Is Bigger Better? Vehicle Size and Driver Perceptions of Safety

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1. Introduction

Large, high mass vehicles have poor fuel efficiency and a high level of pollutant emissions when compared with lighter vehicles (Beydoun & Guldmann, 2006). Despite tangible fuel savings and the environmental benefits of smaller vehicles, the New Zealand public are driving larger vehicles, with mean engine size increasing from 1.9L to 2.1L from 1990 to 2004 (MOT, 2006). A similar trend is observed in Australian and U.S. vehicle fleets, with particular concern being raised for the popularity of Sport Utility Vehicles (SUVs) (Davis & Truett, 2000; ATSB, 2002; Plaut, 2004). The focus of this paper is to examine some of the probable reasons behind the public demand for larger vehicles, with a particular focus on perceived safety as a key motivator.

The perception of large vehicle safety may stem from a set of naïve physics heuristics (see Hegarty & Kozhevnikov, 2001) regarding collisions that focuses concerned motorists on the concept that "bigger is better", without consideration of wider safety implications. It has been clearly established that passengers of heavier cars have a lower risk of serious or terminal injury in two-vehicle collisions relative to passengers of lighter cars (Evans, 2004; Tay, 2002; Wenzel & Ross, 2005). However, when balanced against other accident scenarios, such as loss of control roll-over accidents, where SUVs have higher accident risk, and taking into account the reduced safety of other road users, the reality that bigger is better is far from clear (Wenzel and Ross, 2005).

Advertising campaigns have pushed the SUV safety image to the point where they have been cautioned against promoting "limit ads" that show SUVs driving in extreme terrain, performing high-speed manoeuvres that exaggerate the emergency handling capabilities of this vehicle type (United States Department of Justice, 2003). Notwithstanding negative environmental impacts, large SUVs are also promoted for their active "outdoor" image, with the ability to go off-road and tow heavy loads, and the capacity to carry more people and provide extra storage space (Davis & Truett, 2000; Bradsher, 2004). This is not an irony that is lost on anti-SUV lobbyists that state that SUVs are anti-environment and suggest that the off-road ability of these vehicles is utilised by only a minority of drivers (Bradsher, 2004). There are also suggestions that SUV drivers are more aggressive and overconfident compared with other car drivers (AAMI, 2004; Olsen, 2002; Plaut, 2004; Rudin-Brown, 2004).

Anti-safety arguments regarding SUVs show that any safety gains from driving a large vehicle are offset by the instability of SUVs and the reduction in safety of smaller vehicle passengers, cyclists and pedestrians. Wenzel and Ross (2005) found that weight alone does not increase overall passenger safety, and that a typical SUV driver has a comparable risk to that of a car driver. For example, larger vehicles, with a higher centre of gravity are more prone to rollover accidents (Kweon & Kockelman, 2003; Wenzel and Ross, 2005). From a wider perspective, the best overall safety benefit for the occupants in a two-vehicle collision occurs when both vehicles are the same mass, and when both vehicles have a small mass (Tay, 2002). Still, the best individual occupant safety in a two-vehicle collision is afforded to the passengers of the vehicle that has a larger mass (Tay, 2002).

Larger vehicles are typically taller and provide the driver with a higher viewpoint and a better sight distance of the road ahead. However, Rudin-Brown (2004) found that headway to a

lead vehicle increases when the lead vehicle is large, indicating driver compensation to the reduction in sight distance caused by the large vehicle. Individual safety gains relative to other drivers may be regarded as “selfish safety”, where a driver can obtain self-protection in a larger vehicle with a higher level of passenger safety in a multiple car collision, and a better line of sight of the road ahead. Smaller vehicles can be considered a more altruistic alternative, with better overall vehicle fleet safety, less reduction in sight distance, and a lower level of vehicle emissions. Even with the overall benefits of smaller vehicles, the trend is toward larger vehicles, the issue is why?

To examine whether passenger safety is an antecedent for driving a large vehicle, the perceived safety of the vehicle can be examined through surrogate measures of driver risk taking behaviours. Wasielewski and Evans (1985) photographed traffic and observed that the drivers of higher mass vehicles had a higher level of risk-taking, as indicated by lower seat belt use, shorter headways to lead vehicles and faster speeds. Horswill and Coster (2002) found that a greater number of vehicle safety features increases driver intentions to exceed the speed limit, allow smaller headways, and accept smaller gaps when entering traffic. Thomas and Walton (2006) found that SUV drivers were less likely to adopt the recommended ’10-2’ steering wheel hand placement, suggesting a lower level of perceived risk when driving through the same environment as other drivers.

The purpose of this study is to determine whether SUV drivers perceive they are safer than car drivers when travelling in their vehicle. A further aim is to examine whether a concern for safety motivates the vehicle size selection process. To test safety motivations, attitudes towards vehicle size and safety, vehicle characteristic preferences, naïve knowledge of collisions, and self-reported driver risk taking behaviours, such as overtaking behaviour are examined. It is expected that if safety concerns motivate vehicle size selection decisions then SUV drivers will believe that there is a strong positive relationship between vehicle size and passenger safety. Alternative explanations for the popularity of SUVs that are not motivated by concern for passenger safety are also examined. These include the utility of the vehicle, vehicle performance, lower environmental concern, and the prestige and status that may be associated with larger, more expensive vehicles.

2. Method

Participants

Participants consisted of 571 drivers of SUVs and cars from the Wellington region in New Zealand. Drivers of trucks, motorbikes, and easily identifiable commercial vehicles were excluded from the study. A sample of driver licence plates was recorded over five different weekdays during fine weather conditions. From this sample 750 car drivers and 750 SUV drivers were mailed questionnaires. The response rate to questionnaires was 38% (Car n = 288; SUV n = 283).

Example small vehicle

Example medium vehicle

Example large vehicle (SUV)

Figure1. Example pictures of small, medium and large motor vehicles

Differentiation of vehicle size was assured by self-report about the size of a driver's main vehicle. Figure 1 shows the three categories and example pictures given to participants. Participants were discarded if they were observed in an SUV but reported driving a small vehicle or if they were observed in a car and reported driving a large vehicle. This reduced the overall sample, N = 496, with 47.4% of the reduced sample driving SUVs. This reduced sample was used for all further analyses.

The mean age of the sample was 46.2 years (SD = 13.4 years). There was no difference in mean age between SUV and car samples (t (476) = -1.495, p > .05). Males were slightly overrepresented in the overall sample with 58.5% males. A chi-square test reveals a relationship between vehicle type and gender, with males being more likely to drive SUVs (χ^2 (1, N = 491) = 3.928, p < .05). SUV drivers are more experienced, both in terms of years of driving (t (427) = -2.508, p < .05) and actual annual driving exposure (Car M = 15500km, SD = 7560km; SUV M = 18400, SD = 8395km; t (491) = -4.008, p < .001). SUV drivers have a higher income than car drivers (t (477) = -4.156, p < .001).

Materials

The questionnaire has 133 items and examines attitudes towards vehicle size and safety, household characteristics, vehicle characteristics, driver characteristics, and other demographic information. Key items focussed on reported driving behaviour, driving infringements, car purchase decision making, naïve physics, prestige, environmental concern, and locus of control (Rotter, 1966). Seven items measure self-reported, safe driving behaviour; including seat belt use, tyre pressure, warrant of fitness[1], following distance, hand positions on the steering wheel, overtaking behaviour, and cell phone use while driving. Five items examine driving infringement history, from "I have never had a parking ticket" to "I have never lost my licence (ie been disqualified from driving)". Ten items examine factors that Bottomley, Doyle and Green (2000) identify as likely to influence car purchase decision making, such as performance, comfort and fuel consumption. Six items examined knowledge of naïve physics in the context of vehicle mass, vehicle speed and passenger protection in collisions. Seven items (adapted from Ellayway, Macintyre, Hiscock & Kearns, 2003) investigate the prestige (e.g. "my vehicle is a reflection of my lifestyle") and feeling of protection associated with driving their vehicle (e.g. "I feel I have privacy when I'm in my vehicle"). Four items examine self-other comparisons of driver safety and consideration using 10-point semantically anchored scales (e.g. "Please estimate how safe the AVERAGE driver is" and "Please estimate how safe a driver YOU are").

Seven items examine environmental concern, futility, and fatalism (Walton, Thomas & Dravitzki, 2003). The environmental concern items form a 5-item scale that has a Cronbach's Alpha of 0.8, indicating a high degree of internal reliability. Twenty items (adapted from Rotter, 1966) measure locus of control, such as "I do not really believe in luck or chance" and "Other people usually control my life". A high internal locus of control indicates that a person believes they control their own fate, whereas a high external locus of control indicates that a person believes they are controlled by the environment and situational factors around them. Drivers with a higher internal locus of control may wish to control their passenger safety by driving a vehicle they perceive is safe. The locus of control (LOC) scale has a Cronbach's Alpha of 0.63, showing a moderate degree of internal reliability. The item "I never try anything that I am not sure of" has a high level of disagreement and shows low inter-item correlation, so it is removed from the scale to increase reliability and make it a 19-item scale.

[1] A warrant of fitness is the 6-monthly vehicle safety inspection a vehicle must pass to be considered roadworthy in New Zealand.

Procedure

Observers were placed on the side of a 100 kph speed zone motorway into Wellington City in New Zealand. For the purposes of this study, SUVs were identified by several simple visual criteria including passenger carrying capacity, vehicle make and model, vehicle body shape, and high ground clearance.

Most analyses were conducted using Mann-Whitney U tests to examine any differences between SUV and car drivers. An alpha level of .05 was used for all statistical tests.

3. Results

Vehicle size and safety

Driver attitudes towards vehicle size and safety were examined with 16 Likert scale items (1 = Strongly Disagree to 5 = Strongly Agree). Table 1 shows the means, standard deviations and differences in level of agreement for these items between car and SUV drivers. Car and SUV drivers both perceive that larger motor vehicles and motor vehicles that have greater mass offer better passenger protection in a collision (see Table 1). A Wilcoxin's matched pairs sign ranks test reveals that drivers do distinguish between size and mass, believing that larger vehicles offer better protection than heavier vehicles (Larger M = 3.60; Heavier M = 3.31; T (485) = -6.616, p < .001). Table 1 shows that several items indicate that car drivers believe that smaller vehicles are safer and SUV drivers believe that larger vehicles are safer.

SUV drivers are more likely to agree that an SUV is the safest vehicle on the road, that they would not feel safe in a smaller car and that when all things are considered it is safer to drive a larger motor vehicle. In comparison, car drivers would happily drive a smaller vehicle, would rather have a small powerful car than a large underpowered car, and believe that smaller vehicles would be best in addition to being safer if there were less large vehicles around.

SUV drivers have a greater level of agreement that taller vehicles increase safety by offering better visibility for the driver, whereas car drivers suggest that large vehicles reduce safety by blocking the visibility of vehicles that are following them. Similarly, car drivers have higher agreement that any benefit gained from being in a taller vehicle is reduced by a higher centre of gravity.

Both SUV and car drivers report to be knowledgeable about vehicle safety (Car M = 3.43, SD = 0.78; SUV M = 3.63, SD = 2.72). There are no significant differences between SUV and car drivers in terms of their actual knowledge of naïve physics relating to vehicle collisions. Overall, 68% of participants recognise that the combined safety of passengers of both vehicles is higher in a collision between two small vehicles. Eighty-four percent of participants recognise the safety benefits of being in a larger vehicle colliding with a smaller vehicle, but only 56% of participants recognise that this is the least safe scenario for the combined safety of passengers of both vehicles.

Table 1. Means and differences between degree of agreement with statements regarding vehicle size and safety for car and SUV drivers.

Vehicle size and safety items	Car M	Car SD	SUV M	SUV SD	Mean Difference	
Taller vehicles increase safety as they provide better visibility for the driver	3.12	0.99	3.58	0.84	-0.46	***
When all things are considered, it is safer to drive a larger motor vehicle	3.14	0.88	3.50	0.78	-0.36	***
An SUV is the safest vehicle on the road	2.15	0.92	2.47	0.88	-0.32	***
I would not feel safe in a smaller car	2.59	0.98	2.91	1.01	-0.32	***
My car is safer than the average car	3.14	0.88	3.36	0.74	-0.22	**
In an accident, taller vehicles, where the passenger is raised further away from the ground, offer better passenger protection	3.00	1.06	3.15	0.96	-0.15	
Larger motor vehicles offer better protection for their passengers in a collision	3.57	1.01	3.65	0.84	-0.08	
You are at much greater risk of serious injury in a car-to-car collision if you are in a small car	3.65	0.91	3.72	0.8	-0.07	
Motor vehicles that are heavier (have greater mass) offer better protection for their passengers in a collision	3.32	0.91	3.30	0.87	-0.02	
Drivers of small cars are more cautious when driving	2.65	0.93	2.41	0.87	0.24	**
Any safety advantage gained from being in a taller vehicle is reduced by the instability of a higher centre of gravity	3.68	0.88	3.38	0.85	0.30	***
If all vehicles were small there would be less risk of injury in a car-to-car collision	2.81	1.03	2.49	0.99	0.32	***
I would happily drive a smaller vehicle	3.23	1.12	2.77	1.09	0.46	***
I would rather have a small powerful car than a large underpowered car	3.52	0.96	3.06	1.01	0.46	***
Large vehicles reduce overall safety because they decrease the visibility for the drivers that are following them	3.54	0.92	2.94	0.93	0.60	***
Smaller vehicles would be best if there weren't so many large vehicles on the road	3.54	2.15	2.86	0.97	0.68	***

*** = p < .001 ** = p < .01 * = p < .05

SUV drivers report less safe driving behaviour on three out of the seven behavioural safety measures when compared with car drivers. Table 2 shows the means, standard deviations

and differences between car and SUV drivers for the seven behavioural safety measures (1 = Strongly Disagree to 5 = Strongly Agree). SUV drivers are more likely to drive with one hand on the steering wheel when relaxed, more likely to use a cell phone (without a hands-free kit) when driving, and less likely to maintain headway, described as following two seconds behind another vehicle[2]. Similarly, car drivers are more likely to agree that drivers of small cars are more cautious when driving (see Table 1). In terms of reported traffic history, SUV and car drivers are equally likely to have traffic infringements, such as parking tickets, speeding tickets, involvement in traffic accidents, and traffic infractions causing disqualification of licence.

There is no difference in Locus of Control (LOC) between the SUV and car groups (U (494) = -1.387, p > .05), with both groups expressing a high internal locus of control, indicating that they believe they have personal control over their own fate (SUV M = 3.74, SD = 0.29, Car M = 3.69, SD = 0.32).

Self-other comparisons using Wilcoxin's matched pairs signed ranks tests found that SUV and car drivers all rate themselves as safer (T (490) = -16.8, p < .001) and more considerate (T (489) = -17.131, p < .001) than the average driver. SUV drivers believe they are safer drivers when compared with car drivers (SUV M = 7.28, SD = 1.39; Car M = 6.99, SD = 1.55; U (490) = -2.043, p < .05). There was no difference in ratings of consideration for other drivers between car and SUV drivers (U (489) = -0.234, p > .05). There was also no difference between car and SUV drivers on the item "I am a very cautious driver" (U (488) = -1.13, p > .05), with both groups indicating a high level of caution when driving (SUV M = 3.66, SD = 0.76; Car M = 3.59, SD = 0.81).

Table 2. Means and differences between degree of agreement with behavioural safety measures for car and SUV drivers.

	Car		SUV		Mean	
Behavioural safety measures	M	SD	M	SD	Difference	
When in a relaxed driving situation I normally keep only one hand on the steering wheel	2.53	1.23	2.8	1.17	-0.27	*
I never let my vehicle's warrant of fitness go past the due date	4.23	1	4.28	0.95	-0.05	
I regularly check the air pressure in my vehicle's tyres	3.37	1.07	3.39	1.02	-0.02	
I prefer to wait for a passing lane to overtake slower-moving traffic	3.76	1.05	3.66	1.04	0.1	
I don't always use my safety belt during very short drives, such as going to the dairy	1.58	1.14	1.47	1	0.11	
When following another vehicle, I always use the 2 second rule	4.03	0.74	3.84	0.8	0.19	**
I would never talk on my cell phone when driving unless I had a hands-free kit	3.16	1.32	2.89	1.15	0.27	*

1 = Strongly Disagree 3 = Not sure/Neutral 5 = Strongly Agree
*** = p < .001 ** = p < .01 * = p < .05

Ten vehicle characteristics are examined for importance when making a vehicle purchase decision using 5-point Likert scales (1 = Very Unimportant; 2 = Unimportant; 3 = Not sure/Neutral; 4 = Important; 5 = Very Important). When purchasing a vehicle SUV drivers

[2] Two seconds is the recommended headway when following another vehicle in New Zealand.

place less importance on running and maintenance costs (U (490) = -3.558, p < .05) and fuel consumption (U (488) = -2.335, p < .05), and more importance on space (U (490) = -3.201, p < .05). Passenger safety is perceived as very important when making a vehicle purchase decision by both driver groups, whereas fuel consumption ranks 7th out of the 10 purchase characteristics, showing less importance in the decision making process (see Table 3).

Table 3. Vehicle purchase characteristics, ranked by mean level of importance, for car and SUV drivers.

	Car			SUV		
Rank	Feature	M	SD	Feature	M	SD
1	Reliability	4.43	0.55	Reliability	4.44	0.63
2	Passenger Safety	4.11	0.73	Space	4.12	0.86
3	Running and maintenance costs	4.10	0.82	Passenger Safety	4.11	0.74
4	Road handling	4.09	0.67	Road handling	4.07	0.75
5	Comfort	4.02	0.63	Comfort	4.00	0.76
6	Space	3.93	0.86	Running and maintenance costs	3.95	0.84
7	Fuel consumption	3.82	0.90	Fuel consumption	3.68	0.92
8	Aesthetics	3.59	1.02	Aesthetics	3.66	0.96
9	Performance	3.58	0.91	Performance	3.54	0.92
10	Security features	3.48	0.94	Security features	3.51	0.95

Non-safety alternatives

Car drivers have significantly higher concern for the environment on the GEC scale when compared with SUV drivers (U (490) = -2.249, p < .05). Both groups express a strong concern for the environment (Car M = 3.61, SD = 0.71; SUV M = 3.48, SD = 0.64). SUV drivers are more likely to embrace the concept that it is futile to change their emissions behaviour because the rest of the population will not change their behaviour (U (489) = -3.495, p < .01).

Several vehicle usage factors represent environmental behaviour in terms of fuel consumption and vehicle emissions. SUV drivers have more vehicles per household when compared with car drivers (SUV M = 1.96, SD = 0.84; Car M = 1.77, SD = 0.76; t (394) = -2.42, p < .05). SUV drivers also travel a greater distance annually than other car drivers (Car M = 15500km, SD = 7560km; SUV M = 18400, SD = 8395km; t (491) = -4.008, p < .001). SUV drivers have more modern vehicles when compared with car drivers (SUV M = 8.17years, SD = 4.39; Car M = 9.44years, SD = 4.55; t (470) = 3.07, p < .05).

SUV drivers are more likely to agree that a smaller vehicle would limit the utility of their vehicle (U (487) = -8.022, p < .001). The SUV drivers in the sample are more likely to have children, and also more likely to drop their children at school compared with the car drivers in the sample. Analysis using a Mantel Hertel odds ratio finds that SUV drivers report that they are 5.16 times more likely than car drivers to use their vehicle for off-road trips, such as travelling on unsealed gravel/dirt roads, beaches or farmland (p < .001).

Aesthetics, including the style, design and finish of the vehicle, ranked 8th in importance by both car and SUV drivers when making a vehicle purchase decision (see Table 3). There is

some evidence of an influence of perceived prestige, with SUV drivers being more likely to agree that they drove an expensive vehicle (U (488) = -6.032, p < .001), that most people would like a vehicle like theirs (U (489) = -2.240, p < .05), and that their vehicle is a reflection of their lifestyle (U (489) = -3.115, p < .01).

The sense of protection (privacy, escape from stress, and safety) gained from driving a vehicle was no different between SUV and car drivers (U (487) = -0.408, p > .05). When driving their vehicles, SUV and car drivers report a feeling of privacy (Car M = 3.45; SUV M = 3.39) and safety (Car M = 3.50; SUV M = 3.48), but do not feel they can get away from stresses (Car M = 2.67; SUV M = 2.80).

Preference in a vehicle's performance (acceleration and power) did not differ between SUV and car drivers (U (488) = -0.868, p > .05). Compared with other vehicles of the same size range, there was no difference in reported engine power between SUV and car drivers (U (495) = -0.798, p > .05). Only 12% of drivers believed their vehicle was more powerful than other vehicles of the same size. Performance, defined as acceleration and power was ranked 9th in importance when making a purchase decision.

4. Discussion

Although policy makers are aware of the negative impacts of SUVs and other large vehicles, they are cautious not to impede on the rights of an individual to protect themselves and their family. SUV drivers have a strong perception of safety associated with their vehicle and declare that they would not feel safe or happy driving a smaller vehicle. Concern for safety is likely to be raised as an argument to defend driving a larger vehicle, such as an SUV, even if there is no overall safety benefit from driving that vehicle. However, the findings of this research provide evidence that concern for safety does not relate to vehicle size selection decisions.

Small car drivers value safety very highly when making a vehicle purchase decision, they have a high internal LOC, the same level knowledge of vehicle collisions as SUV drivers, are more cautious than SUV drivers, and still choose to drive a small vehicle. If vehicle size is important when selecting a "safe" vehicle, then SUV drivers should be more knowledgeable about the naïve physics of vehicle collisions, but this is not the case. Drivers that place a high value on safety, particularly those with a high internal LOC, will attempt to control their passive safety by actively selecting a vehicle they perceive as safe. However, there is no difference in regard for safety and LOC between small car and large SUV drivers. These findings all support the theory that actual safety decisions when selecting a vehicle are made independent of vehicle size. In fact, while SUV drivers rate themselves as safer drivers, in reality they report less safe driving behaviour than smaller car drivers.

SUV drivers have lower perceived risk, are more likely to be distracted by cell phones, and adopt a more aggressive driving style with close following distances to other vehicles. Utter's (2001) observations of more prevalent hand held cell phone use, Thomas and Walton's (2006) findings regarding lower perceived driver risk based on more relaxed hand positions, and Wasielewski and Evan's (1985) findings of smaller headways when following other vehicles are all corroborated by SUV drivers in this study. The inflated perception of safety and more prevalent risk taking behaviour is fuelled by advertising that exaggerates the emergency handling capabilities of SUVs (United States Department of Justice, 2003).

Negative attitudes towards SUVs (AAMI, 2005; Bradsher, 2004) increase the need for drivers to defend their vehicle purchase decision. SUV drivers rationalise that the overall safety benefits of a larger mass and better visibility outweigh any negative safety aspects relating to the higher centre of gravity or reduced handling afforded by an SUV. In this respect SUV

drivers adopt an egocentric approach to safety, where individual safety needs are met with higher importance than overall road user safety. SUV drivers are less amenable to Tay's (2002) concept that larger vehicles reduce overall safety in the vehicle fleet, and are less likely to recognise the impairment of safety to passengers in smaller vehicles. They can rationalise that their vehicle provides them enhanced safety, as this is more socially defensible than alternative reasons, such as prestige or utility.

Safety is important to both car and SUV drivers, however, the AAMI (2004) study found that only five per cent of drivers purchased a four-wheel-drive for safety reasons. The primary reason for purchasing a four-wheel-drive was the utility of the vehicle (AAMI, 2004). SUV drivers in this research make good use of their vehicle's off-road functionality as well as the increased space afforded by their larger vehicle, supporting previous evidence that vehicle utility is a large reason for the popularity of SUVs (AAMI, 2004; Davis & Truett, 2000). These findings do not support claims from anti-SUV press (e.g. Bradshaw, 2004) that SUVs are used for off-road purposes by only a minority of drivers.

The acceleration and power of vehicles was ranked almost last when making a vehicle purchase decision, even though analysis of vehicle advertising themes shows that they focus on vehicle performance, including the speed, power and handling of the vehicle (Ferguson, Hardy & Williams, 2003). Similarly, when vehicle size is held constant, there is no difference in engine power between SUV and car drivers. These findings indicate that vehicle selection is independent from the power of the vehicle.

SUV drivers value the prestige of their vehicle more highly than other drivers when making a vehicle purchase decision. Much of this motivation stems from the cost of the vehicle, and the perception that cost excludes other people that are envious of people that drive large SUVs. While size often implies value, this is not necessarily the case with vehicles, for example, sports cars are often associated with lifestyle and prestige and expense. Therefore, a smaller, expensive vehicle may still accommodate the same level of prestige without the negative safety and emissions impacts of a larger vehicle.

Lower environmental concern appears to make it easier to accept any negative environmental impacts from driving a high mass vehicle. SUV drivers are less concerned than car drivers with fuel consumption and have a lower level of environmental concern. SUV drivers are more likely to rationalise their relatively poor emissions behaviour (driving a large vehicle) by arguing that it is futile to change their emissions behaviour, as the rest of the population will not change their behaviour. This egocentric approach to the environment is mirrors the SUV drivers' selfish approach to safety. The situation is similar to a smoker satisfying their individual need for nicotine at the health cost of those around them. The difference is that the damage is not limited to a small proximity, rather their smoking impacts upon the entire environment. Pointing this out and increasing environmental concern may be one strategy to improve emissions behaviour.

5. Conclusions

SUVs have a negative impact on the environment and the general safety of road users. Large SUV drivers are likely to raise safety arguments when defending the use of their SUV, but safety concerns do not appear to motivate drivers to purchase SUVs. In fact, there is some evidence to support the belief that SUV drivers overestimate their driving ability and safety, and are more likely to perform high risk behaviours when driving. The power of a vehicle is also unlikely to be a strong reason for selecting a large SUV. SUV drivers are more likely to be motivated by the reflection of their lifestyle an SUV represents, the utility of their vehicle, in terms of the off-road capabilities and carrying capacity of the vehicle, and their lower concern for the environment. Policy decisions to discourage the use of large vehicles

could easily target the vehicle prestige and utility of smaller vehicles and make more prominent the negative environmental impacts of larger vehicles.

6. Recommendations

- Policy decisions should discourage the unnecessary use of larger vehicles, as these vehicles do have negative impacts on public welfare
- Highlighting the egocentric rationalisations of large vehicle drivers in the context of wider safety and environmental outcomes may help to diffuse the personal safety stance adopted by SUV drivers and lessen the appeal of large vehicles
- The prestige and utility of smaller vehicles should be actively promoted

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8. References

AAMI (2004). *Half of Australian Drivers Say 4WDs Don't Belong in the City.* Media Release, 28 September, 2004. Retrieved from: http://www.aami.com.au/about_aami_insurance/aami_news_centre/pdf/press_releases/press_release_four-wheel%20drives_280904.pdf

Australian Transport Safety Bureau (2002). *Monograph 11: Four Wheel Drive Crashes.* Retrieved January 18, 2006, from the Australian Transport Safety Bureau Web site: http://www.atsb.gov.au/publications/2002/pdf/FWD_Crash.pdf

Beydoun, M. and Guldmann, J. (2006). Vehicle Characteristics and Emissions: Logit and Regression Analyses of I/M Data from Massachusetts, Maryland, and Illinois. *Transportation Research. Part D: Transport and Environment, 11* (1), 59-76.

Bottomley, P.A., Doyle, J.R. and Green, R.H. (2000). Testing the reliability of weight elicitation methods: Direct rating versus point allocation. *Journal of Marketing Research, 37* (4), 508-513.

Bradsher, K. (2004). *High and Mighty: The Dangerous Rise of the SUV.* New York: Public Affairs Press.

Davis, S. C. and L. F. Truett (2000). *An Analysis of the Impacts of Sport Utility Vehicles in the United States.* Retrieved August 8, 2005, from the Oak Ridge National Library Web site: http://www-cta.ornl.gov/cta/Publications/Reports/ORNL_TM_2000_147.pdf

Ellaway, A., Macintyre, S., Hiscock, R. and Kearns, A. (2003). In the driving seat: psychosocial benefits from private motor vehicle transport compared to public transport. *Transportation Research Part F, 6,* 217-231.

Evans, L. (2004). *Traffic Safety.* Bloomfield Hills, Michigan: Science Serving Society.

Ferguson, S.A., Hardy, A. and Williams, A.F. (2003). Content analysis of television advertising for cars and minivans: 1983-1998. *Accident Analysis and Prevention, 35* (6), 825-831.

Horswill, M.S. and Helman, S. (2003). A behavioural comparison between motorcyclists and a matched group of non-motorcycling car drivers: factors influencing accident risk. *Accident Analysis and Prevention, 35,* 589-597.

Kweon, Y.J. and Kockelman, K.M. (2003). Overall injury risk to different drivers: combining exposure, frequency, and service models. *Accident Analysis and Prevention, 35* (4), 441-450.

MOT (2006). [New Zealand Continuous Household Travel Survey]. Unpublished raw data.

Olsen, E.C.B., Lee, S.E. and Wierwille, W.W. (2002). *Analysis of Distribution, Frequency and Duration of Naturalistic Lane Changes.* Washington, DC: National Highway Traffic Safety Administration. Retrieved August 8, 2005, from: http://filebox.vt.edu/users/eolsen/files/HFES_2002/HFES02-ErikOlsen_final.pdf

Plaut, P.O. (2004). The uses and users of SUVs and light trucks in commuting. *Transportation Research Part D, 9,* 175-183.

Rotter, J.B. (1966) Generalized expectancies for internal versus external control of reinforcement, *Psychological Monographs, 80,* (1, Whole No. 609).

Rudin-Brown, C. (2004). Vehicle height affects drivers' speed perception: implications for rollover risk. *Transportation Research Record 1899*, 84-89.

Tay, R. (2002). The Prisoner's Dilemma and Vehicle Safety: Some Policy Implications. *Journal of Transport Economics and Policy, 36(3),* 491-495.

Thomas, J.A. and Walton, D. (In Press). Measuring perceived risk: Self-reported and actual hand positions of SUV and car drivers. *Transportation Research Part F. Traffic Psychology and Behaviour.*

United States Department of Justice (2003, April 23). *Attorneys General Caution Automakers on SUV Advertising.* Retrieved March 15, 2006 from: http://www.state.ia.us/government/ag/latest_news/releases/apr_2003/Ford_SUV.html

Utter, D. (2001). *Passenger vehicle driver cell phone use: results from the fall 2000 national occupant protection use survey.* Report DOT-HS-809-293. Washington, DC: National Highway Traffic Safety Administration. Retrieved March 15, 2006, from the NHTSA website: http://www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/RNotes/2001/809-293.pdf

Walton, D., Thomas, J. and Dravitzki, V. (2003). Commuters concern for the environment and knowledge of the effects of vehicle emissions. *Transportation Research Part D. Transport and the Environment, 9,* 335-340.

Wasielewski and Evans (1985). Do drivers of small cars take less risk in everyday driving? *Risk Analysis and Prevention, 5* (1), 25-32.

Wenzel, T.P. and Ross, M. (2005). The effects of vehicle model and driver behavior on risk. *Accident Analysis and Prevention, 37,* 479-494.