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Hiring Safer Rideshare Drivers: The Influence of Mechanical Reasoning

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Introduction

The rideshare industry is growing rapidly. The Transportation Network Company, Uber, grew from near-zero active drivers in mid-2012 to 327,000 in 2015 (Carson, 2015; Solomon, 2015). Despite this, little research has been done to examine rideshare drivers themselves, or to develop safe driver hiring practices.

Cognitive ability measures have been shown to predict safer driving. Mechanical reasoning, one's understanding of underlying physical forces and mechanical elements, has been found to correlate with spatial reasoning (Pearson, 2014), which may aid driving. Further, given that higher levels of general cognitive ability predict one's ability to learn new concepts quickly (Hunter, 1986), it follows that high mechanical reasoning ability likely allows one to learn mechanical-related concepts, such as driving and the rules of the road, more quickly.

Researchers have also been interested in examining gender differences regarding safety, and findings have generally been strong. Although the gap is closing, male motor vehicle crash deaths are generally double that of female crash deaths (Insurance Institute for Highway Safety, 2018).

The current study set out to understand how individual differences affect safety performance for rideshare drivers. This research focuses on the role that mechanical reasoning may play in preventing unsafe driving, while also examining the influence of gender.

Hypothesis 1a.

Mechanical reasoning correlates positively with road knowledge.

Hypothesis 1b.

Mechanical reasoning correlates negatively with unsafe driving outcomes.

Hypothesis 2a.

Women score lower on mechanical reasoning than men.

Hypothesis 2b.

Women report fewer unsafe driving outcomes than men.

Procedure

Mechanical Reasoning Ability and Road Knowledge was assessed in 133 respondents recruited through online rideshare driver Facebook groups. Unsafe Driving was measured by presenting several safety-related questions to these participants, including a self-report of the prevalence of personal moving violations and accidents.

Results

Table 1

	n	Mean	*SD*	median	skew	kurtosis	*SE*
Ability							
Mechanical Reasoning	108	0.71	1.00	0.72	0.41	-0.41	0.10
Outcomes							
Road Knowledge	133	65.41	12.63	63.64	-0.15	-0.48	1.10
Unsafe Driving	129	-0.61	8.35	0.30	-8.17	80.84	0.74

Table 2

	1	2	3
Ability			
1. Mechanical Reasoning	1		
Outcomes			
2. Road Knowledge	0.31**	1	
3. Unsafe Driving	-0.22*	-0.16	1

*Note. * $p < .05$, ** $p < .01$, *** $p < .001$. Data was deleted pairwise (sample sizes range from 105 – 133).*

Table 1 shows the descriptive statistics for the predictor and outcomes. Mechanical reasoning showed sufficient variance and unsafe driving outcome scores were negatively skewed.

Table 2 shows the obtained correlations between predictors and outcomes. Mechanical reasoning shows the strongest correlations with outcomes. Supporting hypotheses 1a and 1b, mechanical reasoning is positively correlated with road knowledge (r = .31, p = .001) and negatively correlated with unsafe driving outcomes (r = -.22, p = .023). While a negative correlation was found between road knowledge and unsafe driving, this result was not significant (r = -.16, p = .069).

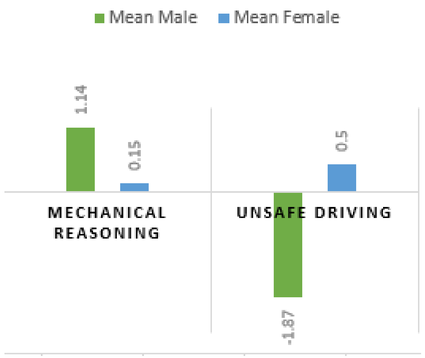

Figure 1 provides the results of the gender analysis tests, with partial support for our hypotheses. Supporting hypothesis 2a, men scored significantly higher on mechanical reasoning than women, $t(90) = 5.43$, $p < .001$. However, while the women in our sample reported higher unsafe driving outcomes than men, results were not significant, $t(105) = -1.34$, $p = .183$. Thus, hypothesis 2b was not supported. Note that we had expected men to score higher on this outcome.

Given the gender differences in mechanical reasoning and the significant correlations found between mechanical reasoning and unsafe driving, we conduct follow-up analyses to further explore the relationship between gender, mechanical reasoning, and outcomes.

Table 3

	Males			Female		
	n	*r*	*p*	*n*	*r*	*p*
Mechanical Reasoning – Unsafe Driving	57	-.23	.103	37	-.18	.298

Table 3 provides the gender-based differential validity between mechanical reasoning and unsafe driving outcomes. The results demonstrate similar negative relationships between mechanical reasoning and unsafe driving for both males and females. Thus, while mechanical reasoning did predict unsafe driving outcomes, we did not identify significant differences in prediction by gender.

Discussion

This study provides advances in transportation research, in that it expands the study of driver safety to rideshare drivers themselves. The results show that mechanical reasoning ability was positively related to safe driving outcomes, and this finding has important practical implications.

Findings regarding gender are also important to note. That is, gender differences in safety, while not significant, were opposite to the direction hypothesized. This result may reflect the type of sample assessed. It may be that women who take on a profession such as rideshare driving may be systematically different from the general population. This finding was unexpected and warrants further exploration regarding gender differences in driving for work.

From a practical perspective, this research provides evidence that mechanical reasoning is likely to be beneficial for selecting rideshare drivers to reduce unsafe driving outcomes. It is important to note that the obtained correlation coefficient was uncorrected, and unreliability in the criterion likely affected the observed correlation coefficient (Spearman, 1904). There is also partial support for the notion that part of this relationship may be because mechanical reasoning leads one to better understand the rules of the road and, consequently, behave more safely.

Limitations and Future Directions

Further research into unsafe driving would benefit by using other measures of unsafe driving, perhaps longer self-report scales that assess safety more broadly. Secondly, the power to detect small to moderate effects was low in this study due to the sample size. Future research using larger samples of rideshare drivers would be beneficial.

Conclusions

This research focused on rideshare drivers. The results build on previous research to help understand how to reduce unsafe driving outcomes and identify more effective drivers in the process. As the findings illustrate, mechanical reasoning ability may be one avenue for selecting safer drivers.

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