Are Drivers With Arthritis More Likely To Be Involved In A Crash?

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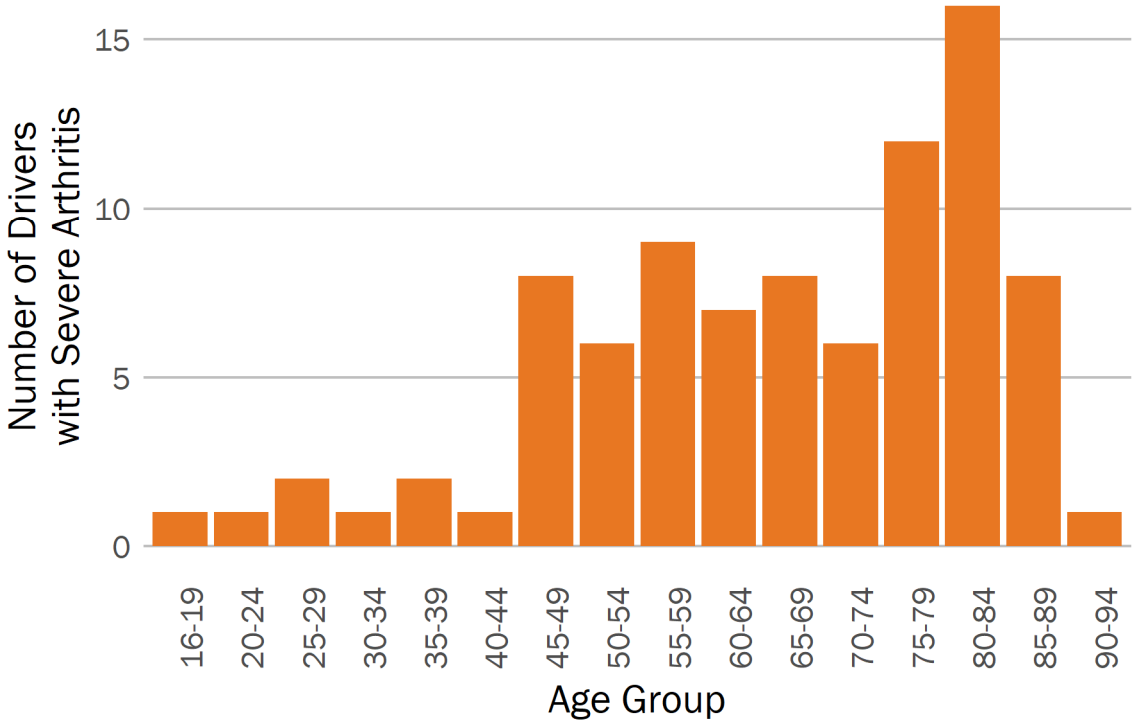
Arthritis

- Inflammation of the joints
- Causes pain and limits motion
- 54 million Americans diagnosed every year

Arthritis Prevalence in SHRP 2



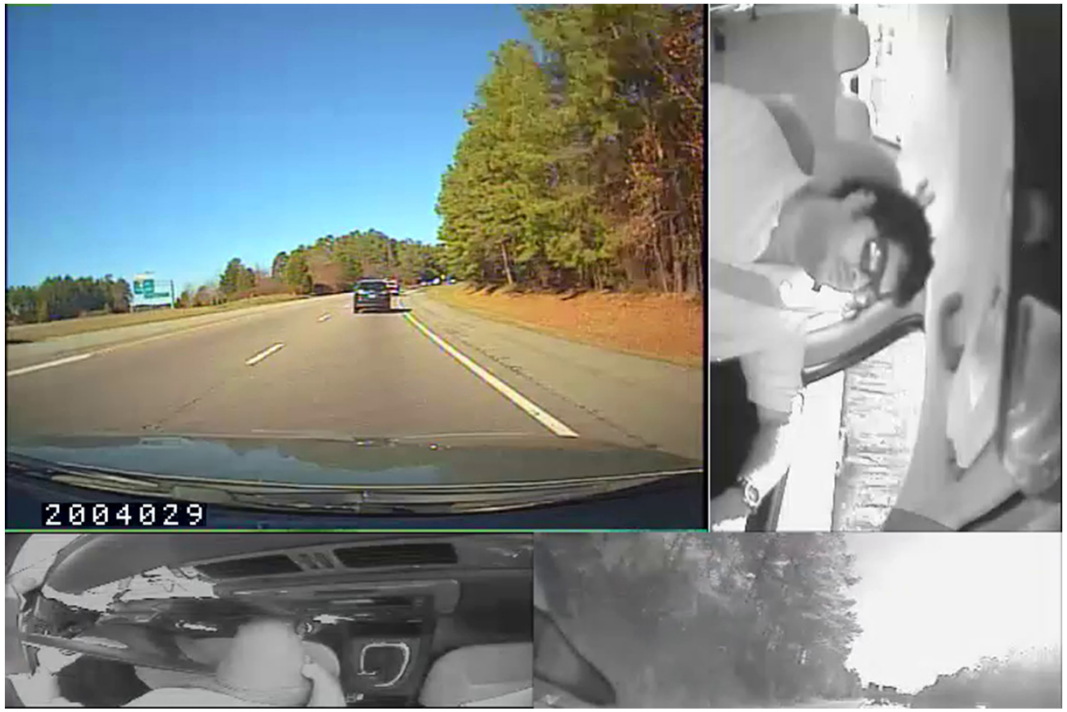
National Prevalence		
Age Group	Age	Prevalence
Young	18-44	7.4%
Middle-Aged	45-64	29.3%
Senior	≥65	49.6%

Objective

What is the relationship between crash risk and arthritis in the SHRP 2 NDS population?

SHRP 2 NDS

- ~3,400 drivers
- ~5.5 million trips



Dataset

- 78 Drivers with Arthritis
- 34 Male
- 44 Female
- 414 out of 1836 Crashes
- 20,000 Crashes and Baseline Cases

Model Design

- Random Effects Model
  - Random Effect for Each Driver in SHRP 2
- Variables:
  - Arthritis? Yes/No
  - Middle Aged (45-64)? Yes/No
  - Senior (65+)? Yes/No
  - Male? Yes/No

Was Arthritis Related to Crash Risk?

Parameter	Estimate	Odds Ratio	P-Value
Intercept	-2.68	1.00	-
Arthritis	**0.69**	**1.87**	**<0.001***
Middle-Aged	-0.41	0.68	<0.001*
Senior	-0.017	0.98	0.048*
Male Gender	-0.06	0.95	0.422

Drivers with arthritis were **87% more likely to be in a crash** when accounting for age

Gender was not a significant factor

Interaction effects were not significant

Why was there an Increased Crash Risk?

- Secondary Task Use
- Individual Recklessness
- Strength Loss

Was Arthritis Related to Secondary Task Engagement?

Parameter	Estimate	P-Value
Intercept	0.31	-
Arthritis	**-0.14**	**0.300**
Middle-Aged	-0.37	0.000
Senior	-0.72	0.000
Male Gender	-0.02	0.504

Arthritis had no influence on the driver performing secondary tasks
Gender was not a significant factor

Why was there an Increased Crash Risk?

- Secondary Task Use
- Individual Recklessness
- Strength Loss

NO EFFECT

Sensation Seeking Score

A. There are some movies I enjoy seeing a second or even third time
B. I can't stand watching a movie that I've seen before

A. I often wish I could be a mountain climber
B. I can't understand people who risk their necks climbing mountains

A. I dislike all body odours
B. I like some of the earthy body smells

Higher score (0 to 40) indicates more of a sensation seeker

Correlated with crash risk (Jonah et. al.)

Was Arthritis Related to Sensation Seeking Score?

Parameter	Estimate	P-Value
Intercept	15.93 Pts	0.000
Arthritis	**-0.59 Pts**	**0.389**
Middle-Aged	-4.65 Pts	0.000
Senior	-6.94 Pts	0.000
Male Gender	2.48 Pts	0.000

Arthritis has no influence on the driver's sensation seeking score

Why was there an Increased Crash Risk?

- Secondary Task Use NO EFFECT
- Individual Recklessness NO EFFECT
- Strength Loss

Was Arthritis Related to Grip Strength?

Parameter	Estimate	P-Value
Intercept	56.02 lbf	0.000
Arthritis	**-5.58 lbf**	**0.002**
Middle-Aged	-3.08 lbf	0.000
Senior	-16.72 lbf	0.000
Male Gender	33.02 lbf	0.000

Drivers with arthritis had lower grip strength as expected indicating an overall loss in body strength

Effect was small

Why was there an Increased Crash Risk?

- Secondary Task Use
- Individual Recklessness
- Strength Bias

NO EFFECT

NO EFFECT

MAYBE

Conclusion

- Drivers with arthritis:
  - Were more likely to be involved in a crash
  - Were no more likely to engage in secondary tasks
  - Had no difference in Sensation Seeking Score
  - Had slightly lower grip strength

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Secondary Task Usage

	Secondary Task	No Secondary Task	Total
Arthritis	171	229	400
No Arthritis	9,066	8,323	17,389
Total	9,237	8,552	17,789
Odds Ratio = 0.69			

Only looking at the Balanced-Sample Baseline, there appears to be a decrease in secondary task usage, but this does not account for age.

Crash Frequency Table

	Crash	No Crash	Total
Arthritis	62	400	462
No Arthritis	1,565	17,394	18,359
Total	1,627	17,794	19,421
Odds Ratio = 1.72			

Drivers with arthritis have an increased risk of crash but this is confounded by age.