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Reduction in Fuel Consumption Depends on the Fuel Economy Display and Driver Sex: An Observed Interaction.

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1. INTRODUCTION
Drivers trained on EcoDriving techniques (e.g., reach the highest gear quickly, avoid complete stops, engine braking, coast to a stop, reverse with a warm engine, etc.) have achieved large reductions in fuel consumption [3]. The results of EcoDriving demonstrate that driving behavior contributes to fuel consumption. Drivers' greatest opportunity to change their driving behavior to reduce fuel consumption occurs on routes that contain multiple signalized intersections. Fuel economy support tools have been shown to help drivers reduce fuel consumption in this type of environment [1, 2]. Fuel savings associated with fuel economy support tools have been 8-15% greater compared to savings associated with employing EcoDriving techniques. We investigated the extent drivers reduced fuel consumption when provided with a Fuel Economy Display (FED) that was designed to present fuel efficiency information. The results were that male drivers benefited from the presence of an FED, but female drivers reduced fuel consumption without the assistance of a display.

2. METHODS
Data from 28 participants (14 female, aged 18-50) are reported. This study was conducted using an Oktal driving simulator. We created an urban scenario that consisted of 4.5km of roadway with three signalized intersections.

After completing a baseline drive (drive 1), participants were then assigned to one of 3 groups and asked to drive the scenario again but *as fuel efficiently as possible* (drive 2) −we did not tell them how to drive fuel efficiently. Group 1 drove with an Acceleration FED that showed how acceleration affected fuel economy, Group 2 drove with an FED that showed instantaneous fuel economy in miles per gallon, and Group 3 served as a control group and drove without a display.

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3. RESULTS
We derived our dependent measure by subtracting Drive 1 fuel consumption from the Drive 2 fuel consumption (Δ mL). There was a marginally significant interaction between driver Sex and Group ($p = .059$). The change in fuel consumption for male drivers was dependent on the presence and type of FED in the vehicle. The change in fuel consumption exhibited by male participants in Group 1 was significantly greater compared to male participants in Group 2 ($p = .04$) and Group 3($p = .01$). Although all female drivers were able to reduce their fuel consumption during Drive 2, to a greater extent than male drivers, there were no significant differences between the three Groups. In other words, they changed their fuel consumption equivalently.

4. CONCLUSIONS
There was a change in fuel consumption that depended on if the driver was male or female, and which, if any, FED was present. Females reduced fuel consumption independent of whether or not an FED was present. Male drivers did not reduce their fuel consumption without an FED but showed a large changed when driving with the Acceleration FED. The results imply that some drivers –Female drivers in this case, can reduce their fuel consumption for at least one drive buy carrying out latent driving strategies to reduce their fuel consumption. Other drivers may require a visual representation of how their driving behavior *controls* the fuel consumption of their vehicle.

5. REFERENCES
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