
Safety correlation and Implications of an In-vehicle Data Recorder on Driver Behavior

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Study Objectives

- Evaluate correlation between the Green Box indices and past risk of accident
- Study the impact of Green Box use on crash rates and costs
- Assess the Green Box effect on drivers behavior

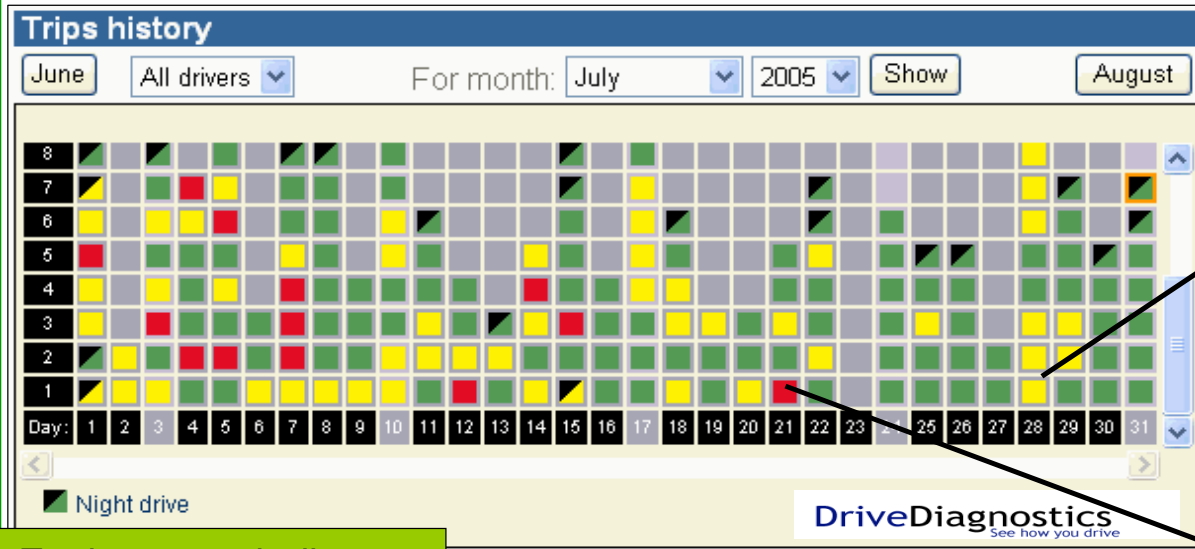
In - Vehicle Data Recorders

- **Monitor vehicle movement and control**
 - Most applications center on crash event or real time warnings
 - Recent interest in analyzing driver behavior
- **Limited empirical evidence**
 - Correlation with drivers crash history
 - Affect driving behavior
 - Correlation with vehicle maintenance costs

Green Box Overall Framework



Web reports



Each square indicates one driving trip; the color indicates safety level

9:06:02 AM	Speed alert	103	
9:07:11 AM	Speed alert	108	
9:08:24 AM	Braking	94	
9:08:56 AM	Speed alert	101	

9:24:52 AM	Braking	73	
9:26:51 AM	Excessive maneuver	55	
9:29:25 AM	Braking	49	
9:30:42 AM	Braking	47	
9:31:57 AM	Braking	53	
9:32:16 AM	Accelerating	Less than 18	
9:32:41 AM	Brake into turn	42	

General statistics		
For last 7 days	Fleet average	757 - אספ ד"ין
Total number of trips during the last 7 days	44	18
Total driving time in the last 7 days	27 hours	6 hours
Aggressive maneuvers per 10 hours of driving	12	80

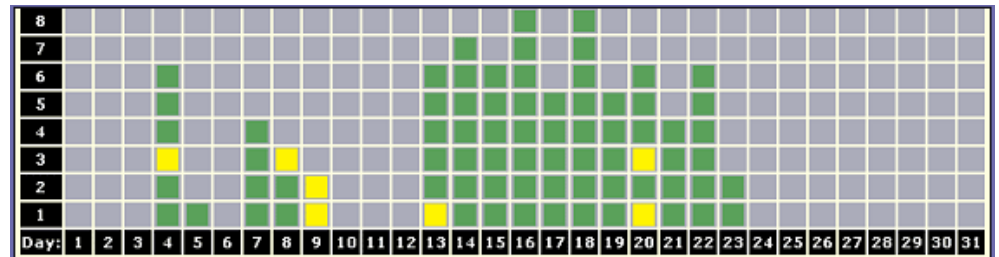
Cumulated information used to create drivers indices

Feedback to Drivers

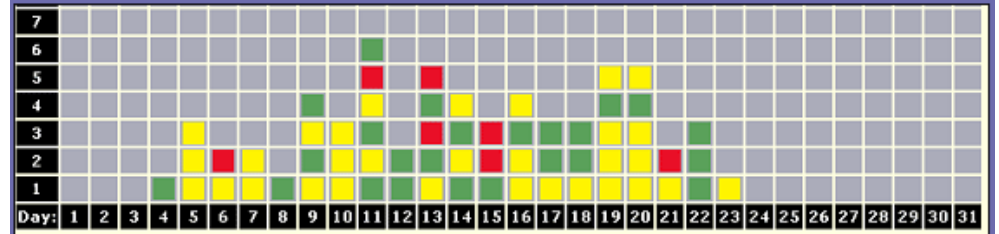
Risk index : detected maneuvers per 10 driving hours

Safety Class: classification based on rates of unsafe maneuvers and their severity

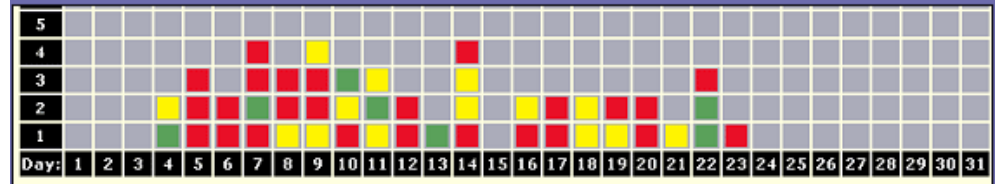
Green



Yellow



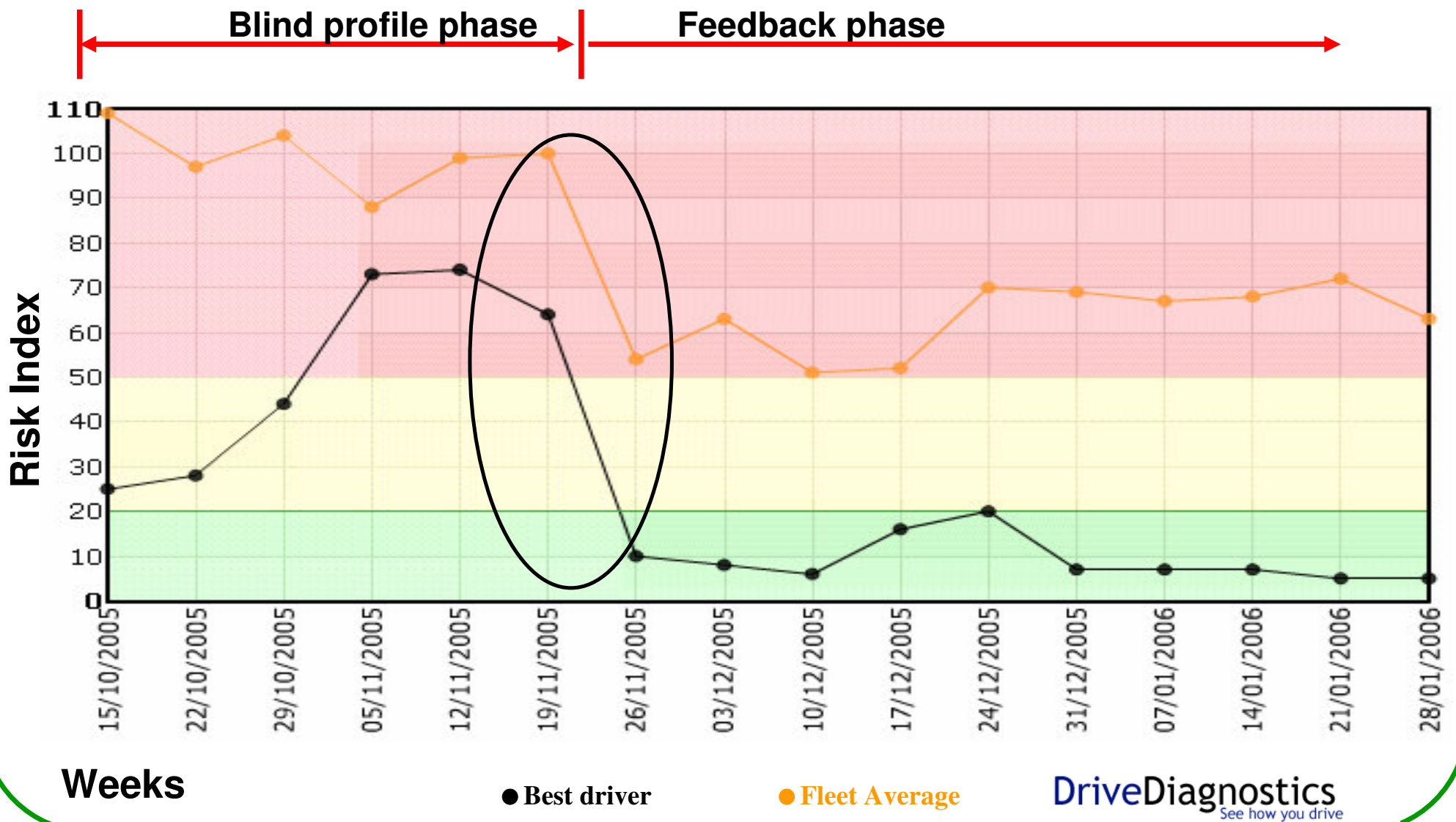
Red



Data Used

- **Green Box indices**
- **Crash involvement records**
- **Number of times a driver logged in to the web report**

Experimental Design



Weeks

● Best driver

● Fleet Average

DriveDiagnostics
See how you drive

Correlation between Green Box data and accident involvement records – Ongoing study

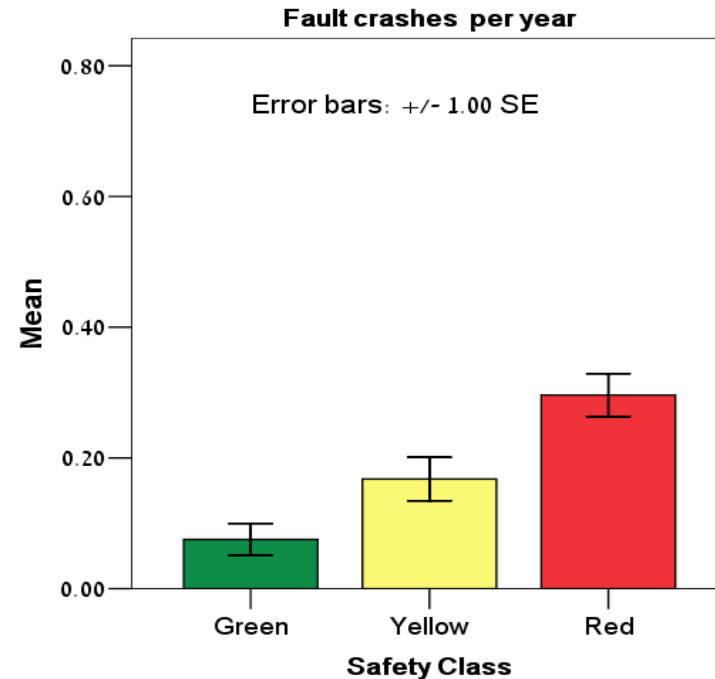
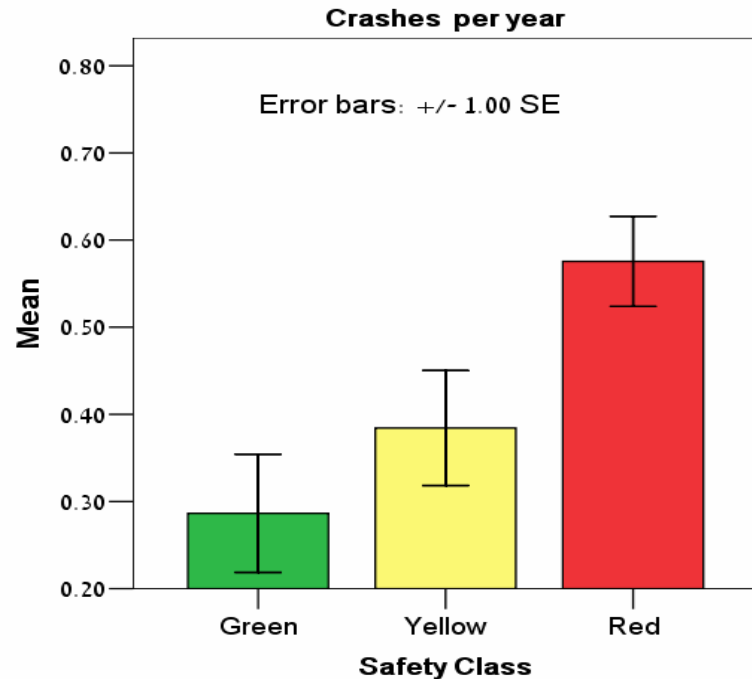
Current study group

- **297 Drivers**
- **32446 driving hours**
- **58367 trips**

Crash records

- **400 crashes (mostly damage only)**
- **185 at fault crashes**

Correlation between the Green Box “Safety class” and crash involvement records

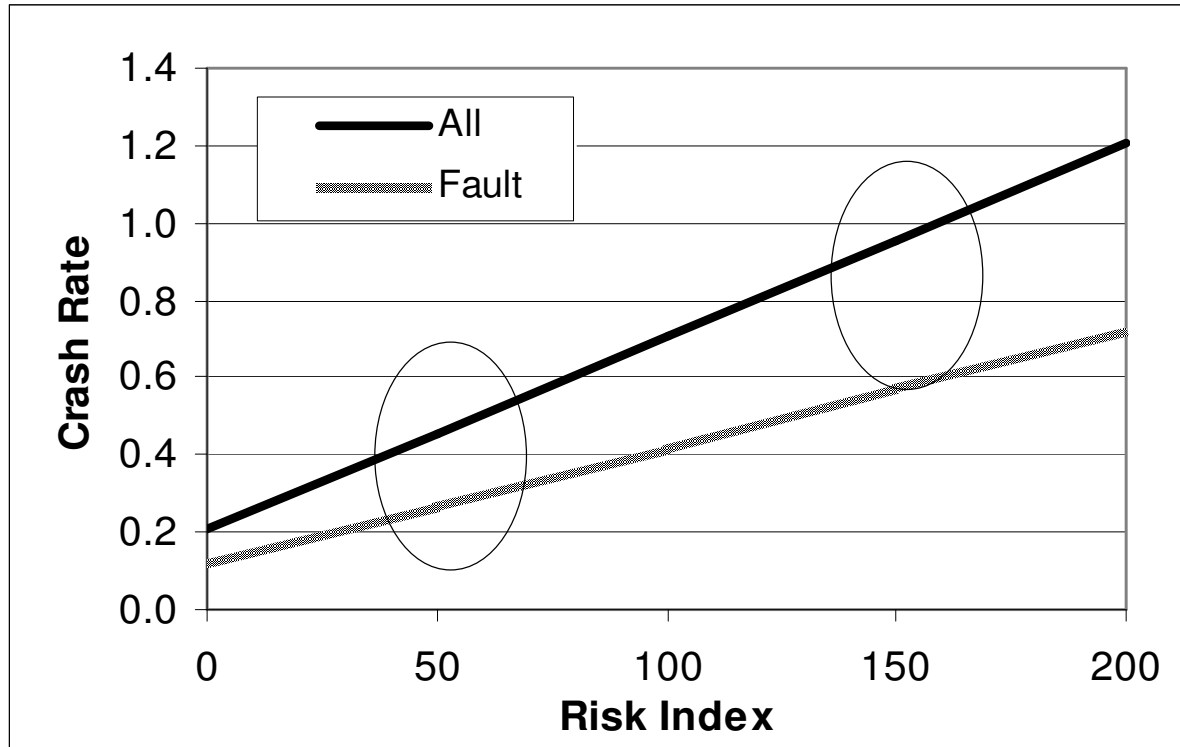


Results

Green and Yellow < Red class ($p < 0.05$)

Correlation between the IVDR “Risk Index” and crash involvement records

Crashes rates Vs Risk index



Dependent	R ²	β(p-value)
crash rate	.455	.005 (.000)
fault crash rate	.348	.003 (.000)

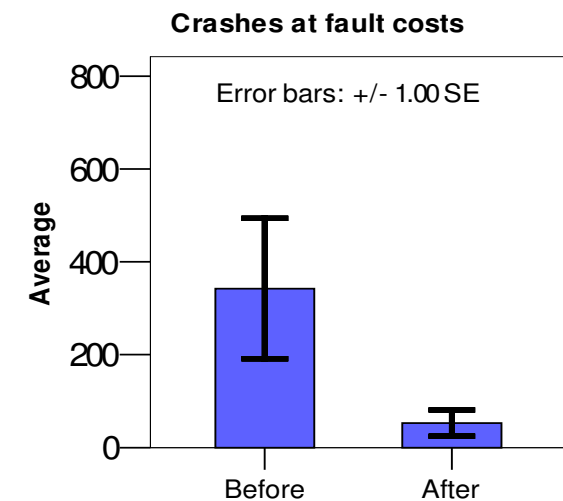
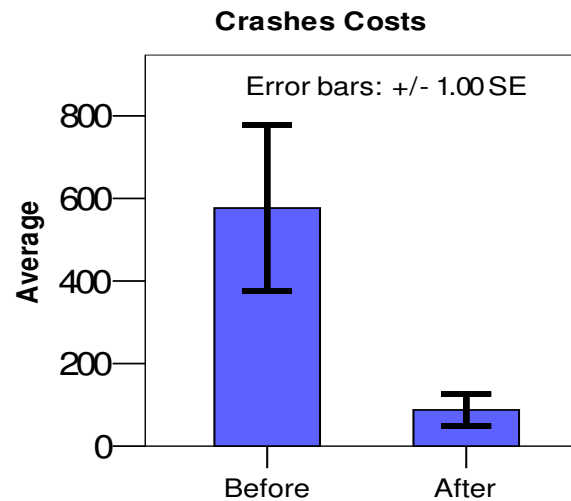
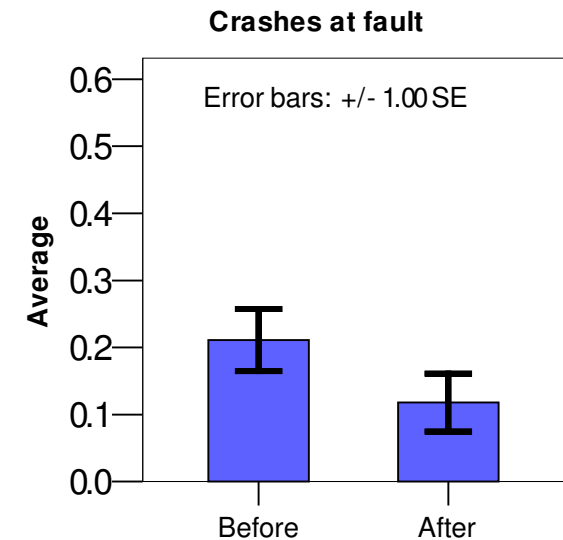
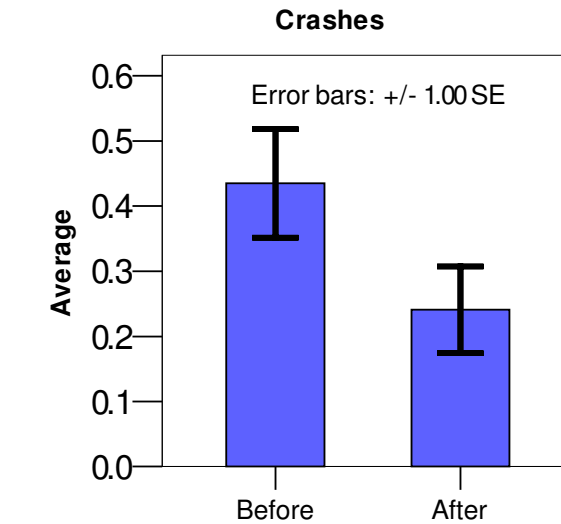
Impact of Green Box use on crash rates and costs a “before” and “after” analysis

Sample

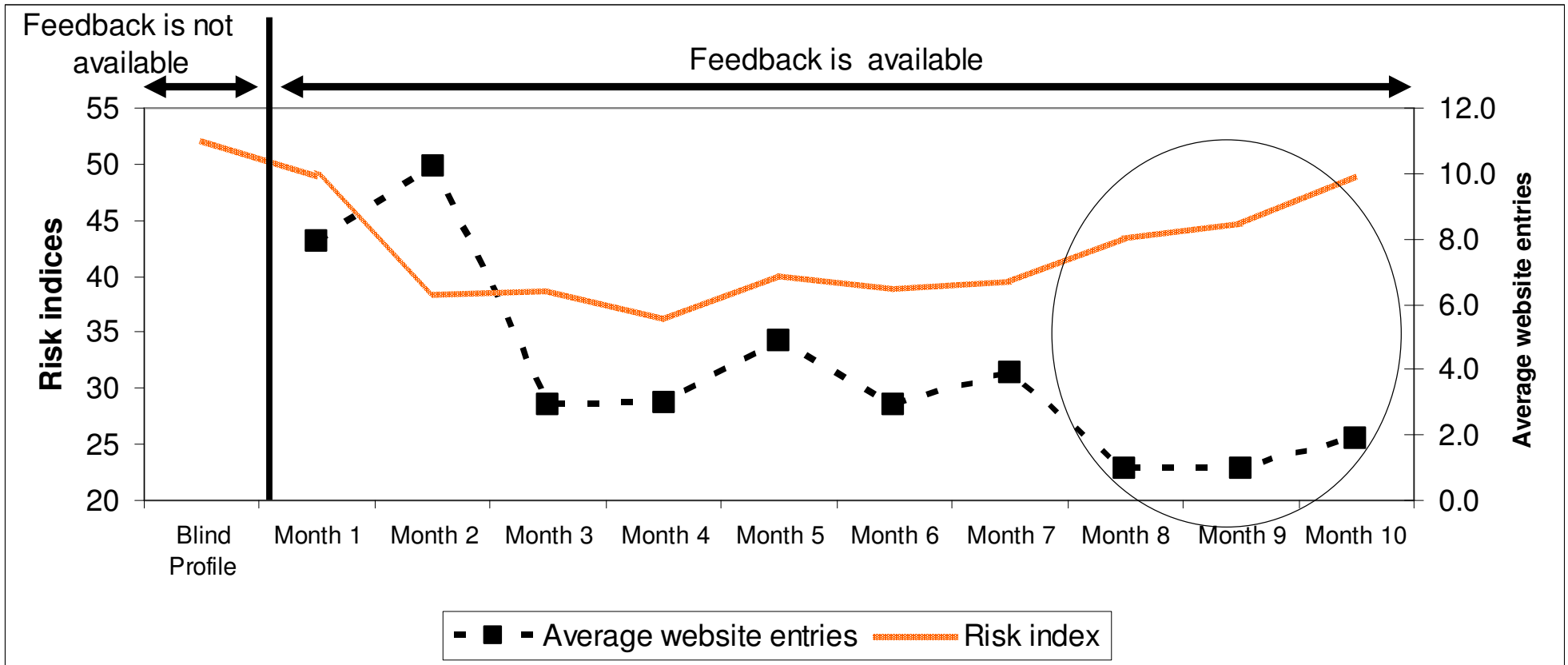
72 drivers

Results

All differences
significant ($p < 0.1$)



Evaluating the extend of effect on driver behavior



Conclusion

sustainability of the Green Box affect depends on the level of feedback use

Summary of the results

Green Box risk indices :

- Positively correlated to past risk of accident
- Positive affect on crash rate and costs reduction
- To maintain sustainability constant follow-up is required

Future directions

Green Box as a tool to study driving behavior

- Novice young drivers
- Impact of fleet safety policies and organizational safety climate on employees driving behavior
- Impact of trip circumstances and vehicle types on driving behavior
- “Pay as you drive” for insurance policies

Thank You