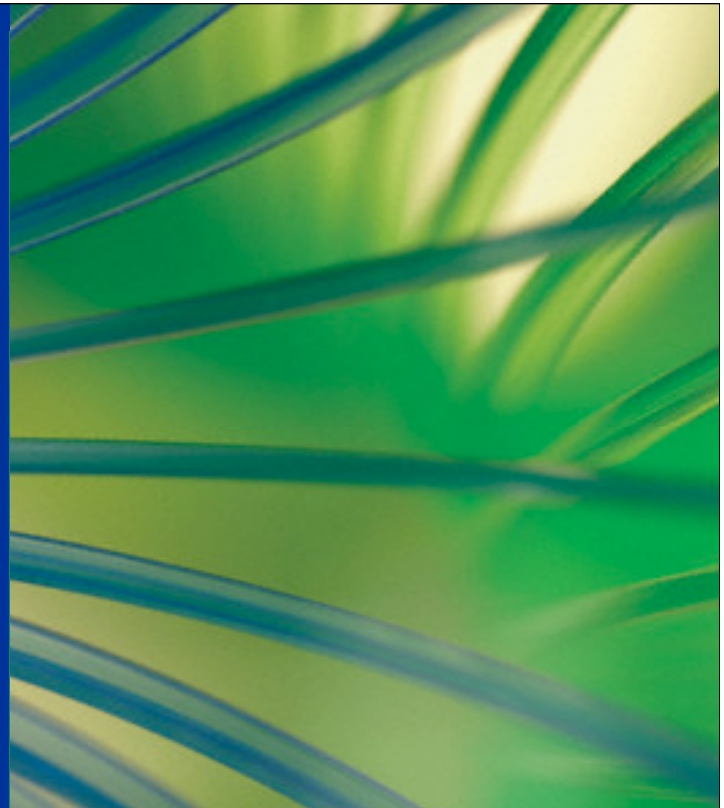




Vehicle Safety Survey Quantifying Perceptions of Weight and Materials



Rocky Mountain Institute



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The Survey Presented Here Explores Consumer Reaction to Lightweight Automobiles and Safety

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1. RMI hired Harris International to conduct an anonymous survey to explore consumer beliefs about the safety implications of lightweight automobiles.
2. Harris asked a group of 1634 respondents 10 questions. The margin of error is $\pm 3\%$.
3. RMI and Harris collaborated to develop questions aimed at discovering general understanding of automobile safety and its relation to design, size, weight, and material.
4. Based on the results of this survey, RMI concludes that while weight is not at the forefront of consumers' minds while thinking about safety, when the issue is specifically highlighted, consumers generally believe that they will be less safe if they are driving a car that is lighter than others on the road. Specific conclusions are:
 - A. There are no significant differences between male and female respondents;
 - B. Vehicle weight and size are at the bottom of consumers' list of all vehicle safety factors, but when asked specifically about weight, consumers believe heavier vehicles will be safer;
 - C. Steel, the most common automotive material, was believed to be the safest, but aluminum, the second most common material, scored fourth;
 - D. More compact car, sedan, and SUV owners would prefer a heavier vehicle, all other things held constant; truck drivers prefer the lighter option.
 - Type of vehicle owned did not appear to be a major differentiator for any other question;
 - E. 58% of respondents believe they would be less safe if their car weighed half as much as others' on the road, but if ALL cars were half as heavy, 46% believe that all road users would be safer;
 - F. In general, consumers understand the positive benefits of fleet-wide lightweighting for themselves.
5. We believe these findings will be helpful for parties interested in marketing lightweight, safe vehicles to consumers, and to parties interested in educating consumers about the safety implications of vehicle weight.

The full results, including breakdown by demographic groups, verbatim responses, and more can be downloaded [here](#) for your own analysis and perusal.

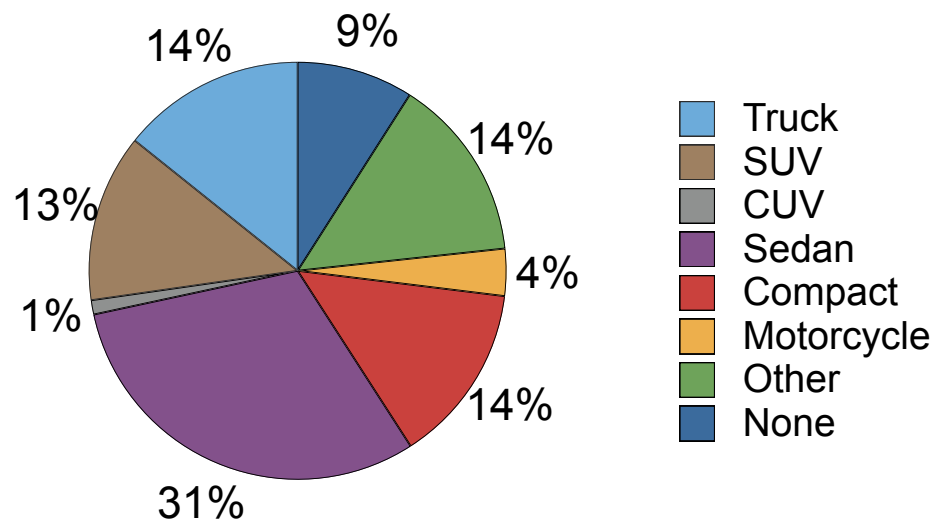
Tell us about implications you find in the data [here](#)!

Survey Demographics Covered Nationally Representative Range of Ages and Type of Vehicle Owned

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Figure 1: What type of vehicle do you own?



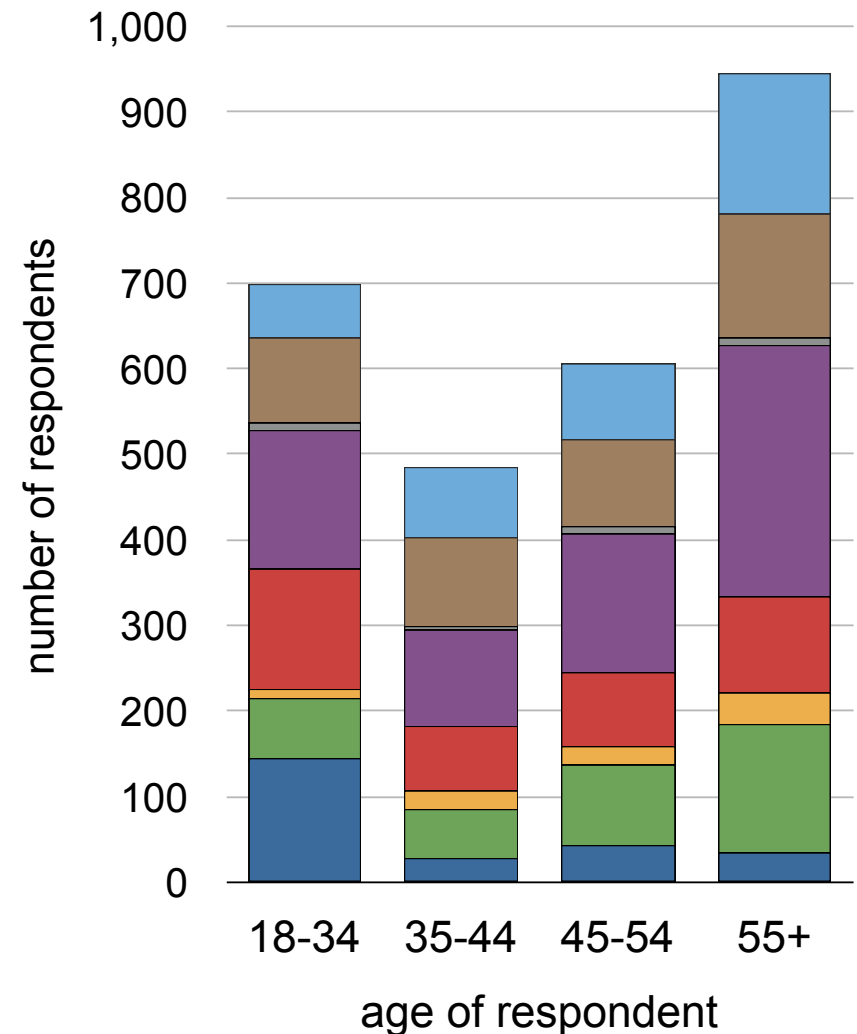
Discussion

This graph indicates the various types of vehicles owned by the survey respondents. This study captures a wide dispersion of automobile markets, including region of the country, marital status, gender, income, employment status, and education level, in addition to age and type of vehicle, displayed here.

Figure 1: When compared with the sales portfolio of two major American automobile manufacturers from 2008, the spread matches within a few percent*.

Figure 2: All age groups had relatively similar distribution of type of vehicle owned.

Figure 2: What type of vehicle do you own? Responses broken down by age.

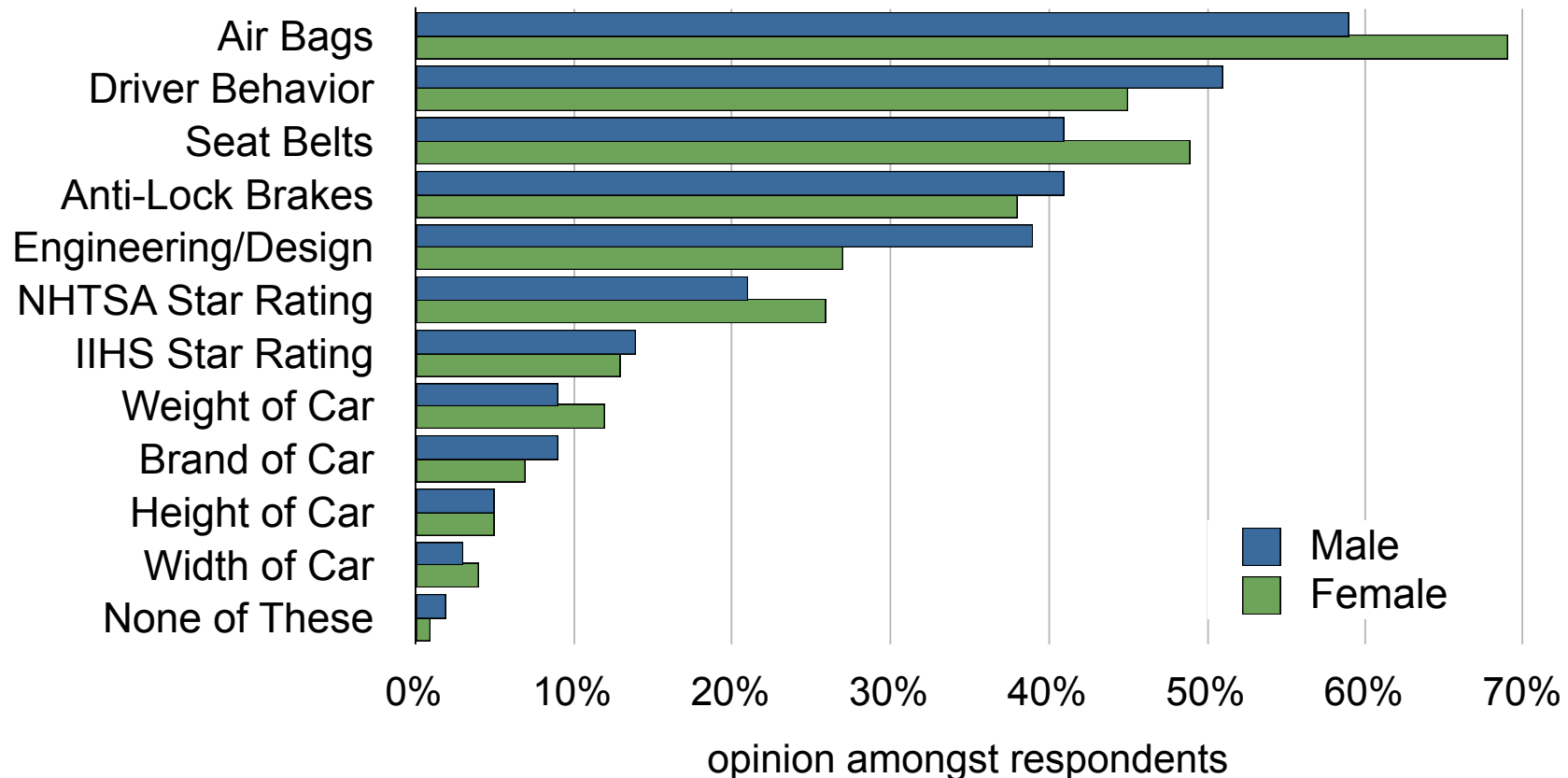


Vehicle Weight and Size Are at the Bottom of Respondents List of Overarching Safety Factors...

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Figure 3a: Which of the following factors make a vehicle safe?



Discussion

Males and females agreed that airbags, driver behavior, and seat-belts most directly affect vehicle safety, and continued to agree throughout most of the safety options. These results suggest that successful marketing of vehicle safety requires no gender bias.

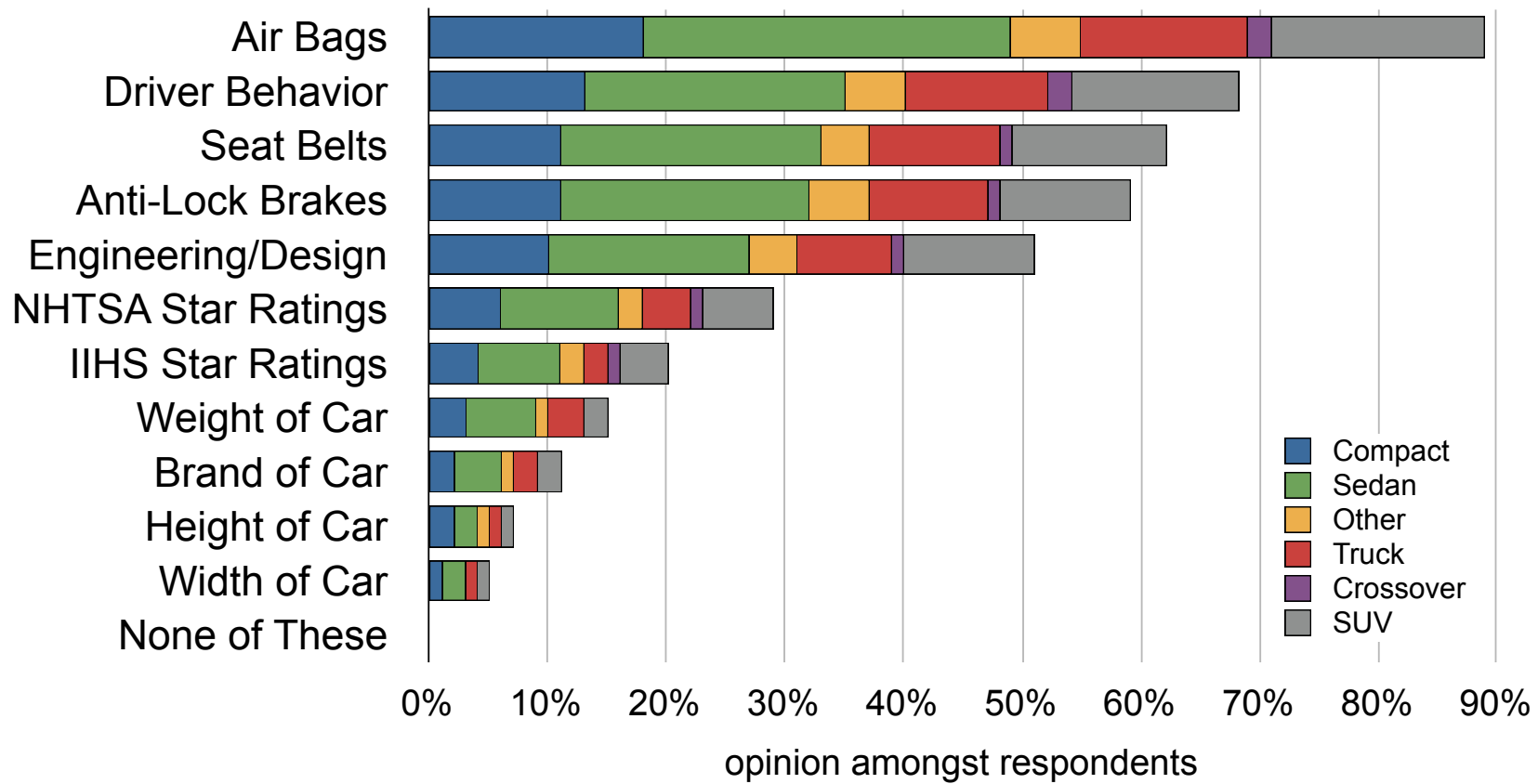
This data indicates that the average automobile consumer does not consider the weight, or size, of the car when considering safety. Also, less than 20% think the NHTSA and IIHS ratings represent vehicle safety.

Vehicle Weight and Size Are at the Bottom of Respondents List of Overarching Safety Factors... (continued)

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Figure 3b: Which of the following factors make a vehicle safe?



Discussion

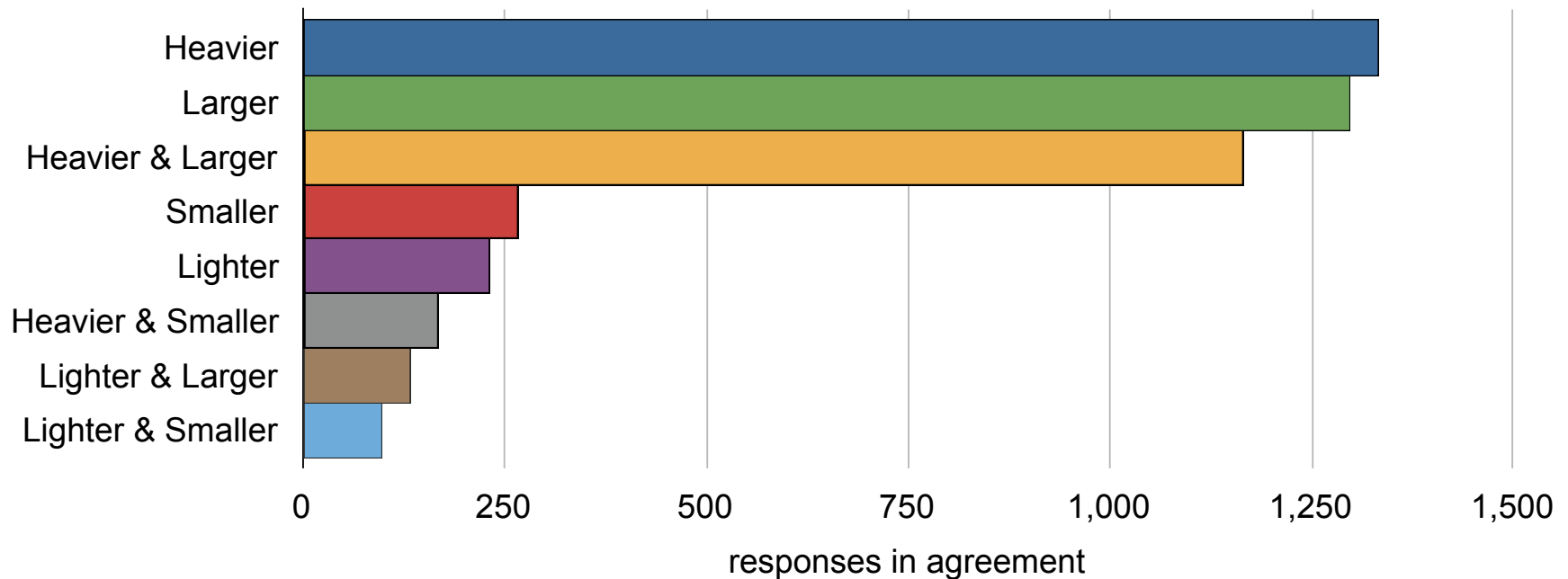
When sorted by the respondents' car type, the rankings occur in the same order as when sorted by gender-based preferences. The car type does not apparently impact the respondents' choices. When represented in this manner, a relative jump in agreement amongst respondents occurs between the Engineering/Design and the crash test star ratings. In other words, over 20% more respondents chose the first five safety factors over the those that chose the remaining six.

...but When Asked Specifically About Weight and Size, Respondents Believe that Heavier and/or Larger Cars will Keep them Safer

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Figure 4: If you were involved in an accident with another car, what size and weight would you prefer your car to be relative to the other car?



Discussion

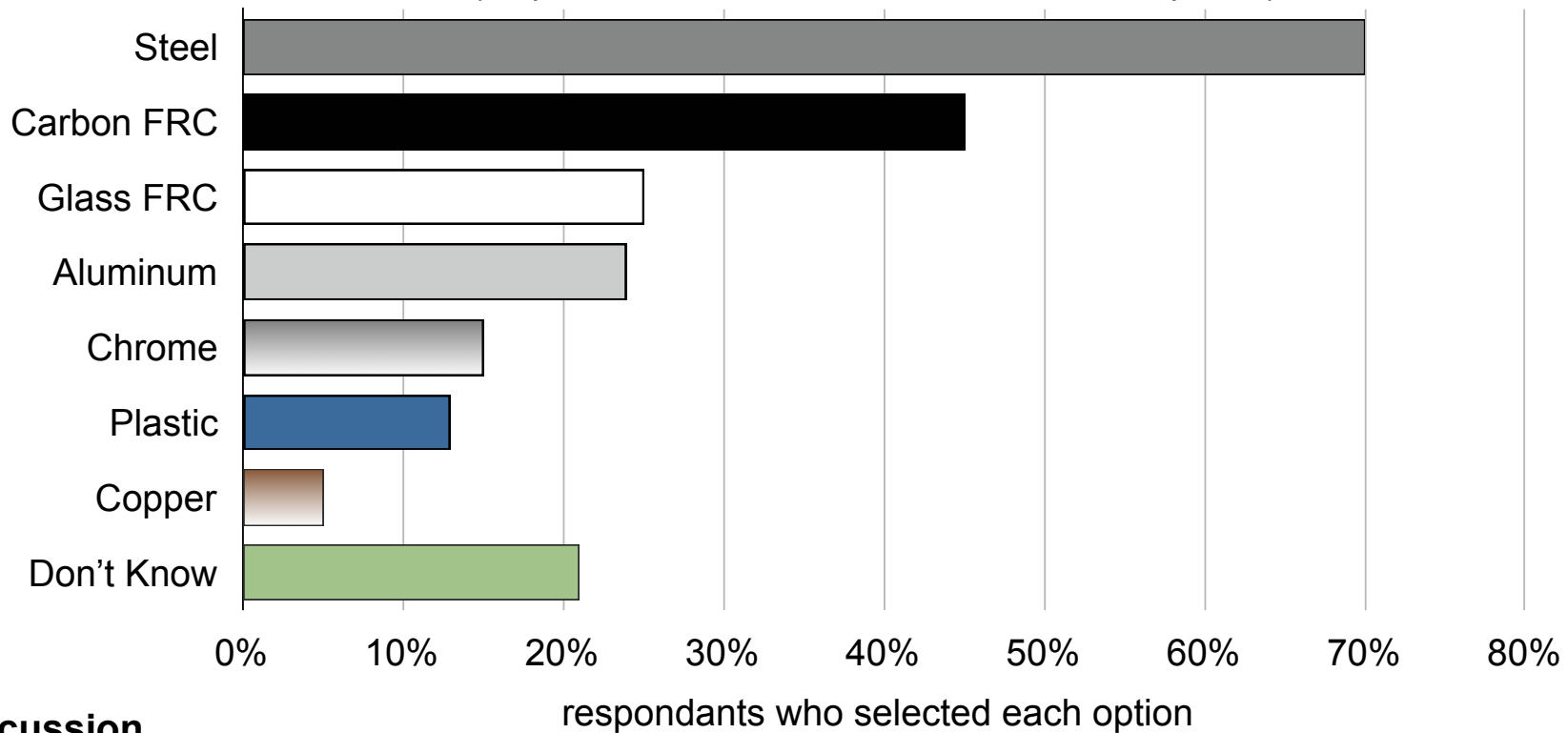
According to the data above, roughly 80% of consumers favor a heavier and/or larger car. Of this group, 65% said specifically “heavier”. Only 3% preferred a lighter and larger vehicle during accidents. This indicates that respondents believe that heavier and/or larger cars will keep them safer than alternatives.

Steel, the Most Common Automotive Material, Was Believed to be the Safest, but Aluminum, the Second Most Common Material, Scored Fourth...

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Figure 5: Which of these materials make the safest car?
(respondents could chose more than one response)



Discussion

A clear majority of survey respondents believed that steel cars are the safest. Steel is the most common material in vehicles, hence probably the most familiar.

Aluminum is the second most common material in vehicles today by average pounds per car (followed by iron and plastics), and several production all-aluminum vehicles exist, such as the Audi A8. Carbon and glass FRP are relatively uncommon in vehicles, and no majority-carbon or glass FRC vehicles are in production. However, respondents believe that carbon and glass FRP vehicles would be more safe than aluminum, plastic, or copper, indicating that the commonness and traditional usage of a vehicle material does not correlate with how safe consumers think it is.

Source: Aluminum Association

Results were generated from an anonymous survey conducted by Harris Interactive for exclusive use by Rocky Mountain Institute

TO BE COMPLETED....



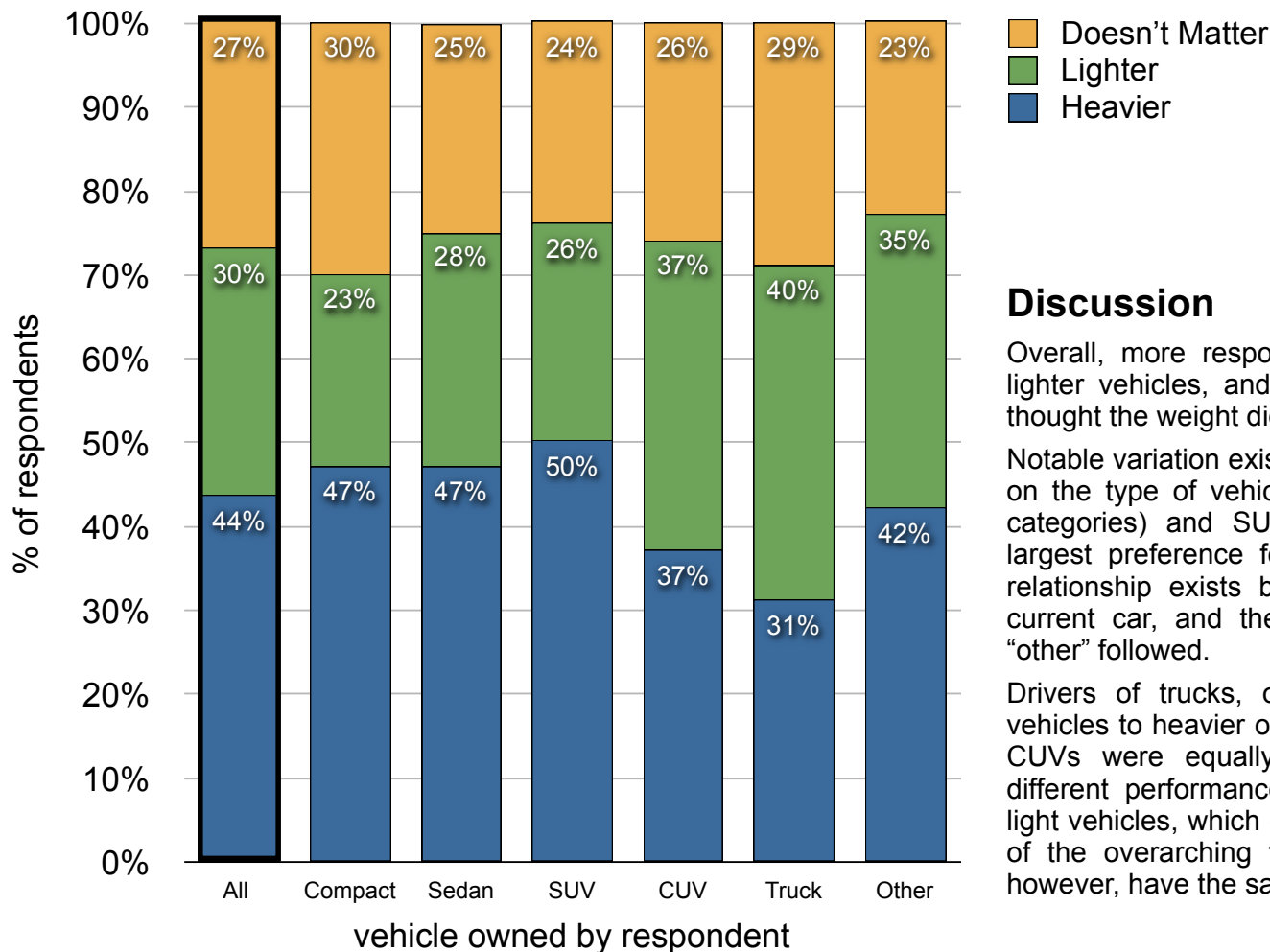
did any respondents write anything about materials. The verbatim explanation might be interesting

More compact car, sedan, and SUV owners would prefer a heavier vehicle, all other things held constant; truck drivers prefer the lighter option.

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Figure 6: If you have an option to buy one of two cars with the same color, size, and crash ratings, but one car weighs half as much as the other, which car would you buy?



Discussion

Overall, more respondents preferred heavier vehicles to lighter vehicles, and more preferred lighter vehicles than thought the weight did not matter.

Notable variation existed in response to this question based on the type of vehicle driven. Compact cars (the lightest categories) and SUVs (the heaviest category) had the largest preference for heavy vehicles, indicating that no relationship exists between the weight of a consumer's current car, and their weight preference. Sedans and "other" followed.

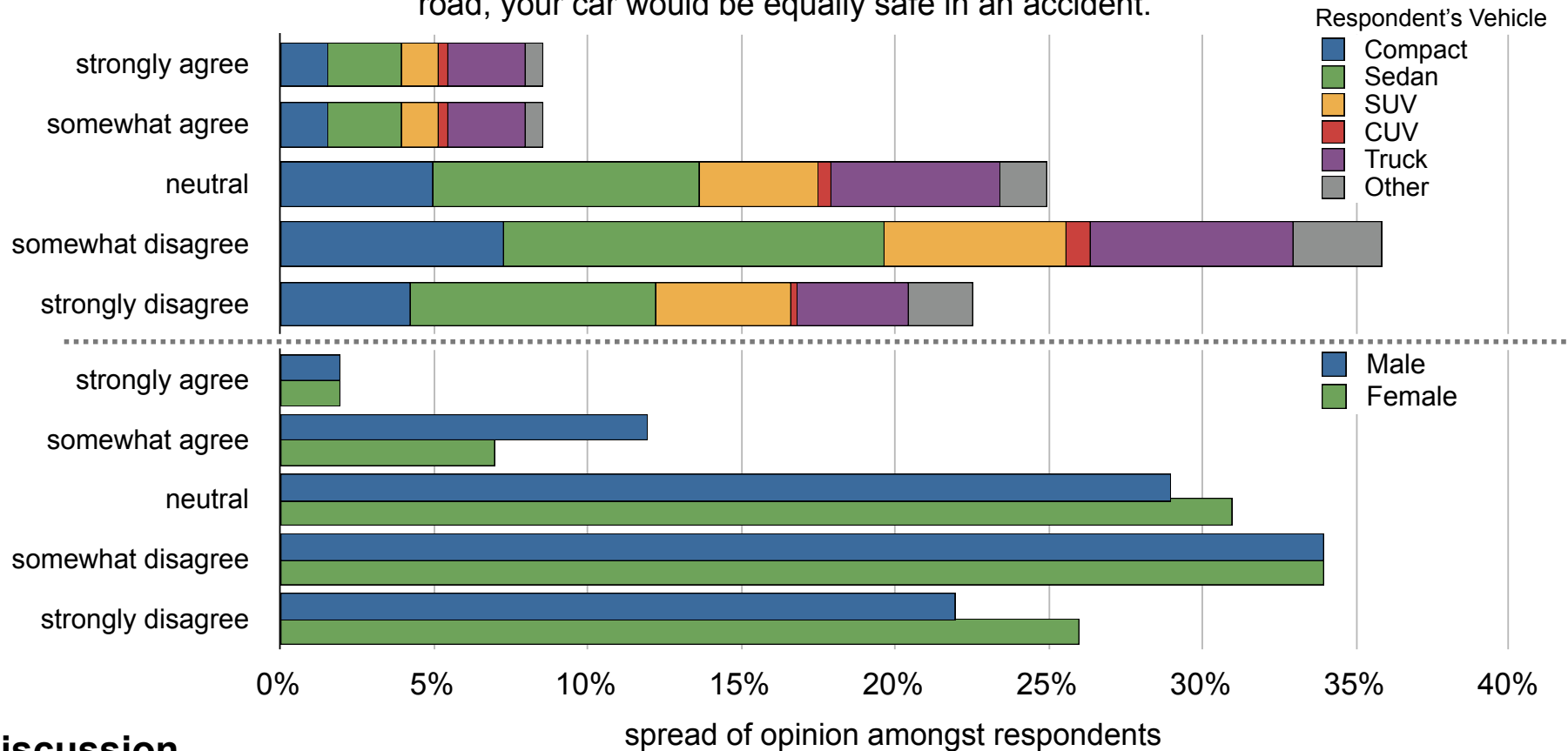
Drivers of trucks, on the other hand, preferred lighter vehicles to heavier ones, all else held equal, and drivers of CUVs were equally divided. Truck drivers often have different performance requirements than drivers of other light vehicles, which could perhaps account for the reversal of the overarching trend for truck drivers. CUV drivers, however, have the same requirements.

58% of respondents believe they would be less safe if their car weighed half as much as others' on the road...

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Figure 7: If your car were half the standard weight of the other cars on the road, your car would be equally safe in an accident.



Discussion

Survey participants tend to disagree with the idea that half-weight cars will be as safe in accidents with today's cars. There is a notable difference between the number of respondents who listed "weight" as a key safety concern (~10%, Figure 3) and the number of participants who believe they would be less safe in a lighter car (60%, Figure 7). This divergence indicates that while weight is not at the forefront of consumers' mind when thinking about safety, when forced to specifically confront the issue, consumers will favor heavier vehicles. Both genders respond similarly except for a slight tendency of males to agree with the safety of a half-weighted car in a conventional fleet more often.

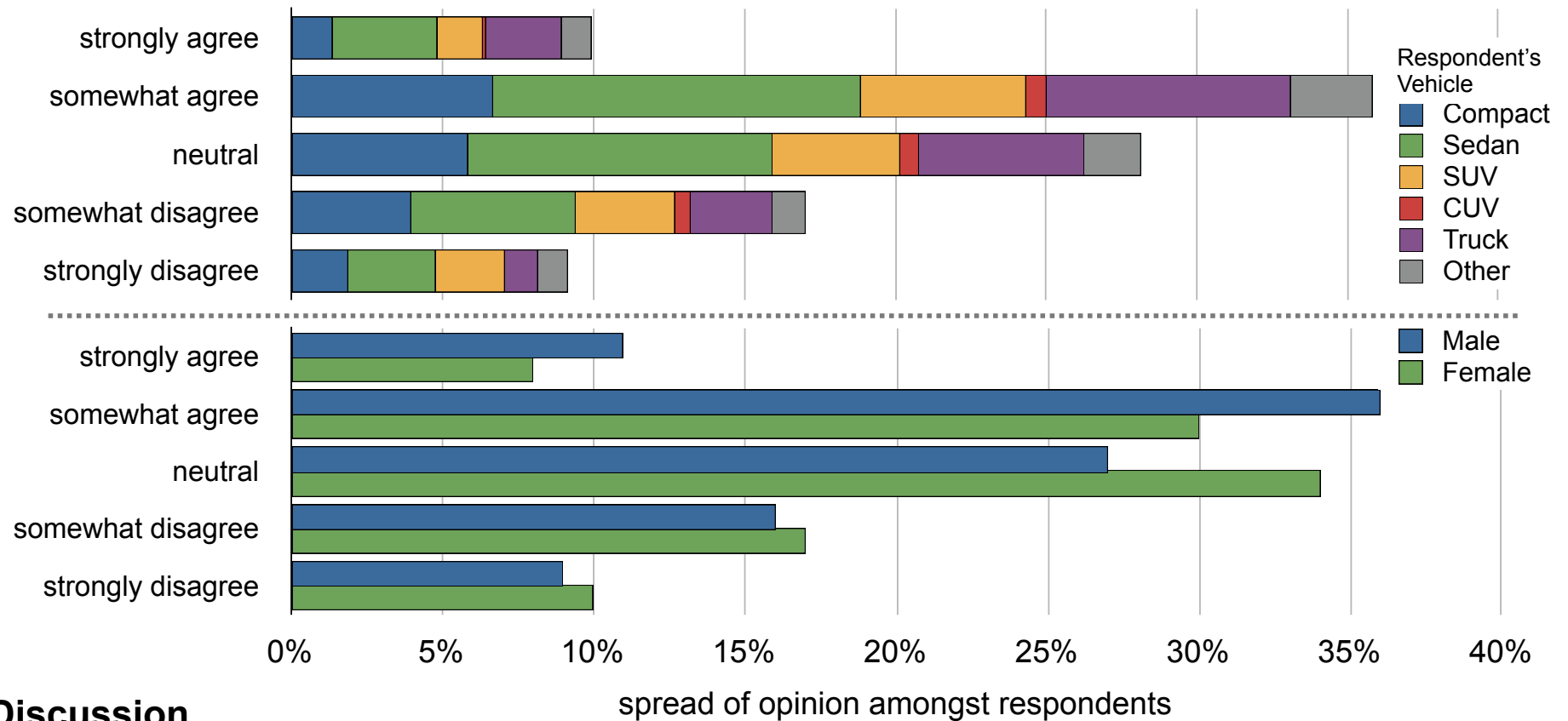
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...but if ALL cars were half as heavy, 46% believe that all road users would be safer

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Figure 8: If ALL cars were half the weight, the road would not only be safer for me, but for everyone else too.



Discussion

Almost half the respondents agreed that halving the weight of the entire vehicle fleet would improve overall safety. 25% disagreed. Almost every relevant study on this topic indicates that a lighter fleet would reduce road deaths and injuries, which over half of respondents either do not accept or do not understand (“disagree” and “neutral” responses). The vehicle owned by the respondents seems to have little effect on their perspective of a half-weighted fleet. Again, both genders respond similarly.

Source: RMI 2007 “Triple Safety”

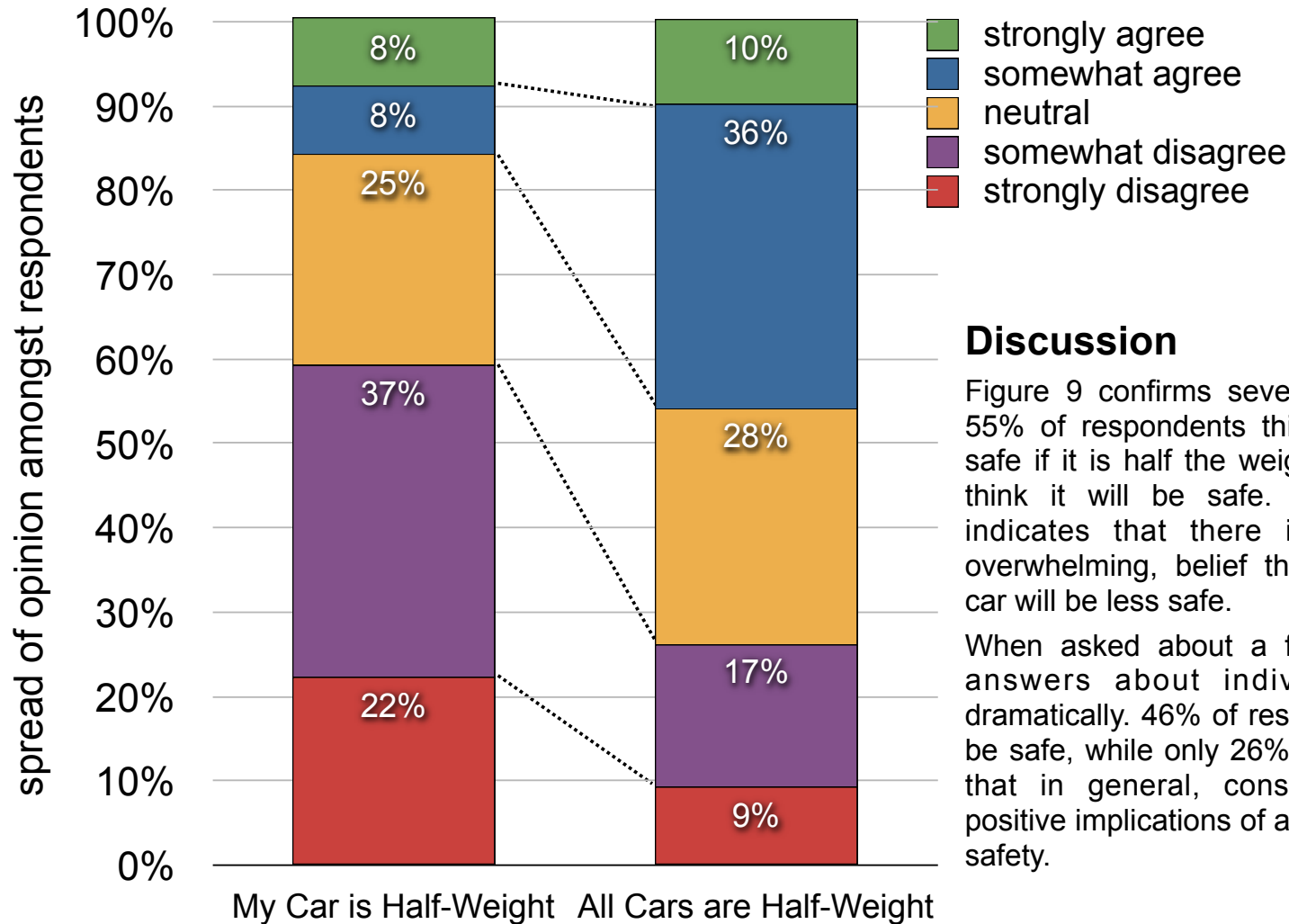
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In general, consumers understand the positive benefits of fleet-wide lightweighting for themselves

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Figure 9: My car is safe if.... (my car is half the weight of others / all cars are half the weight of today's)



Discussion

Figure 9 confirms several trends noted earlier. 55% of respondents think their car will not be safe if it is half the weight of others, while 16% think it will be safe. 25% are neutral. This indicates that there is a general, but not overwhelming, belief that a comparably lighter car will be less safe.

When asked about a fleet-wide lightweighting, answers about individual safety change dramatically. 46% of respondents agree they will be safe, while only 26% disagree. This indicates that in general, consumers understand the positive implications of a lighter fleet for their own safety.