
	Spearman Correlation	.039	.043	.889	.374[c]
Interval by Interval	Pearson's R	.003	.042	.070	.945[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q5 * Own Level 2 AV? (Nominal)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.493[a]	2	.174
Likelihood Ratio	3.345	2	.188
Linear-by-Linear Association	.266	1	.606
N of Valid Cases	516		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 20.76.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.000	.000	.[b]	.[b]
		Q5 Dependent	.000	.000	.[b]	.[b]
		Own Level 2 AV? (Nominal) Dependent	.000	.000	.[b]	.[b]
	Goodman and Kruskal tau	Q5 Dependent	.003	.004		.172[c]
		Own Level 2 AV? (Nominal) Dependent	.007	.008		.175[c]

a. Not assuming the null hypothesis.

b. Cannot be computed because the asymptotic standard error equals zero.

c. Based on chi-square approximation

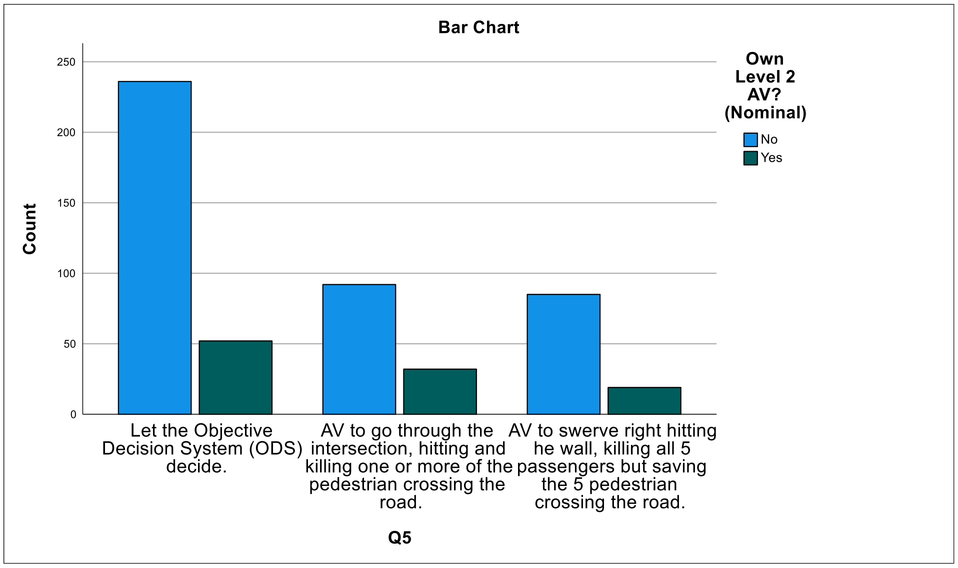
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.082			.174
	Cramer's V	.082			.174
	Contingency Coefficient	.082			.174
Ordinal by Ordinal	Gamma	.072	.091	.780	.436
	Spearman Correlation	.034	.043	.766	.444[c]
Interval by Interval	Pearson's R	.023	.043	.515	.606[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q6 * Gender (Nominal)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	8.080[a]	2	.018
Likelihood Ratio	8.103	2	.017
Linear-by-Linear Association	5.730	1	.017
N of Valid Cases	516		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 52.88.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.061	.030	1.967	.049
		Q6 Dependent	.000	.000	.[c]	.[c]
		Gender (Nominal) Dependent	.114	.055	1.967	.049
	Goodman and Kruskal tau	Q6 Dependent	.010	.007		.006[d]
		Gender (Nominal) Dependent	.016	.011		.018[d]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

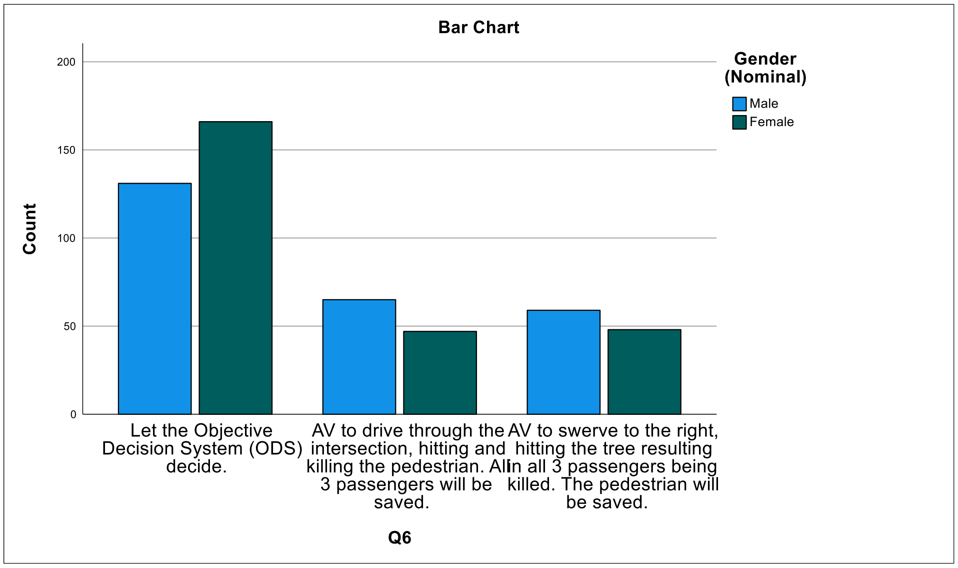
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.125			.018
	Cramer's V	.125			.018
	Contingency Coefficient	.124			.018
Ordinal by Ordinal	Gamma	-.200	.076	-2.607	.009
	Spearman Correlation	-.114	.044	-2.603	.010[c]
Interval by Interval	Pearson's R	-.105	.044	-2.405	.017[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q6 * Age Categories (Categorical)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	14.975[a]	10	.133
Likelihood Ratio	14.884	10	.136
Linear-by-Linear Association	6.055	1	.014
N of Valid Cases	516		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 12.03.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.032	.015	2.050	.040
		Q6 Dependent	.000	.000	.[c]	.[c]
		Age Categories (Categorical) Dependent	.049	.023	2.050	.040
	Goodman and Kruskal tau	Q6 Dependent	.018	.009		.053[d]
		Age Categories (Categorical) Dependent	.006	.003		.092[d]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

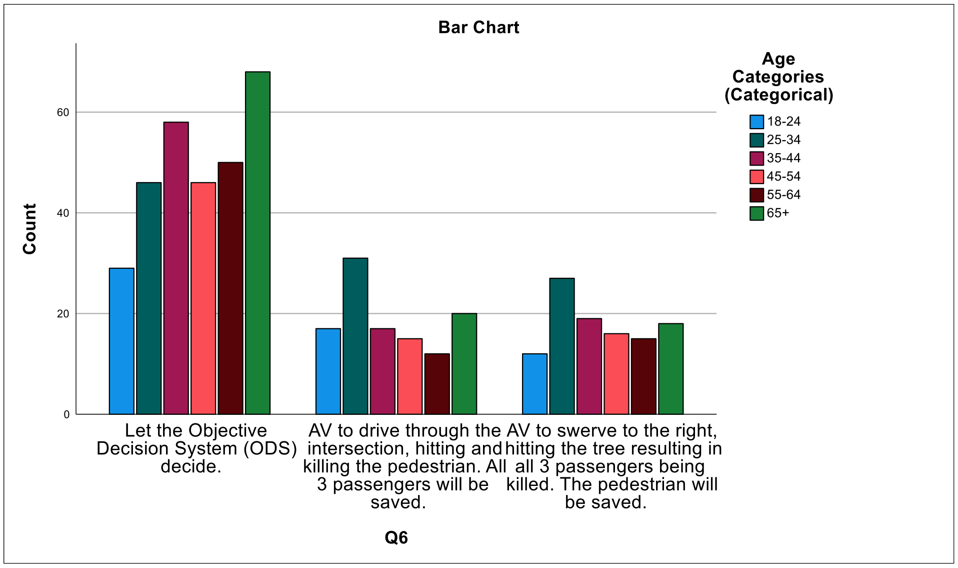
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.170			.133
	Cramer's V	.120			.133
	Contingency Coefficient	.168			.133
Ordinal by Ordinal	Gamma	-.146	.052	-2.787	.005
	Spearman Correlation	-.121	.043	-2.756	.006[c]
Interval by Interval	Pearson's R	-.108	.043	-2.473	.014[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q6 * Education Level (Ordinal)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.345[a]	8	.314
Likelihood Ratio	9.659	8	.290
Linear-by-Linear Association	2.462	1	.117
N of Valid Cases	516		

a. 2 cells (13.3%) have expected count less than 5. The minimum expected count is 2.70.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.000	.000	.[b]	.[b]
		Q6 Dependent	.000	.000	.[b]	.[b]
		Education Level (Ordinal) Dependent	.000	.000	.[b]	.[b]
	Goodman and Kruskal tau	Q6 Dependent	.011	.007		.181[c]
		Education Level (Ordinal) Dependent	.004	.003		.353[c]

a. Not assuming the null hypothesis.

b. Cannot be computed because the asymptotic standard error equals zero.

c. Based on chi-square approximation

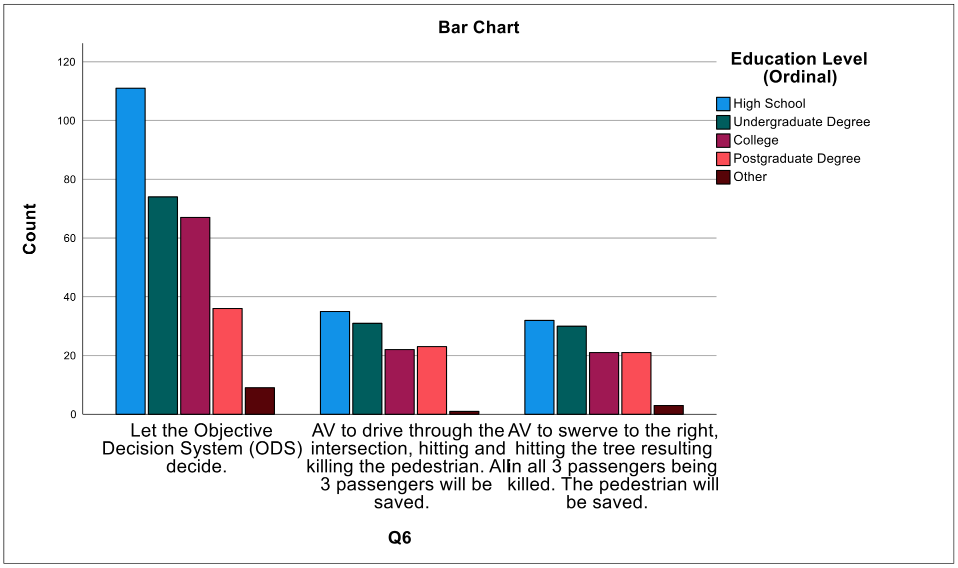
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.135			.314
	Cramer's V	.095			.314
	Contingency Coefficient	.133			.314
Ordinal by Ordinal	Gamma	.097	.058	1.670	.095
	Spearman Correlation	.073	.044	1.669	.096[c]
Interval by Interval	Pearson's R	.069	.044	1.571	.117[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q6 * Customer Adopter Category (Categorical)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.972[a]	10	.443
Likelihood Ratio	10.514	10	.397
Linear-by-Linear Association	.002	1	.963
N of Valid Cases	516		

a. 3 cells (16.7%) have expected count less than 5. The minimum expected count is .83.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.018	.015	1.180	.238
		Q6 Dependent	.000	.000	.[c]	.[c]
		Customer Adopter Category (Categorical) Dependent	.029	.024	1.180	.238
	Goodman and Kruskal tau	Q6 Dependent	.009	.006		.474[d]
		Customer Adopter Category (Categorical) Dependent	.004	.003		.507[d]

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

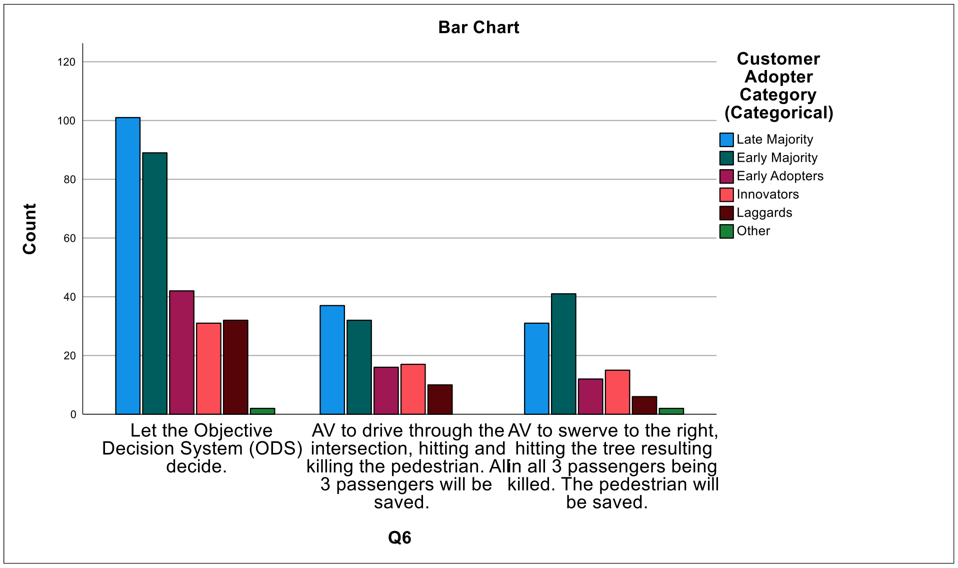
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.139			.443
	Cramer's V	.098			.443
	Contingency Coefficient	.138			.443
Ordinal by Ordinal	Gamma	.013	.056	.223	.824
	Spearman Correlation	.010	.043	.223	.824[c]
Interval by Interval	Pearson's R	-.002	.043	-.047	.963[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Q6 * Own Level 2 AV? (Nominal)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2.717[a]	2	.257
Likelihood Ratio	2.633	2	.268
Linear-by-Linear Association	2.660	1	.103
N of Valid Cases	516		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 21.36.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.000	.000	.[b]	.[b]
		Q6 Dependent	.000	.000	.[b]	.[b]
		Own Level 2 AV? (Nominal) Dependent	.000	.000	.[b]	.[b]
	Goodman and Kruskal tau	Q6 Dependent	.003	.004		.223[c]
		Own Level 2 AV? (Nominal) Dependent	.005	.007		.258[c]

a. Not assuming the null hypothesis.

b. Cannot be computed because the asymptotic standard error equals zero.

c. Based on chi-square approximation

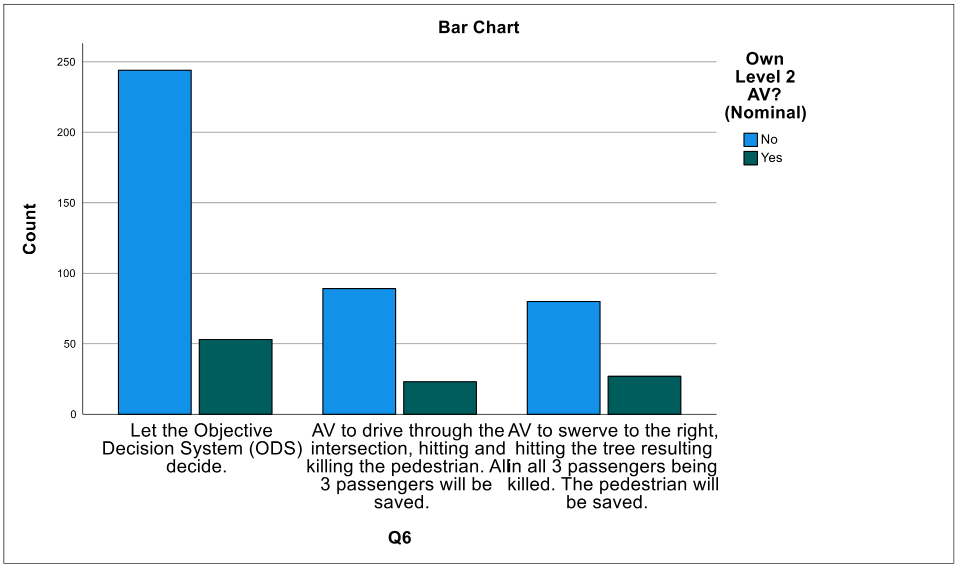
Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.073			.257
	Cramer's V	.073			.257
	Contingency Coefficient	.072			.257
Ordinal by Ordinal	Gamma	.150	.094	1.535	.125
	Spearman Correlation	.070	.045	1.584	.114[c]
Interval by Interval	Pearson's R	.072	.046	1.634	.103[c]
N of Valid Cases		516			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.


Bar Chart
Count
250
200
150
100
50
0
Own Level 2 AV? (Nominal)
No
Yes
Let the Objective Decision System (ODS) decide.
AV to drive through the intersection, hitting and killing the pedestrian. All 3 passengers will be saved.
AV to swerve to the right, hitting the tree resulting in all 3 passengers being killed. The pedestrian will be saved.
Q6

Appendix C

Figures

	Australian Population					Sample Population					
Age Category	Males	Females	Total	Males	Females	Age Category	Male Samples	Female Samples	Total	Males	Females
18-24	1,223,509	1,155,990	2,379,499	13%	11%	18-24	31	29	59	13%	11%
25-34	1,891,333	1,908,521	3,799,854	20%	18%	25-34	47	48	95	20%	18%
35-44	1,679,072	1,699,537	3,378,609	17%	16%	35-44	42	42	84	17%	16%
45-54	1,576,468	1,639,088	3,215,556	16%	16%	45-54	39	41	80	16%	16%
55-64	1,435,273	1,504,814	2,940,087	15%	15%	55-64	36	38	73	15%	15%
65+	1,891,462	2,425,843	4,317,305	20%	23%	65+	47	61	108	20%	23%
Total	9,697,117	10,333,793	20,030,910	48%	52%		242	258	500	48%	52%

Figure C1. Australian population (Australian Bureau of Statistics, 2021b) and sample population.

	Gender (Nominal)	Samples	Ratio
1	Female	261	50.6%
2	Male	255	49.4%
	Age Categories (Categorical)		
1	18-24	58	11.2%
2	25-34	104	20.2%
3	35-44	94	18.2%
4	45-54	77	14.9%
5	55-64	77	14.9%
6	65+	106	20.5%
	Education Level (Ordinal)		
1	High School	178	34.5%
2	Undergraduate Degree	135	26.2%
3	College	110	21.3%
4	Postgraduate Degree	80	15.5%
5	Other	13	2.5%
	Customer Adopter Category (Categorical)		
1	Late majority	169	32.8%
2	Early majority	162	31.4%
3	Early adopters	70	13.6%
4	Innovators	63	12.2%
5	Laggards	48	9.3%
6	Other	4	0.8%
	Own Level 2 AV? (Nominal)		
1	No	413	80.0%
2	Yes	103	20.0%

Figure C2. Sample population by demographic information.

Question	Let ODS decide
1	55%
2	54%
3	37%
4	47%
5	56%
6	58%

Figure C3. ODS popularity by crash scenario.

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