

Risky Driving Among Novice
Teenage Drivers:
Does Risky Driving Predict C/NC?

Naturalistic Teenage Driving Study

Purpose and Methods

Examine teen driving performance - 0-18 months

- Crash/near crash
- Elevated g-force events (risky driving)
- Teen vs parent comparisons

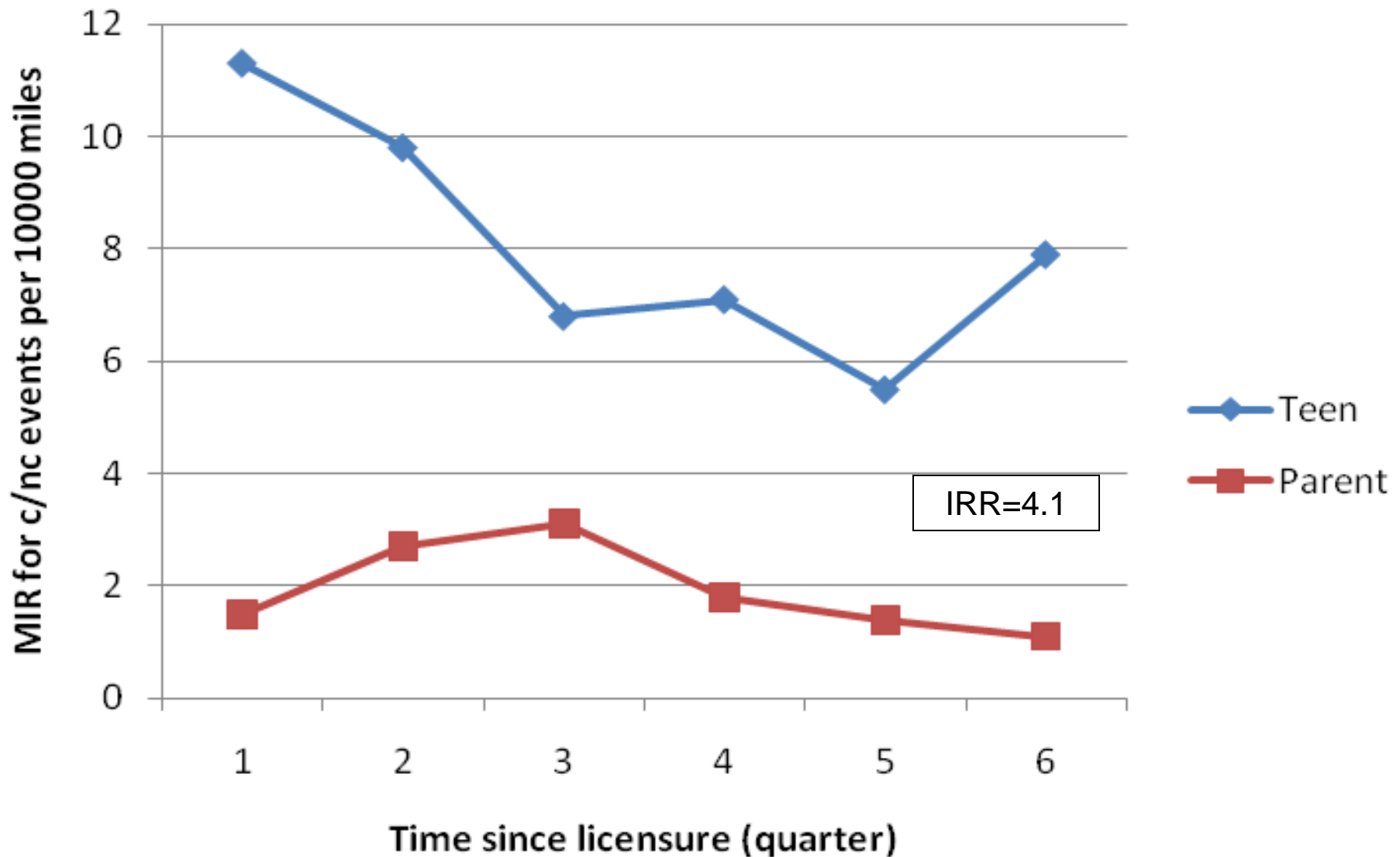
Methods

- 42 volunteer teens & parents recruited at permit
- Instrumentation of primary vehicle

Crash and Near Crash Incidence

	Teens	Teens	Adults	Adults	Total
	M	F	M	F	
Crash	13	25	1	1	40
Near-Crash	118	117	19	16	270
Total	131	142	20	17	310

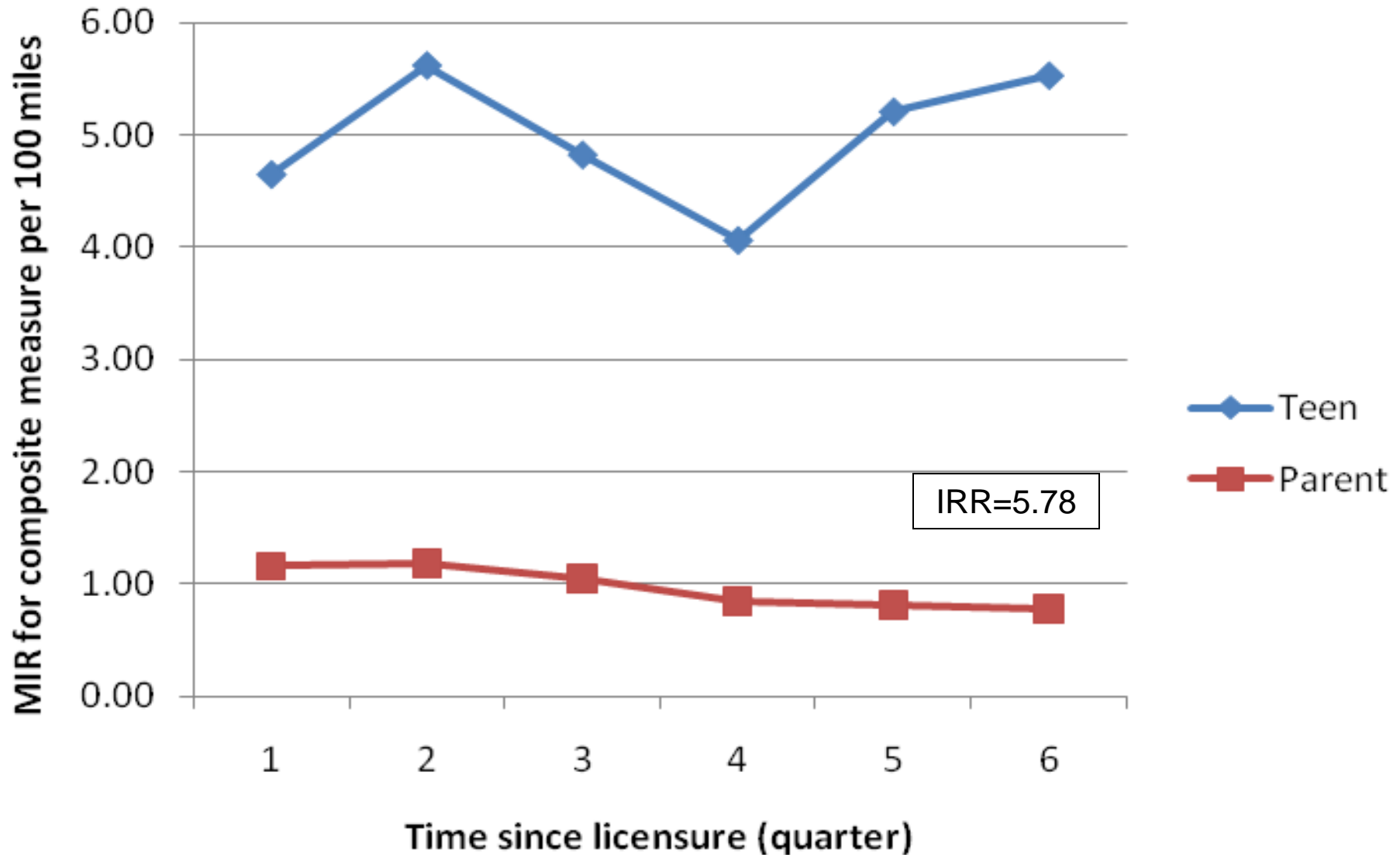
Crash/Near Crash – Teens and Parents



Teenage Driver G-Force Rates

Total 18 Months Measures/rates per 100 miles	Teen (N = 42)		
	Mean	SD	Standardized alpha = .78 Correlation w/ Composite
Rapid starts	2.73	3.81	0.86
Hard stops	1.71	1.63	0.59
Hard left turns	1.58	1.55	0.83
Hard right turns	1.17	1.26	0.63
Yaw	0.50	0.69	0.57
Composite/100 miles	7.68	6.73	

Risky Driving – Teens and Parents



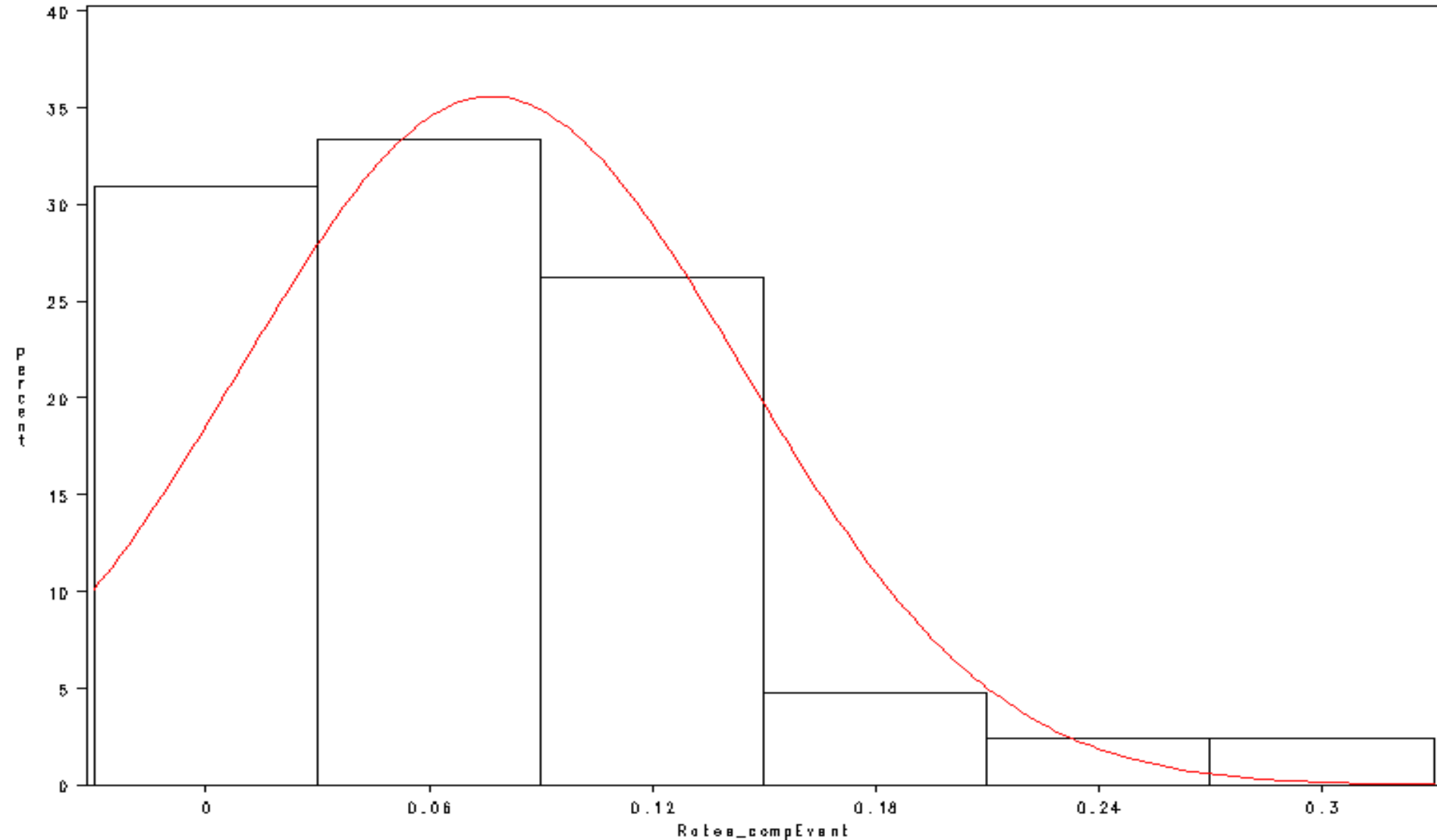
Does Teenage Risky Driving Predict Crashes/Near Crashes?

1. Correlation of Risky Driving and C/NC for 18 month
 - Pearson
 - Spearman
2. Is risky driving correlated before and after a crash?
Wilcoxon Rank Test
3. Time to crash – Cox Survival Model
4. Poisson regression models
5. ROC curve – Zeger-Qagish Model

Teen C/NC and Elevated G-Force Rates Correlations

Kinematic Measure	Pearson Correlations
Hard Stops	0.71
Rapid Starts	0.25
Left Turns	0.35
Right Turns	0.57
Yaw	0.31
Composite	0.52

Histogram of Teen Risky Driving (Composite Measure)



Teen C/NC and Elevated G-Force Rates Correlations

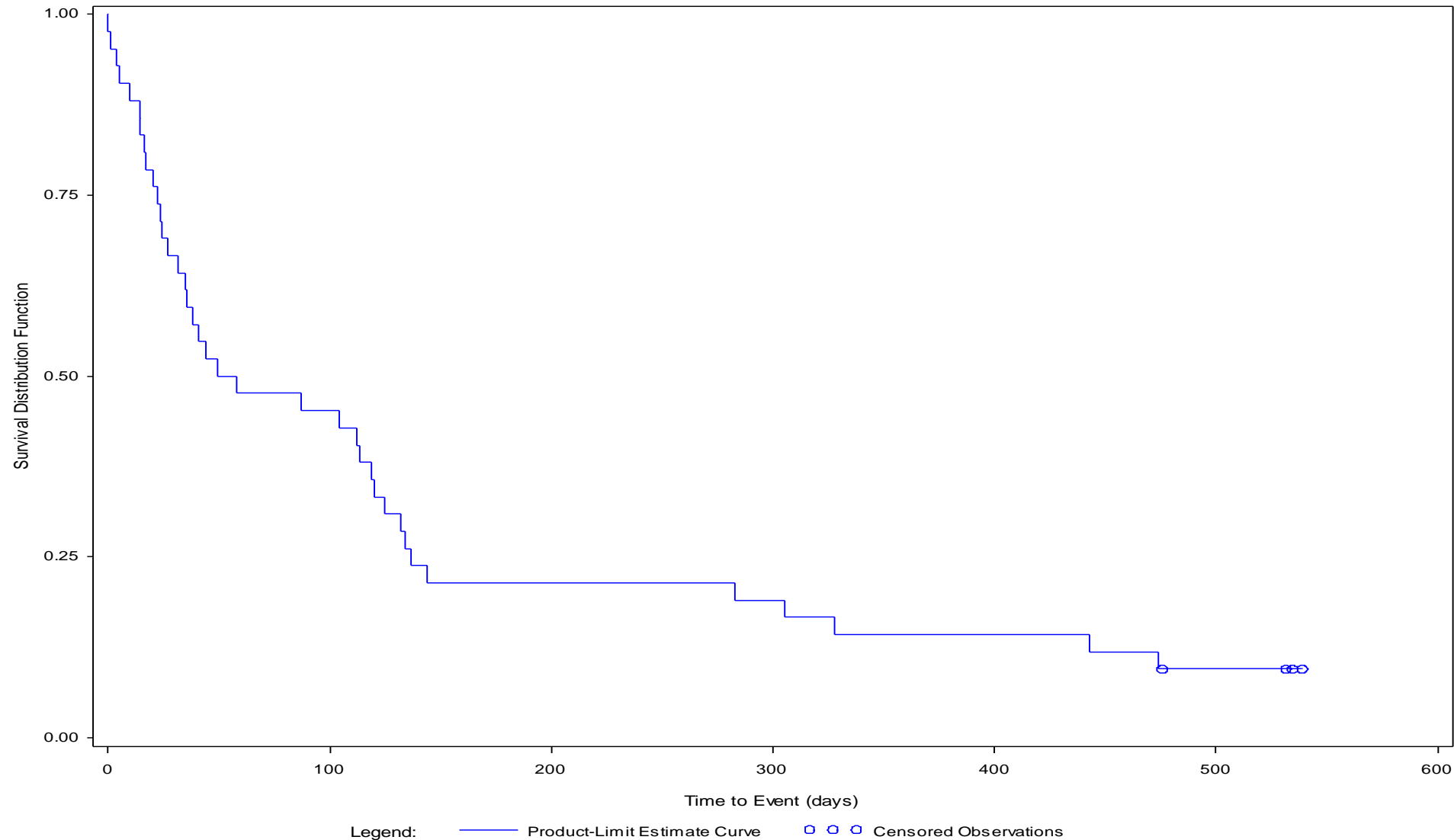
Kinematic Measure	Pearson Correlations	Spearman Rank Order Correlations
Hard Stops	0.71	0.76
Rapid Starts	0.25	0.75
Left Turns	0.35	0.53
Right Turns	0.57	0.62
Yaw	0.31	0.46
Composite	0.52	0.60

Does Risky Driving Change After a Crash or Near Crash?

Time/miles before & after C/NC	Wilcoxon Signed Rank_p
2 Days	0.13
1 week	0.72
1 month	0.85

Cox Proportional Hazards Model

Time to 1st C?NC w/ Risky Driving as IV



Cox Proportional Model

Composite Risky Driving

<u>Risky Driving</u>	<u>Beta (SE)</u>	<u>Hazard Ratio</u> (95% CI)
Previous Month	2.3 (1.6)	10.08 (0.43-240)
18 mo	3.8 (1.9)	44.90 (1.7-1722)

Time to 1st C?NC

Limitations

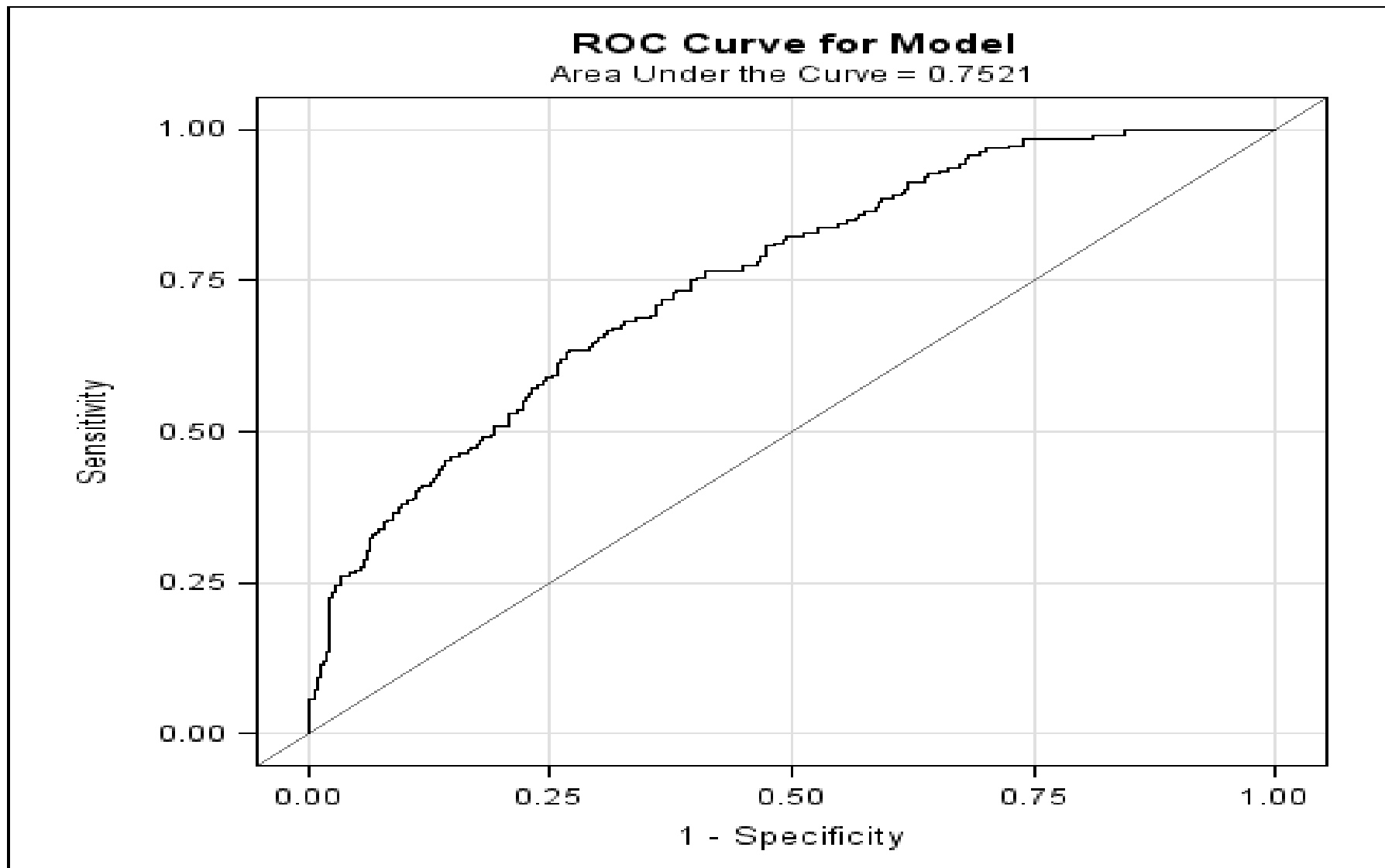
- Can predict only first crash
- Not everyone had C/NC
- Limited kinematic/mileage data for C/NC – 1st mo

Zeger-Qagish Logistic Regression Model

Does risky driving in past month predict C/NC?

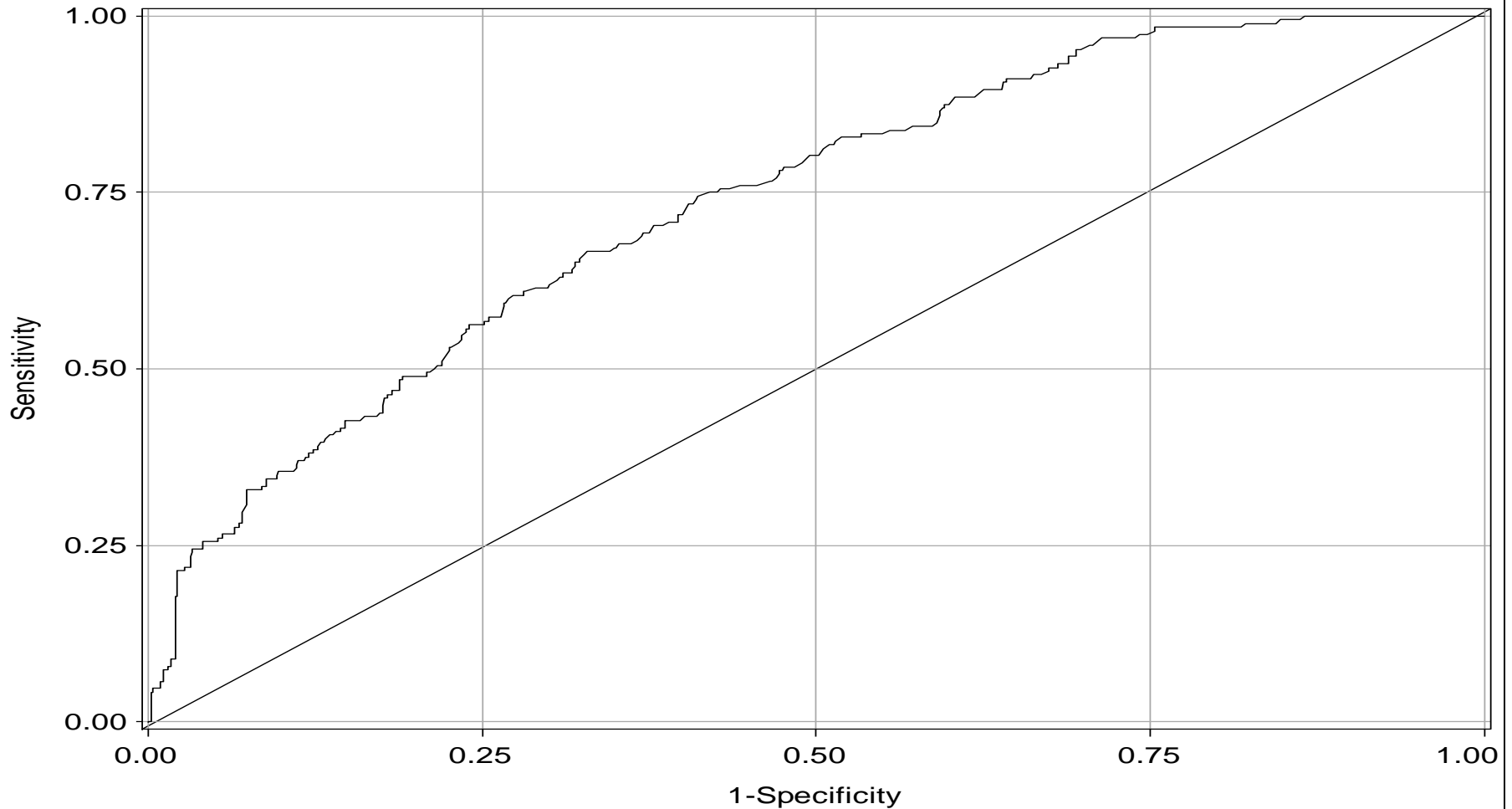
1. Repeat for each C/NC event, each study participant
2. Kinematic event rates past month as IV
3. Mileage offset
4. Area under the curve/ROC
 - Sensitivity
 - specificity

ROC Curve for Model



ROC Curve for Model Bias-adjusted Estimate

Leave-one-out Cross Validation ROC Curve
Area Under the Curve = 0.7367



Summary & Conclusions

1. Teen C/NC rates decline over time; risky driving did not.
2. Risky driving and C/NC over 18 months are associated
3. Pre-post C/NC risky driving not associated; teen driving seemingly unaffected by C/NC experience
4. Previous month risky driving and C/NC ns; 18 mo. Average significant
5. ROC/AUC indicates that risky driving is ~73% predictive
 - Further calibration
 - Need to replicate and validate

Conclusion: risky driving may be a useful C/NC predictor

Collaborators

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Thank you

Incident Rate Ratios for Individual Measures of Teen vs Adult Risky Driving

G-force Rates	Overall	p
Rapid starts	4.91	0.000
Hard stops	4.84	0.080
Hard left turns	26.65	0.831
Hard right turns	26.07	0.059
Yaw	3.18	0.107