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# Type of Vehicle, Speeding, and Acceleration Patterns of Older Drivers During Everyday Driving

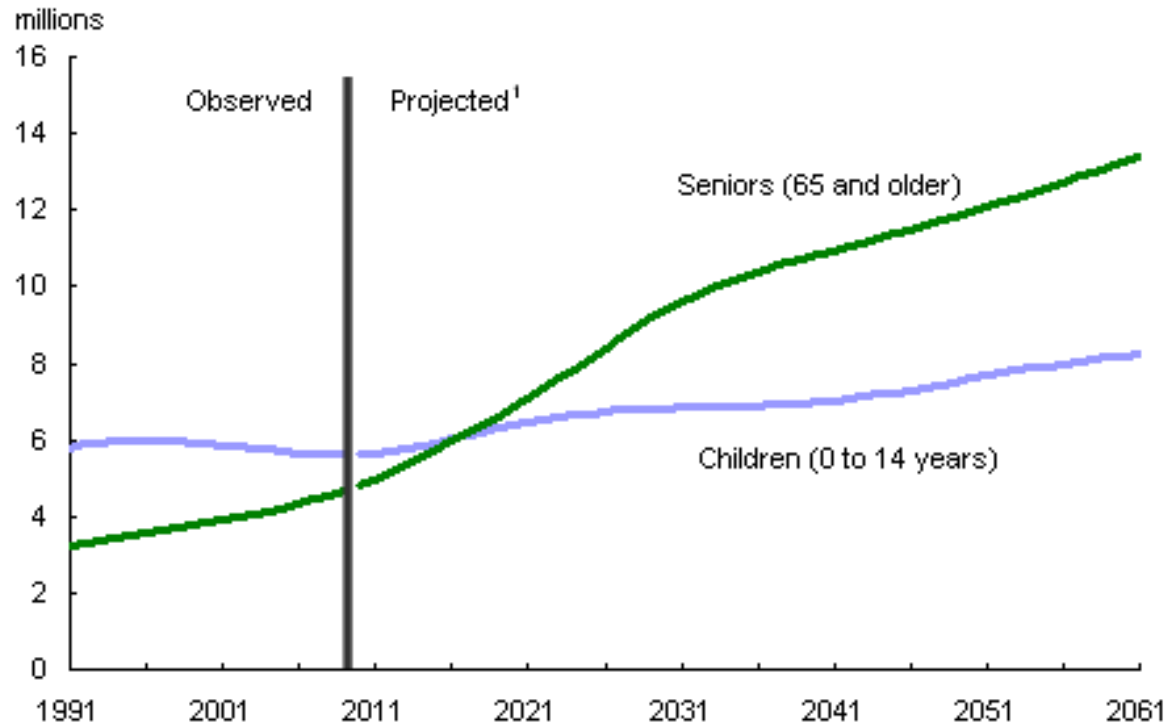
Andrew Cull

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# Introduction



1. Medium-growth scenario.

**Source:** Statistics Canada, CANSIM tables 051-0001 and 052-0005.

# Introduction

- Vehicle performance, mass, and height influence on driving patterns
- Seat height shown to influence speed in simulators with young drivers

# Hypothesis

- Vehicle class will effect speeding and acceleration patterns
- Explore Speeding and Hard Acceleration and Braking Patterns:
  - Study 1:
    - What happens after purchase of different vehicle?
  - Study 2:
    - Naturalistic driving

# Data

- Collected from the CanDrive Study
  - Actively Driving  $\geq 1$  year
  - $\geq 70$  years of age
  - Drives at least 4x week
  - Intends to continue to drive 5 years
  - Have a recording device installed into their vehicle

# Data

- Vehicle Classification based on 2014 Canada Fuel Guide
  - Cars and Station Wagons into 8 categories by *Interior Volume*
  - Trucks, Vans, and SUVs into 6 categories by *Gross Vehicle Weight*

# Data

- **Study 1 (n=51):**
  - Acquired a different vehicle
  - $\leq 15$  days of missing data between vehicle change
  - 25 days of driving before and after
  - $\geq 100$  km of driving in the 25 days
- **Study 2 (n=493):**
  - 25 days of usable driving from May to September in first year of study

# Outcome Variables

- G Force Infractions:
  - $\geq 0.274$  or  $\leq -0.274$  [Jun et al, 2007]
- Speeding:
  - $\geq 5$  and  $\geq 10$  km/h over posted speed limit
    - 40-110 km/h
- p value  $< 0.05$  was deemed significant



# Statistical Analysis

- **Study 1:**
  - Pre/Post G Force (per km & per stop): Wilcoxon Signed Rank Test
  - Speeding: Two way repeated measures ANOVA
- **Study 2:**
  - Vehicle Class collapsed to Car or Other
  - G Force (per km & per stop): Linear Regression
  - Speeding: Multiple Linear Regression @ Speed Limits
  - Differences between Gender, Vehicle Type, and Age: Wilcoxon Signed Rank Test

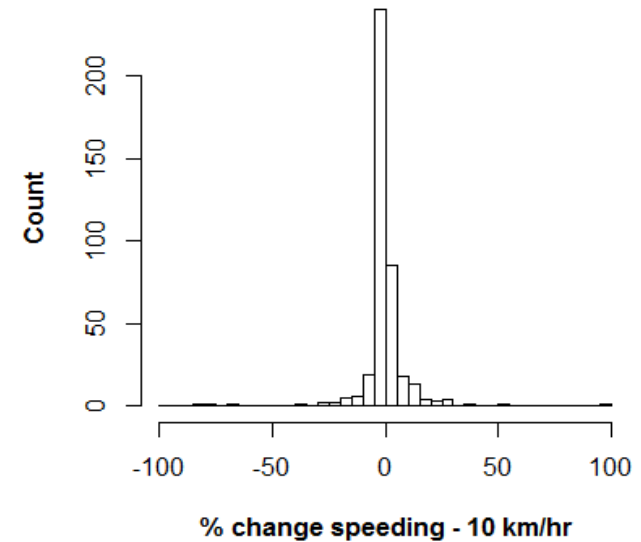
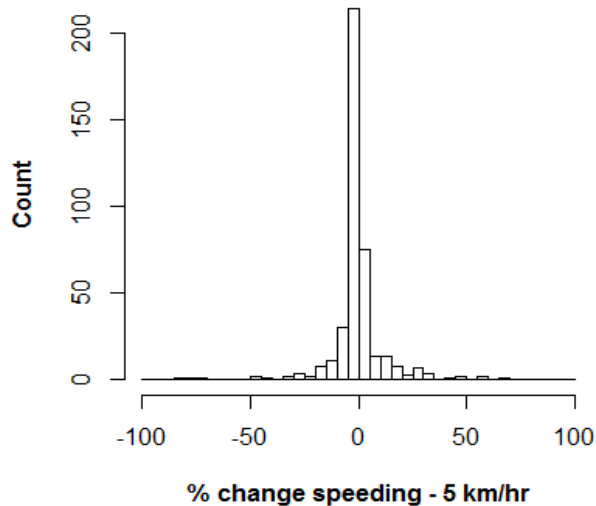
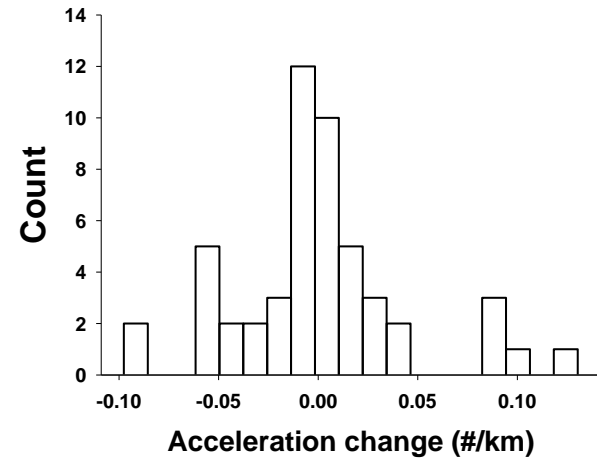
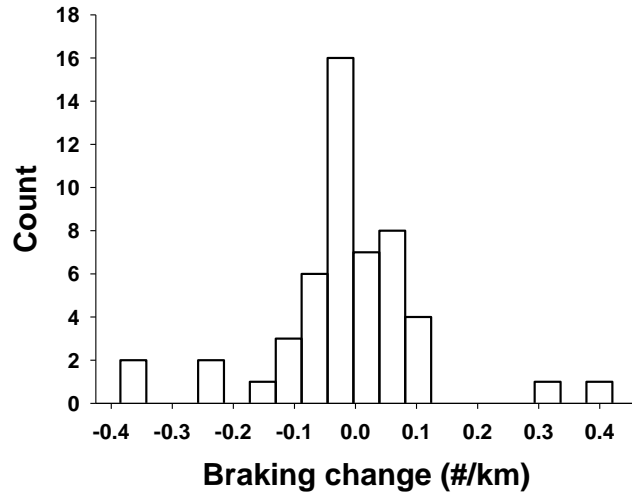
# Results – Study 1

	n	Min (age)	Max (age)	Mean (age)	Std Dev (age)	Median (age)
M	30	71	89	77.5	4.6	76
F	21	71	90	77.4	4.7	76
Combined	51	71	90	77.5	4.6	76

# Results – Study 1

Test	p value
G Force: Acceleration per km	0.58
G Force: Braking per km	0.25
G Force: Acceleration per Stop	0.91
G Force: Braking per Stop	0.45
Speeding: $\geq 5$ km/h	0.34
Speeding: $\geq 10$ km/h	0.54

# Results – Study 1



# Results – Study 2

	n	Min (age)	Max (age)	Mean (age)	Std Dev (age)	Median (age)
Men	287	70	93	77.4	5.1	77
Women	206	70	89	76.4	4.4	76
Combined	493	70	93	77.0	4.8	76

# Results – Study 2

## G Force:

	Adjusted R <sup>2</sup>	Significant Predictors
Acceleration per km	0.027	Age*, Vehicle Class**
Braking per km	0.060	Age**, Gender**, Vehicle Class**
Acceleration per stop	0.035	Vehicle Class**
Braking per Stop	NA	

Note: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

# Results – Study 2

Speeding (Note: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ):  
 $\geq 5$  km/h

Speed Limit (km/h)	n	Adjusted R <sup>2</sup>	Significant predictors
50	493	0.018	Age***
60	448	0.016	Age**
70	458	0.016	Gender**
80	414	0.022	Age*
90	284	0.020	Gender***
100	372	0.085	Age***, Gender**

# Results – Study 2

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$\geq 10$  km/h

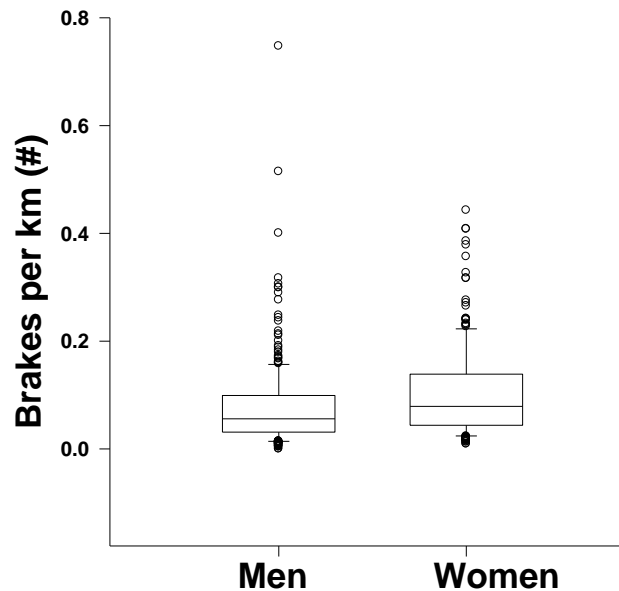
Speed Limit (km/h)	n	Adjusted $R^2$	Significant predictors
80	414	0.015	Age***, Gender*, Vehicle Class*
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# Results – Study 2

## Comparison

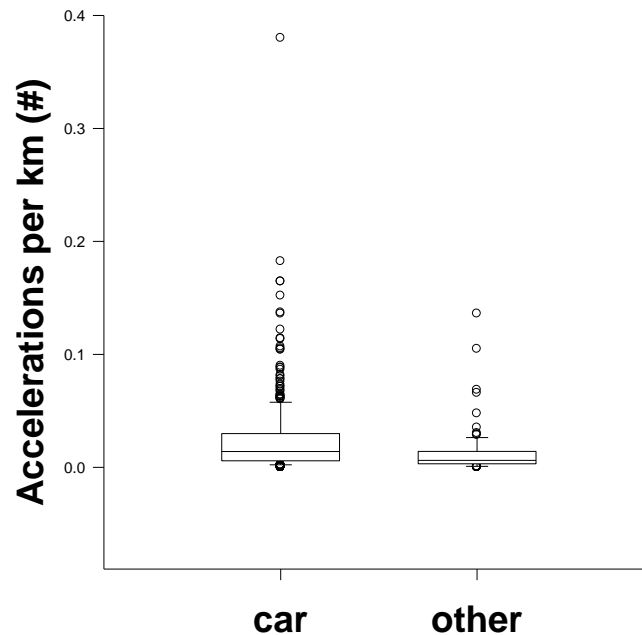
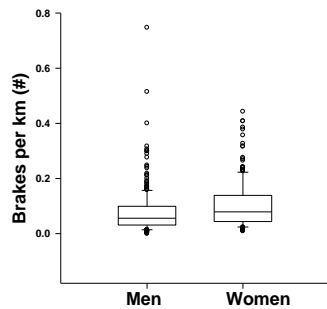
	p value
Gender Effect: Hard Brakes per km	< 0.001



# Results – Study 2

## Comparison

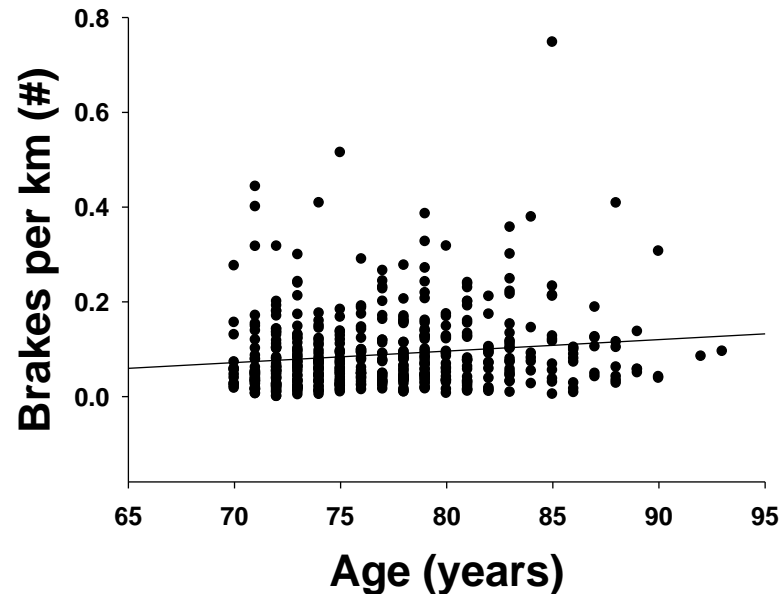
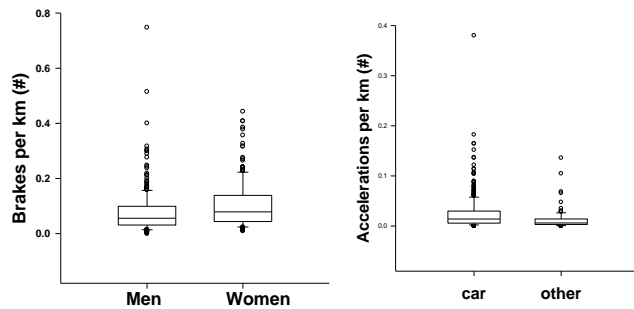
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Gender Effect: Hard Brakes per km	< 0.001
Vehicle Class: Accelerations	< 0.001



# Results – Study 2

## Comparison

	p value
Gender Effect: Hard Brakes per km	< 0.001
Vehicle Class: Accelerations	< 0.001
Age: Hard Brakes per km	< 0.001



# Limitations

- Lag time between device switch
- Only GPS information, NO video information
  - Are they driving with the 'flow' of traffic?

# Conclusion

- Vehicle Class has little to no impact on older drivers speeding or hard acceleration / brakes
- Speeding was prevalent among older drivers
- Further research is needed to determine what effect the variables have on the safety of older drivers

# Thank You



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# Results – Study 1

