Young, novice drivers and telematics feedback to improve safety related driving performance

Webinar: 19 May 2021, 12:30pm to 1:30pm (AEST)

Professor Teresa Senserrick, Centre for Accident Research & Road Safety, Queensland University of Technology (CARRS-Q, QUT)
Dr Amanda Rawlinson, Manager CTP Scheme Policy, State Insurance Regulatory Authority (SIRA)

Facilitator: Dr Anna Chevalier, ACRS NSW Chapter Seminar Co-ordinator

AUSTRALASIAN COLLEGE OF ROAD SAFETY

Fostering communication, networking, professionalism and advocacy in road safety

ACRS NSW Chapter welcome

Duncan McRae

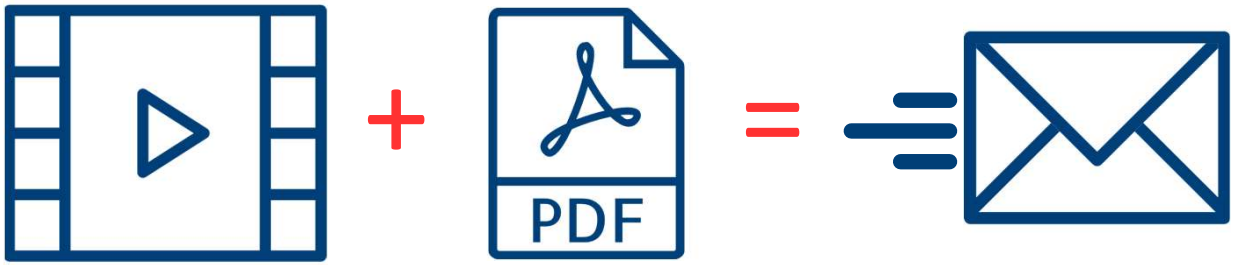
NSW Chapter
Chair

Dr Anna Chevalier

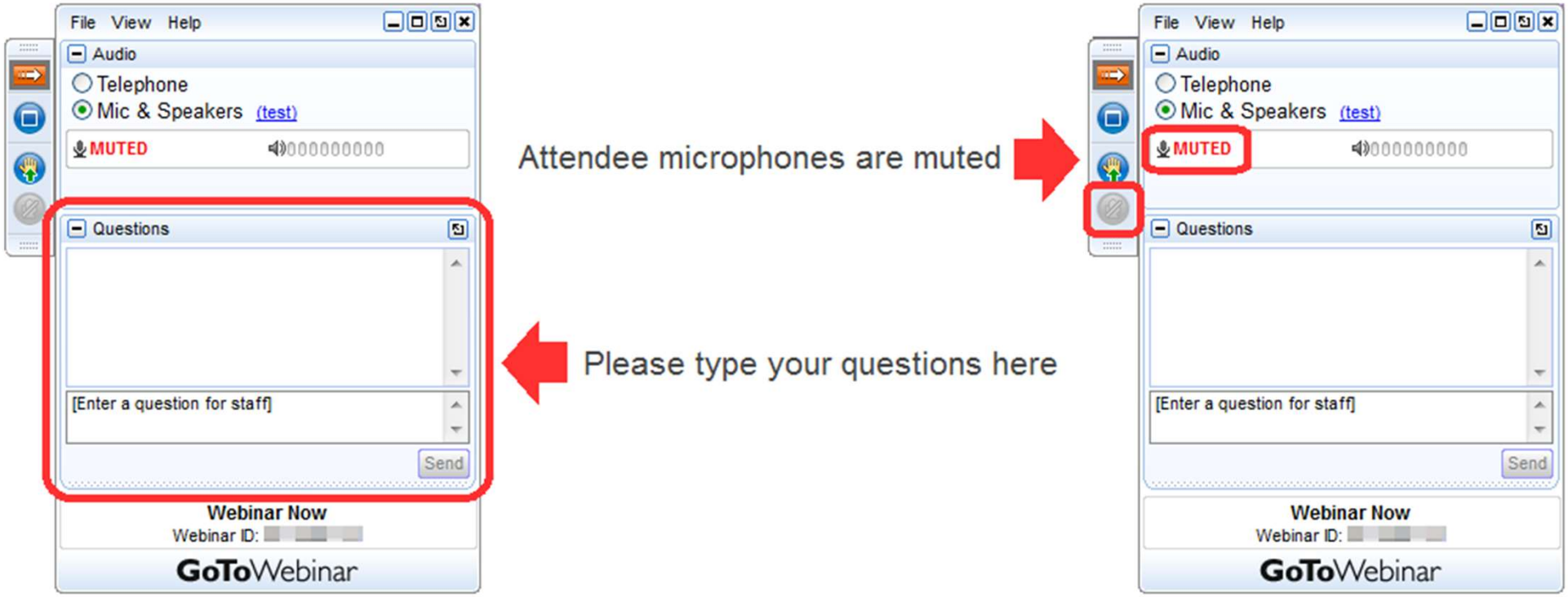
NSW Chapter
Seminar Coordinator

House keeping

- Webinar 60 mins
- incl. question time 10-15 mins
- Webinar will be recorded



To ask a question



AUSTRALASIAN COLLEGE OF ROAD SAFETY

Fostering communication, networking, professionalism and advocacy in road safety

Welcome to our presenters

Title: Young, novice drivers and telematics feedback to improve safety related driving performance

Prof. Teresa Senserrick

CARRS QUT MAIC

Dr Amanda Rawlinson

NSW GOVERNMENT | State Insurance Regulatory Authority

First presenter

Prof. Teresa Senserrick

CARRS
Centre for Accident Research
& Road Safety - Queensland
Youth Development & Driving
How can telematics help?
Teresa Senserrick PhD
May 19, 2021, ACRS NSW Chapter Webinar
MAIC
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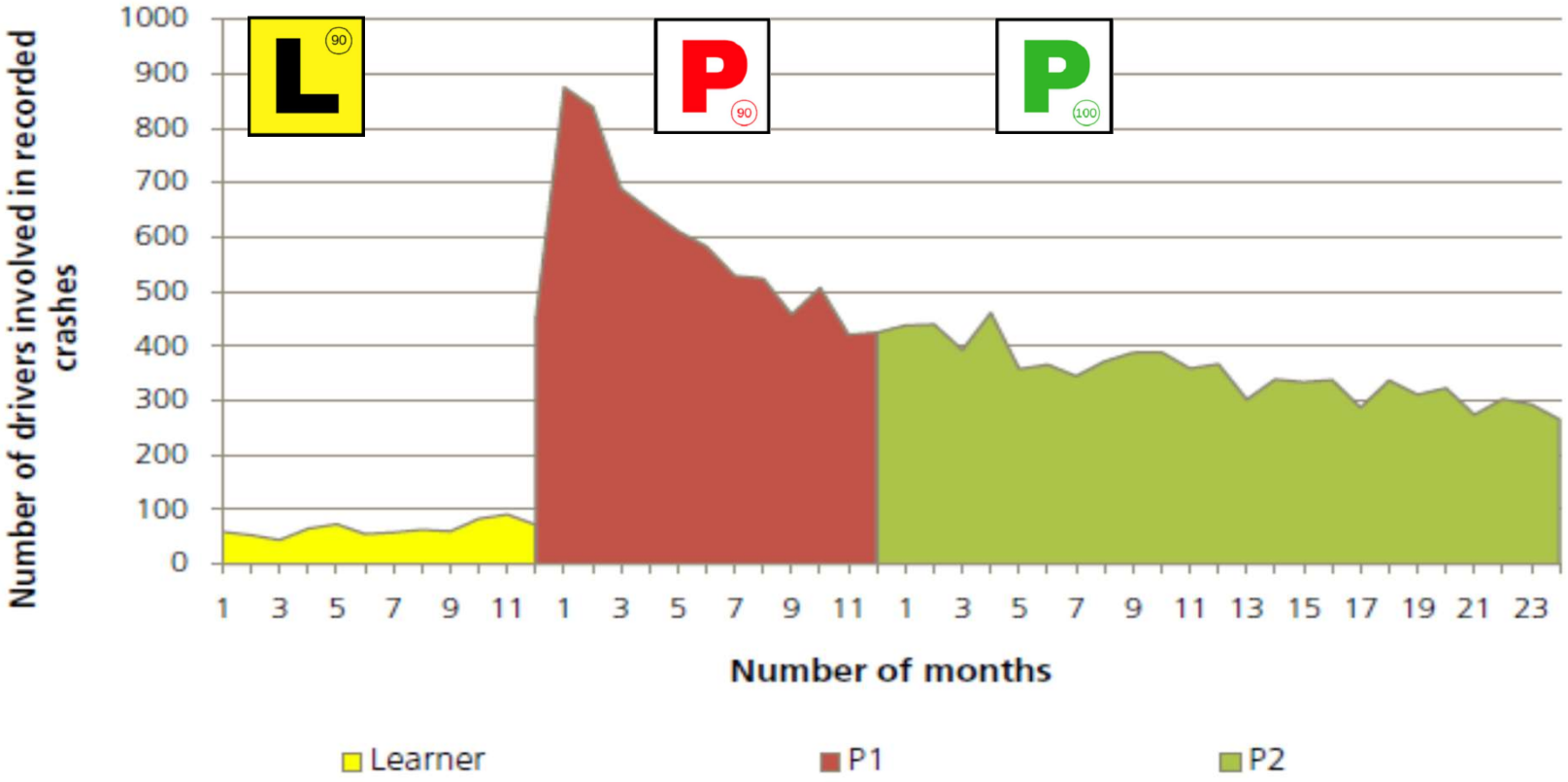
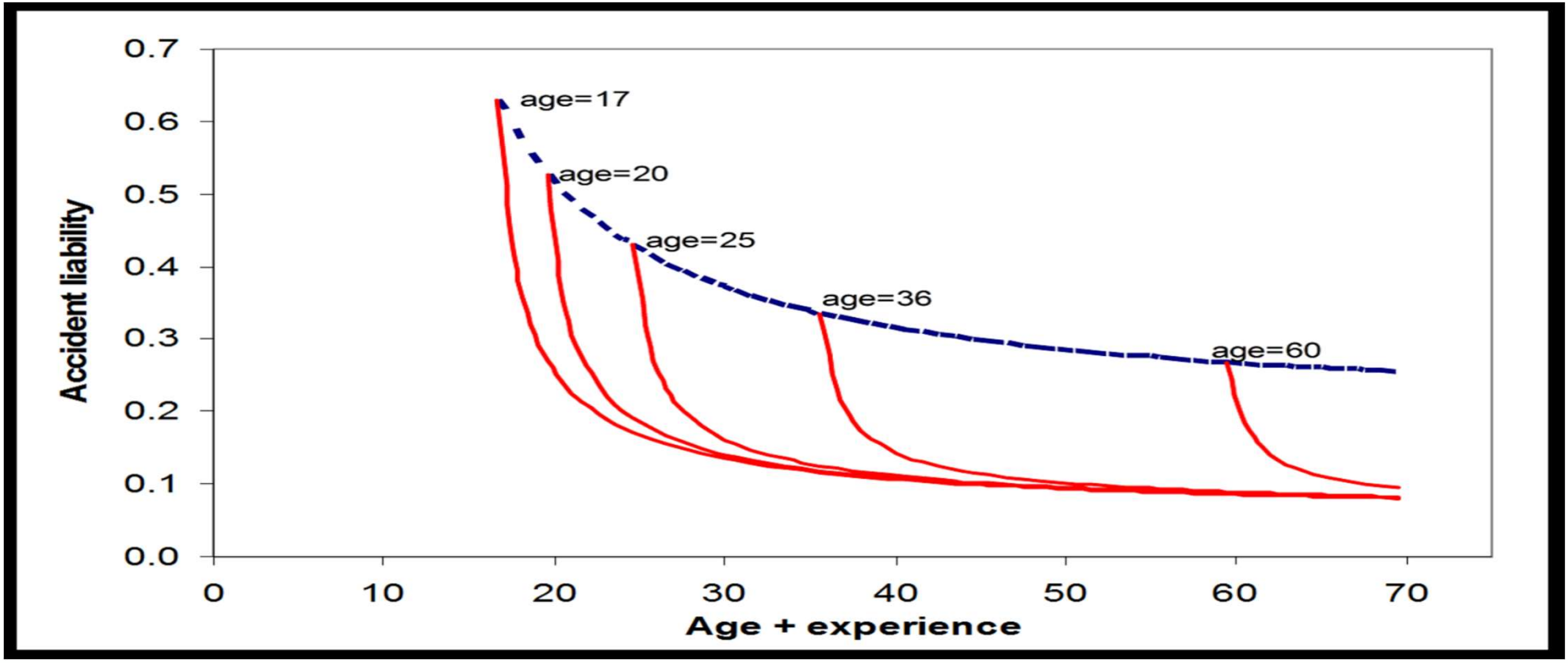
Background

Why novices?



Number of months since licensing

Why young novices?



Developmental Factors

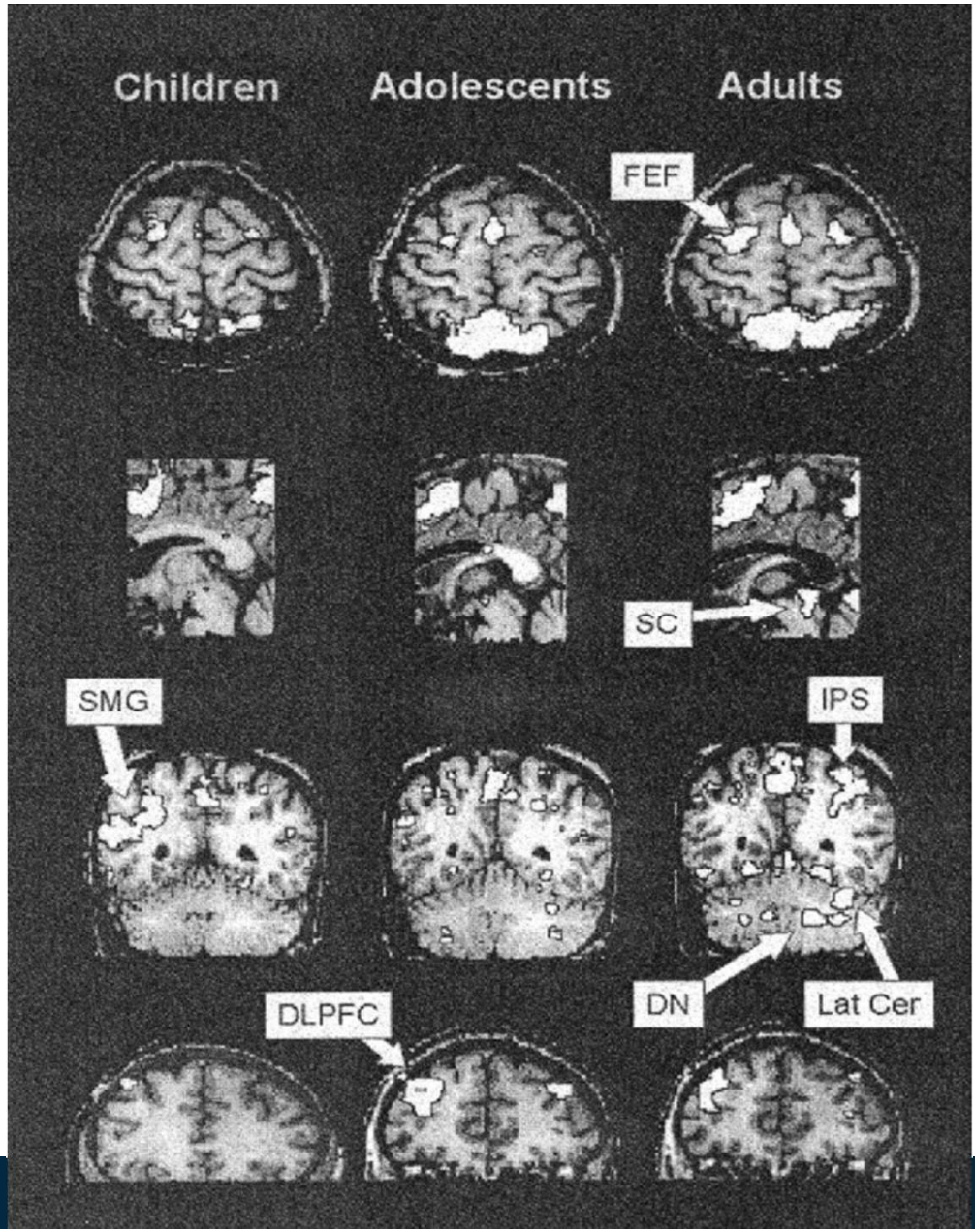
Brain development

Changes throughout lifetime

Adolescence

- begin improving capabilities gained as child
- synaptic pruning, myelination
- faster processing, localisation

fMRI: response inhibition



(Luna & Sweeny , 2004)

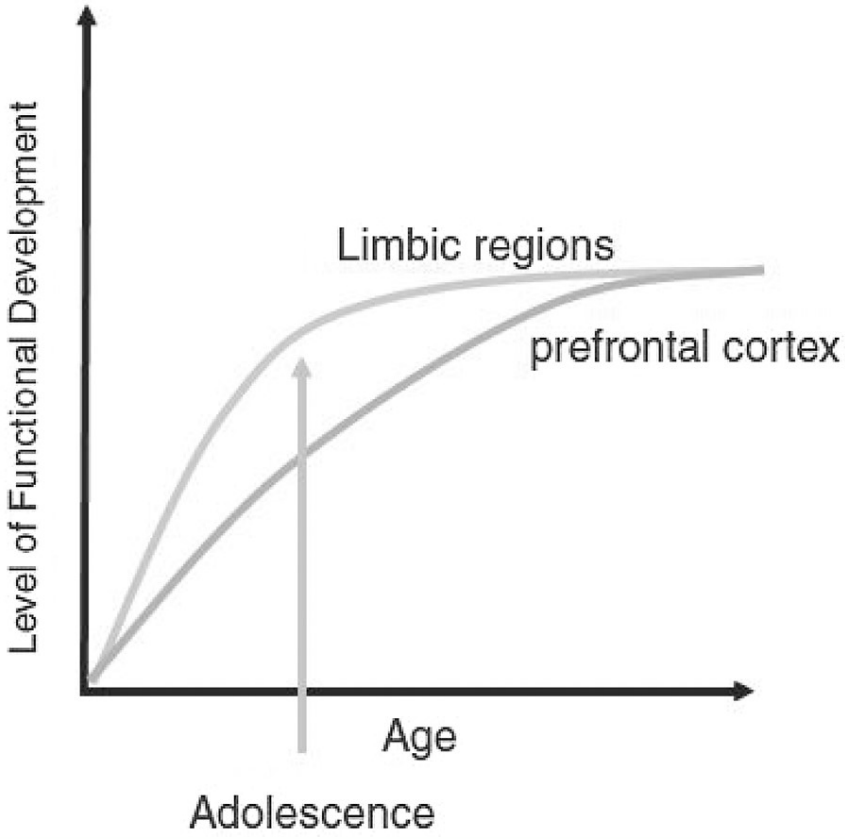
Two Control Processes

Limbic regions

- Sensation seeking, reward
- Impulsivity, distractibility

Prefrontal cortex

- Planning, decision making
- Control impulses, attention



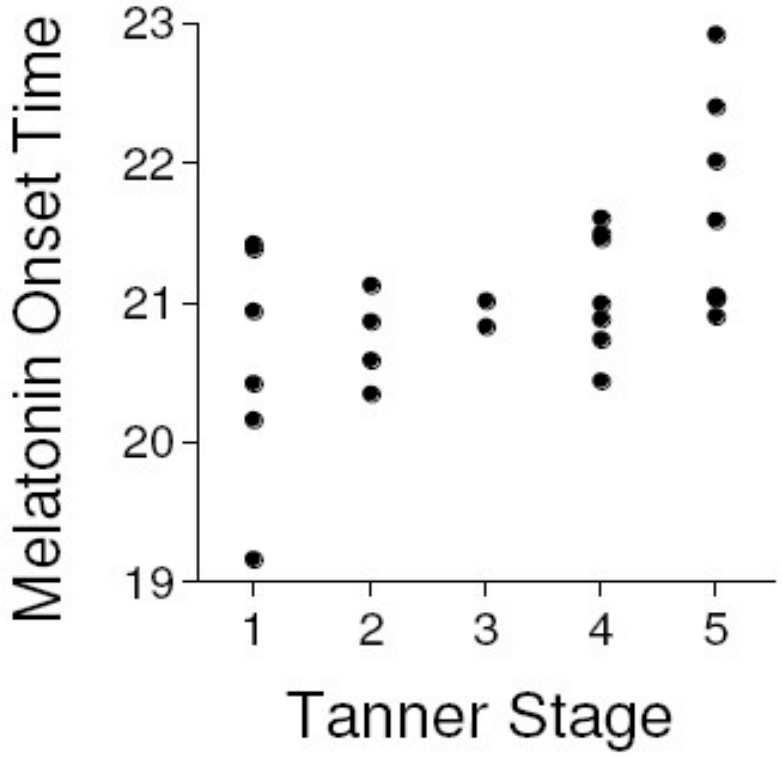
Hormone Shift

Increase sleep needs

- 9.2h high school
- 8.4h graduate

Actual sleep times

- 6.9-7.5 high school
- 7h graduate



Driving Implications

Attention control, distractibility, impulsiveness

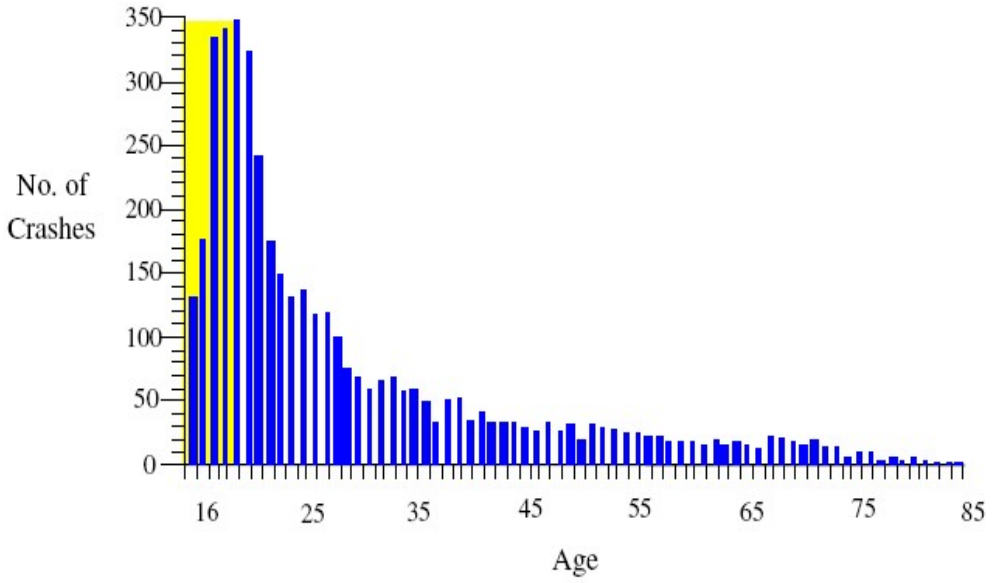
- Speed management
- Phone use
- Drugs/alcohol

Reward sensitivity

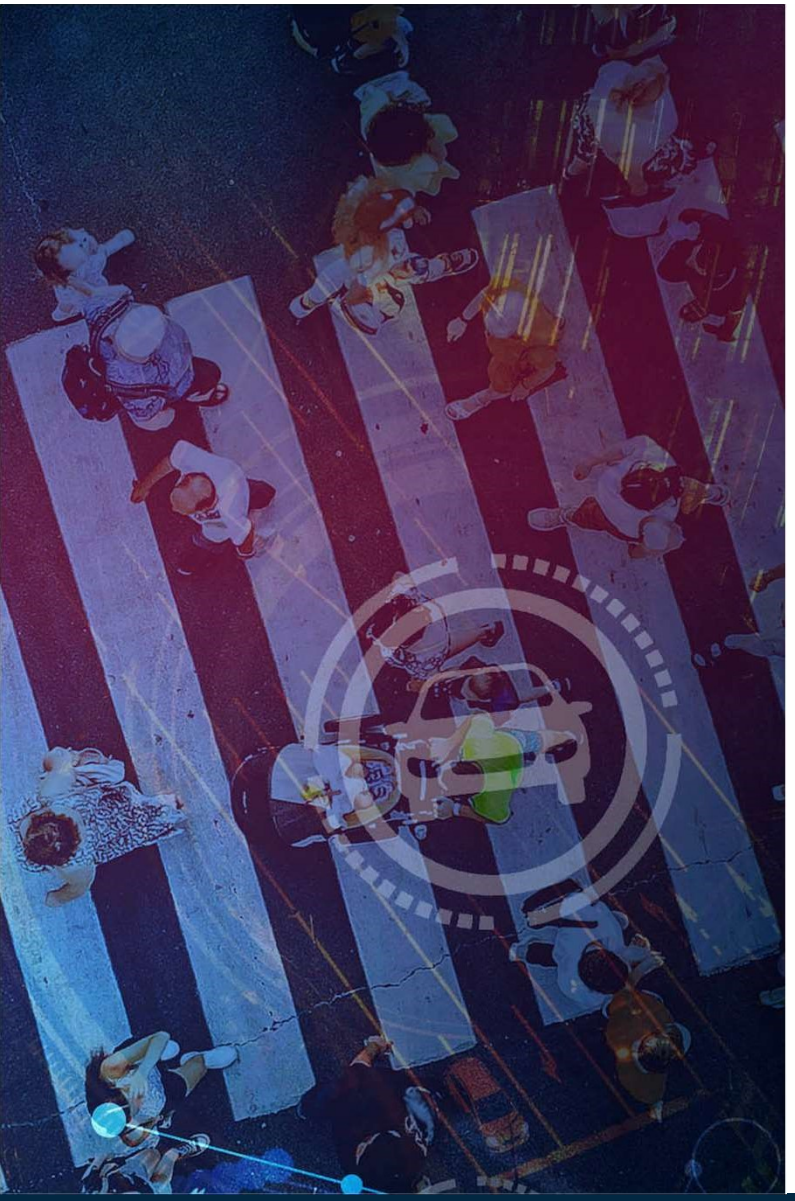
- Peer passengers

Emotions

Fatigue



Age distribution of fall asleep crashes (USA)



Adaptive Development

Role of experience

Role of environment

Only small number do not adjust

Higher risk, not high prevalence

➢ Individual differences

Lifestyle, Inexperience

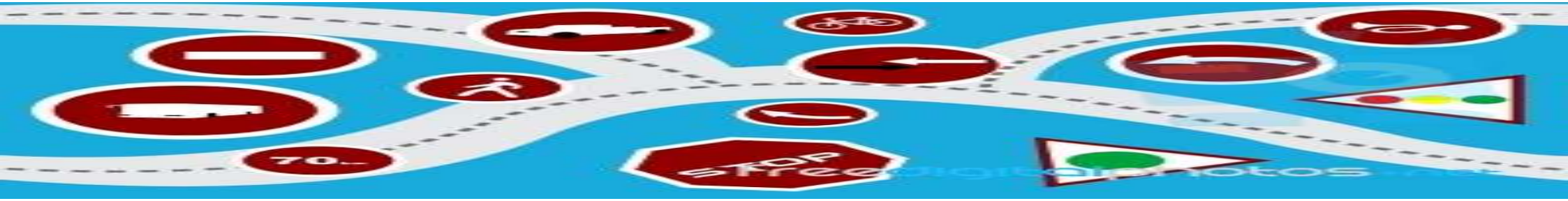
Lifestyle

More driving compared to adults

- At night
- On weekends
- With peer passengers
- For recreation
- In older, smaller cars

Inexperience

- Drive closer to car in front
- Focus just ahead, not far ahead or to sides
  - Hazard anticipation and detection 5x slower than adults
- Travel too fast for conditions
  - Weather, traffic, road conditions



Role of Feedback

GDE

Feedback to aid self-evaluation and reflection

	Knowledge and skills	Risk-increasing factors	Self-evaluation and awareness skills
Level 4: Goals for life and skills for living	Personal tendencies that impact driving	Not accepting safe social norms, e.g., regarding drug use	Ability to recognise and control impulses
Level 3: Goals and contexts for driving	Trip planning, route choice	Poor driver condition, e.g., mood, medication	Personal planning skills, motives for safe vs risky driving
Level 2: Mastery of traffic situations	Road rules, safety margins	Driving skill deficits, e.g., in poor weather conditions	Awareness of personal driving style
Level 1: Vehicle manoeuvring	How to operate a vehicle, e.g., change gears	Not yet automating psychomotor skills for operating a vehicle	Realistic self-evaluation about vehicle handling capability

Feedback Effectiveness

Best when…

- timely, objective, specific, addresses consequences (Van Houten, 1980)
- the more information provided (Wisniew et al, 2020)
  - student education moderate to high effect sizes (d = 0.48–0.79) (Hattie, 2009; Hattie & Timperley, 2007; Wisniew et al, 2020)

Critical role in NSW young driver study exploring Self-explanation and Reflection training programs (Krasnova et al, 2015, 2016)

Young Driver Applications

Simulator

- Eyes-off-road alert: increased attention (Donmez et al, 2007)
- Close following visual/verbal: improvements not sustained (Creaser et al, 2007)

On-road in-car alerts plus parental monitoring

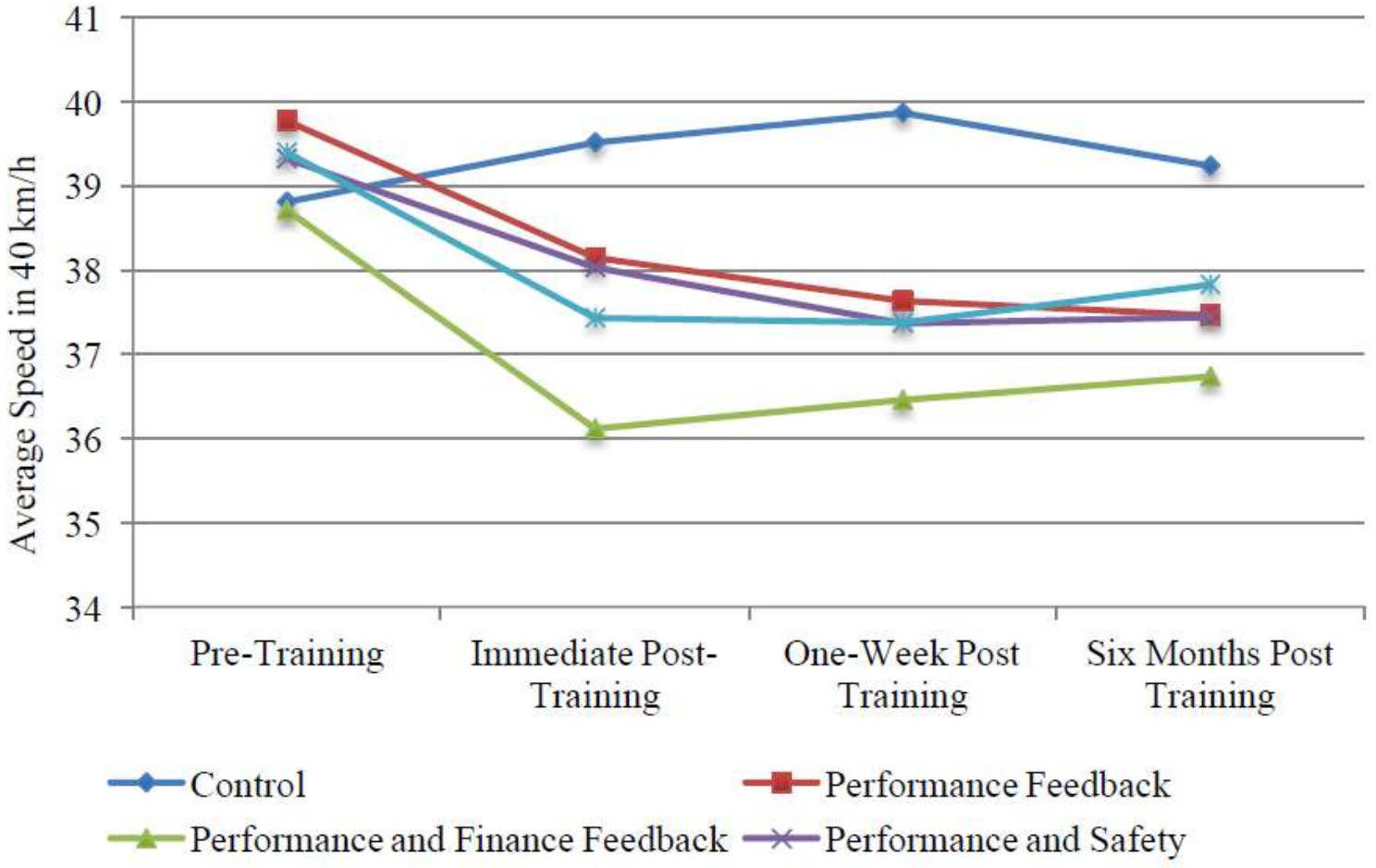
- Decrease g-force events (Carney et al, 2010; McGehee et al, 2007)
- Best no parent report if improve, not sustained (Farmer et al, 2010; McCartt et al, 2010)

Self-report coaching, higher-order driving instruction

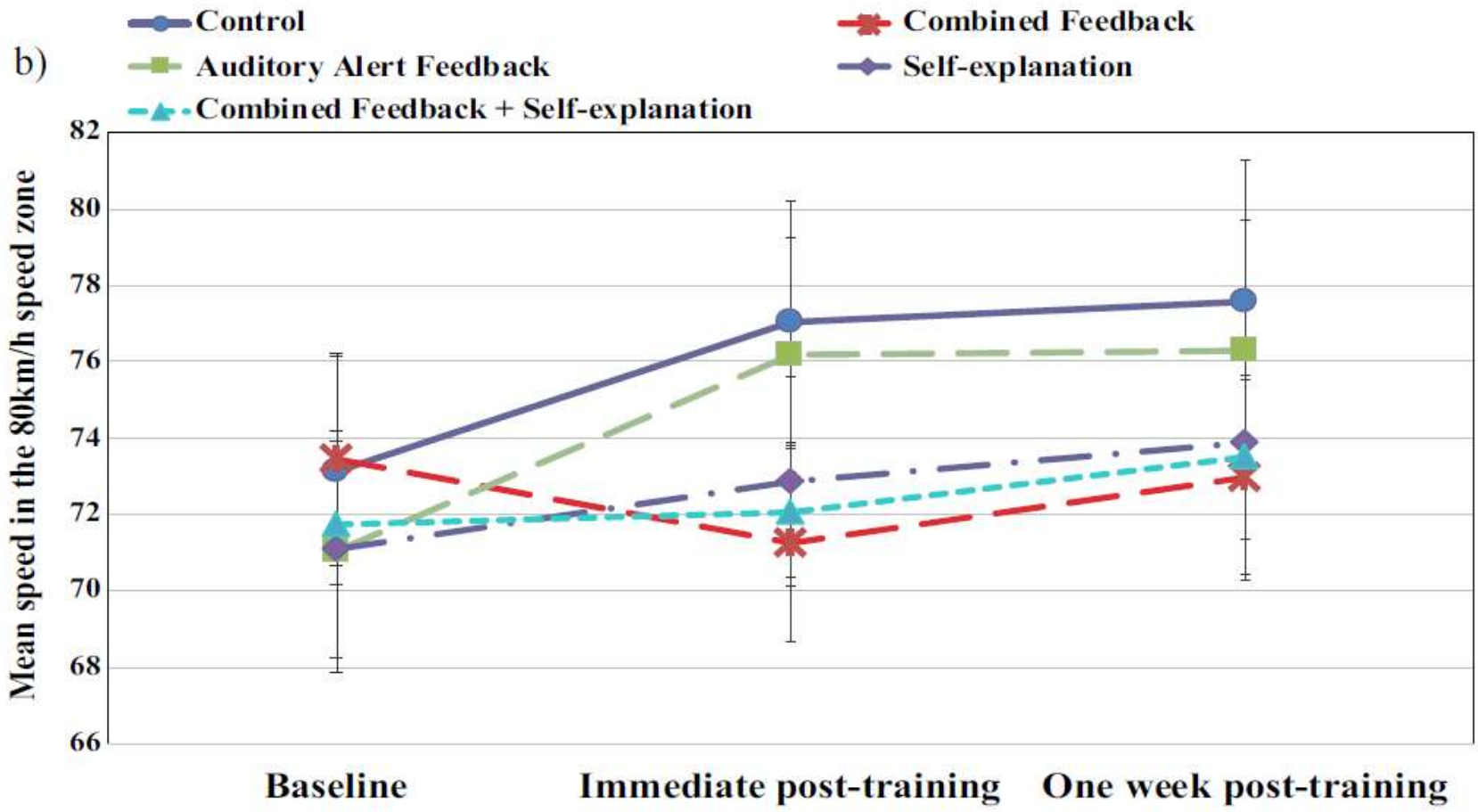
- Reduced inattention, intentional risk-taking, mediated by self-regulated safety orientation (Watson-Brown, Scott-Parker, Senserrick, 2019)

NSW Young Drivers: Sim

Figure 1. Effect of different types of feedback on mean speed in 40 km speed zone for test periods: pre-training, immediately, one week and six months post-training.



NSW Young Drivers: Road



Telematics

SIRA – TBA

Other incentive/insurance linked trials (Dijksterhuiset al, 2019; Ellison et al, 2015; Stevenson et al, 2019)

- Feedback reduces risky driving
- Even greater with financial incentive
- Recent Australian RCT: reduced composite measure of speeding, harsh braking and harsh acceleration (Stevenson et al, in press*)

Conclusions

Healthy development, lifestyle, inexperience inflate risk

- Most young people intend to drive safely

Feedback aids self-reflection, self-regulation

Telematics provides feedback + incentive

- All ‘best practice’: timely, objective, specific, detailed, consequences

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Thank You!
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Second presenter

Dr Amanda Rawlinson

NSW GOVERNMENT | State Insurance Regulatory Authority

Young Drivers Telematics Trial – Key Results

19 May 2021

NSW GOVERNMENT | State Insurance Regulatory Authority

Introduction

Joint SIRA and NSW Centre for Road Safety trial to:

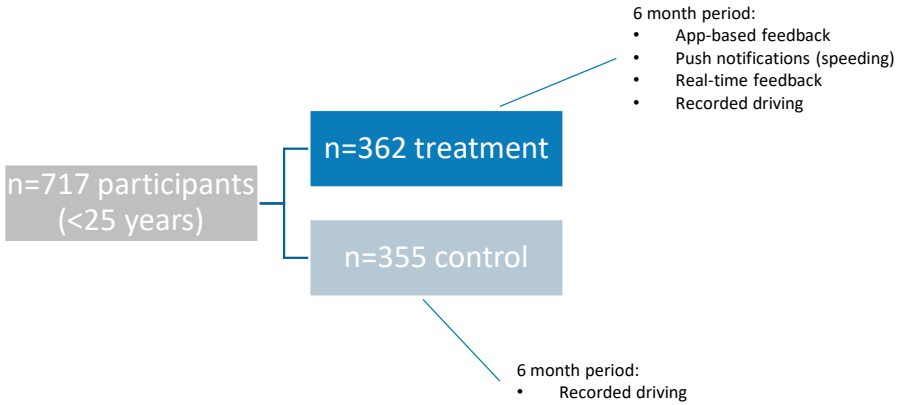
- investigate whether, and the extent to which, telematics can positively influence young driver behaviour
- identify opportunities for and barriers to broadening the use of telematics as means of improving road safety
- understand young driver behaviours through an extensive collection of real-time driving data

- Launched July 2018 and concluded March 2019

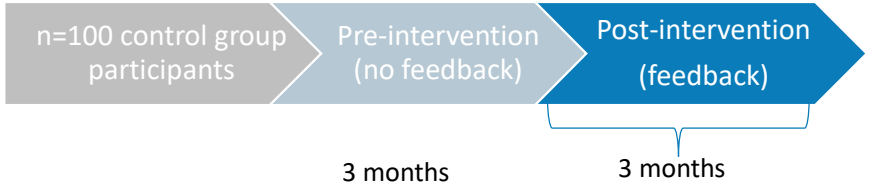
- Largest controlled study of evaluating effect of telematics to date
  - 33,000+ recording driving hours
  - 4.1m kms

Trial methodology

1. Randomised control study



2. Pre-/post- intervention study



3. Attitudinal research

Participant surveys

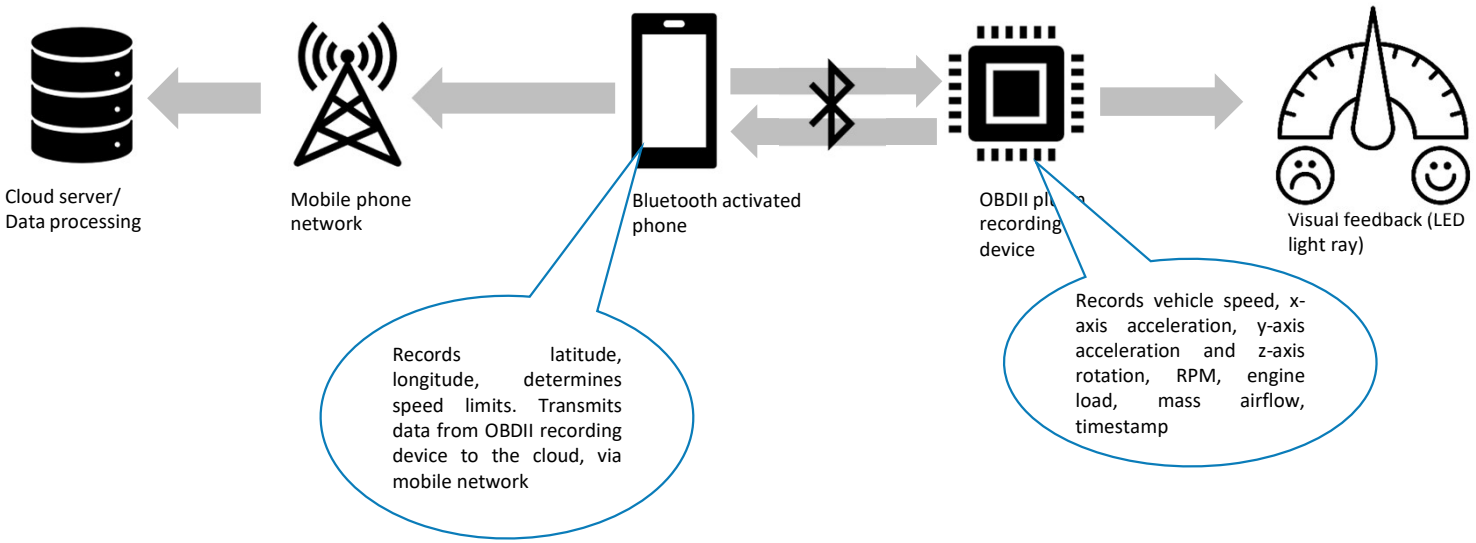
- n=598 respondents

Focus group discuss

- n=50 participants

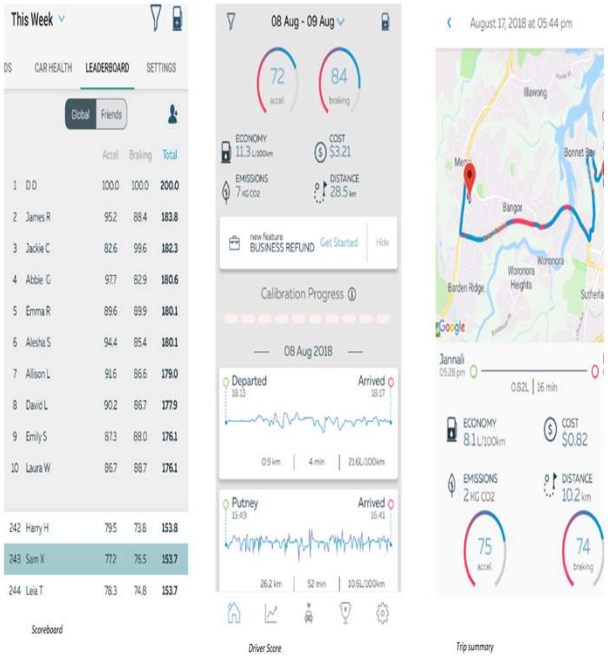
Vehicle Instrumentation

- Once selected, trial participants were sent a telematics device via mail, along with installation instructions and contact details for technical support
- The telematics device consisted of:
  - a OBDII data recorder
  - a LED light ray which changed colour in real-time based on driver behaviour
  - An app to allow users to access driver scores, trip summary, fuel efficiency information, leader board
- Data was recorded and transmitted through user's mobile phone



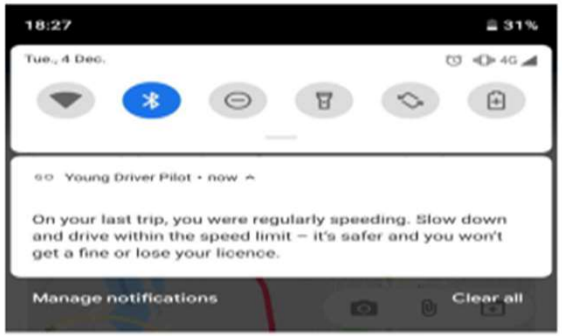
Driver Feedback

App-based feedback

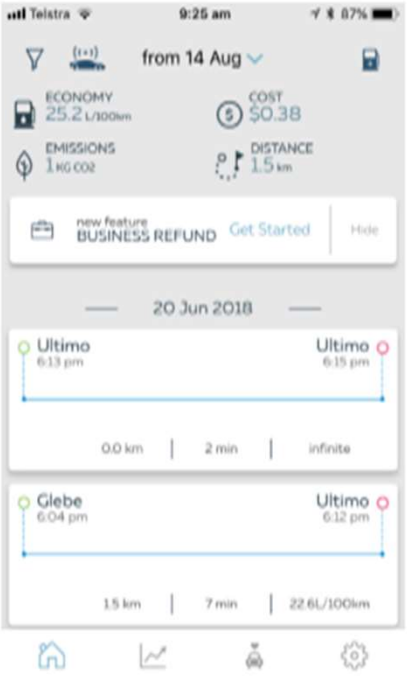


Real-time feedback

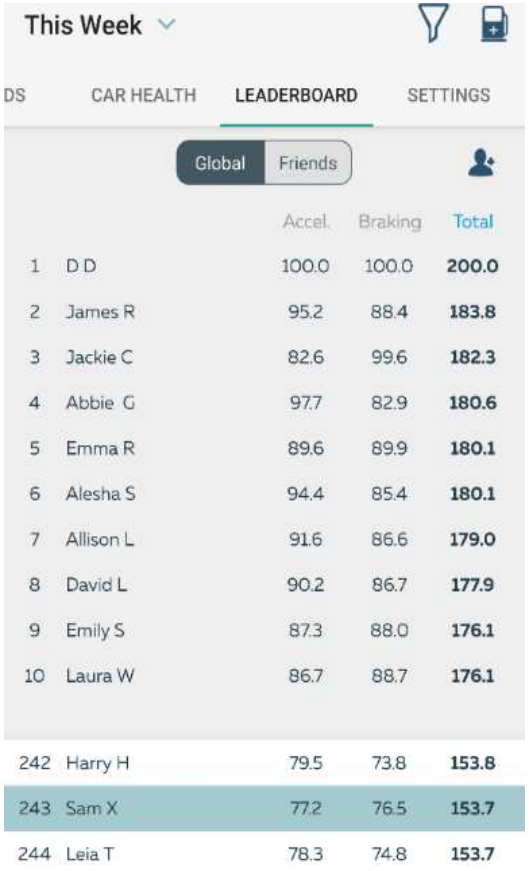
Post-trip notifications



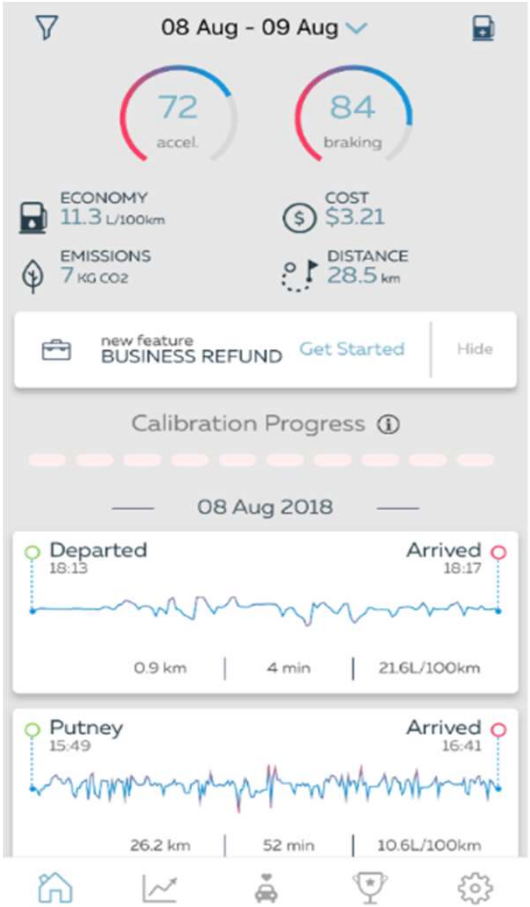
Control group = no feedback



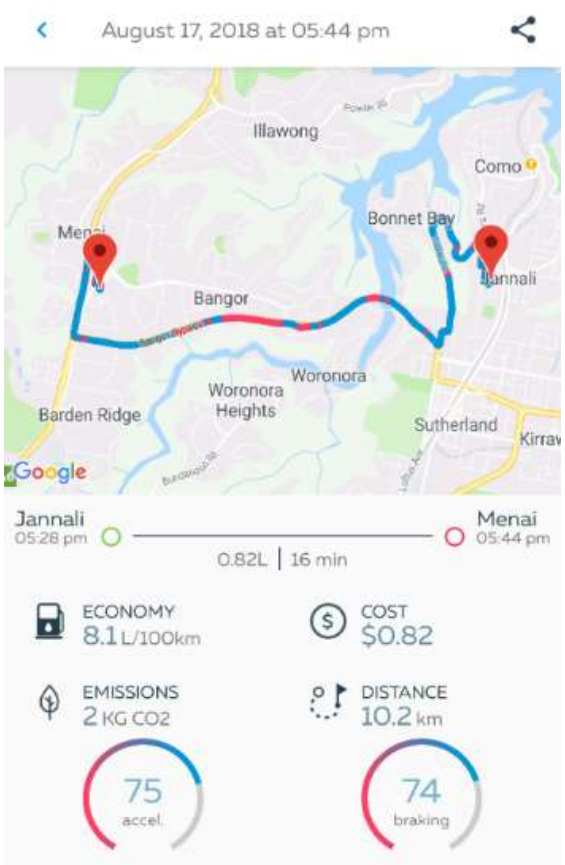
App-based feedback



Scoreboard



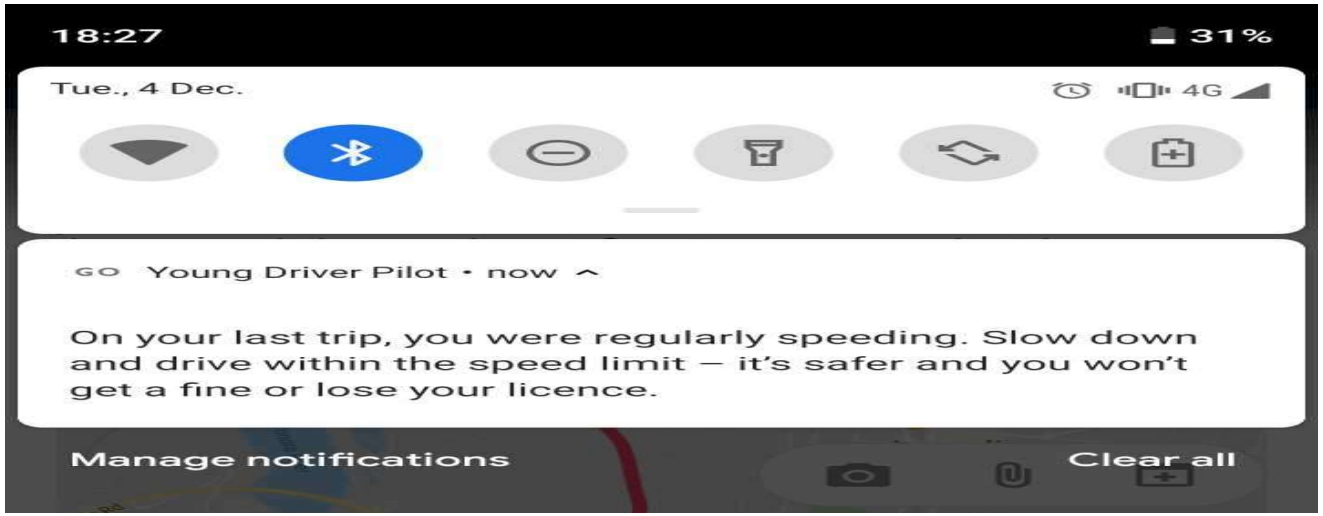
Driver Score



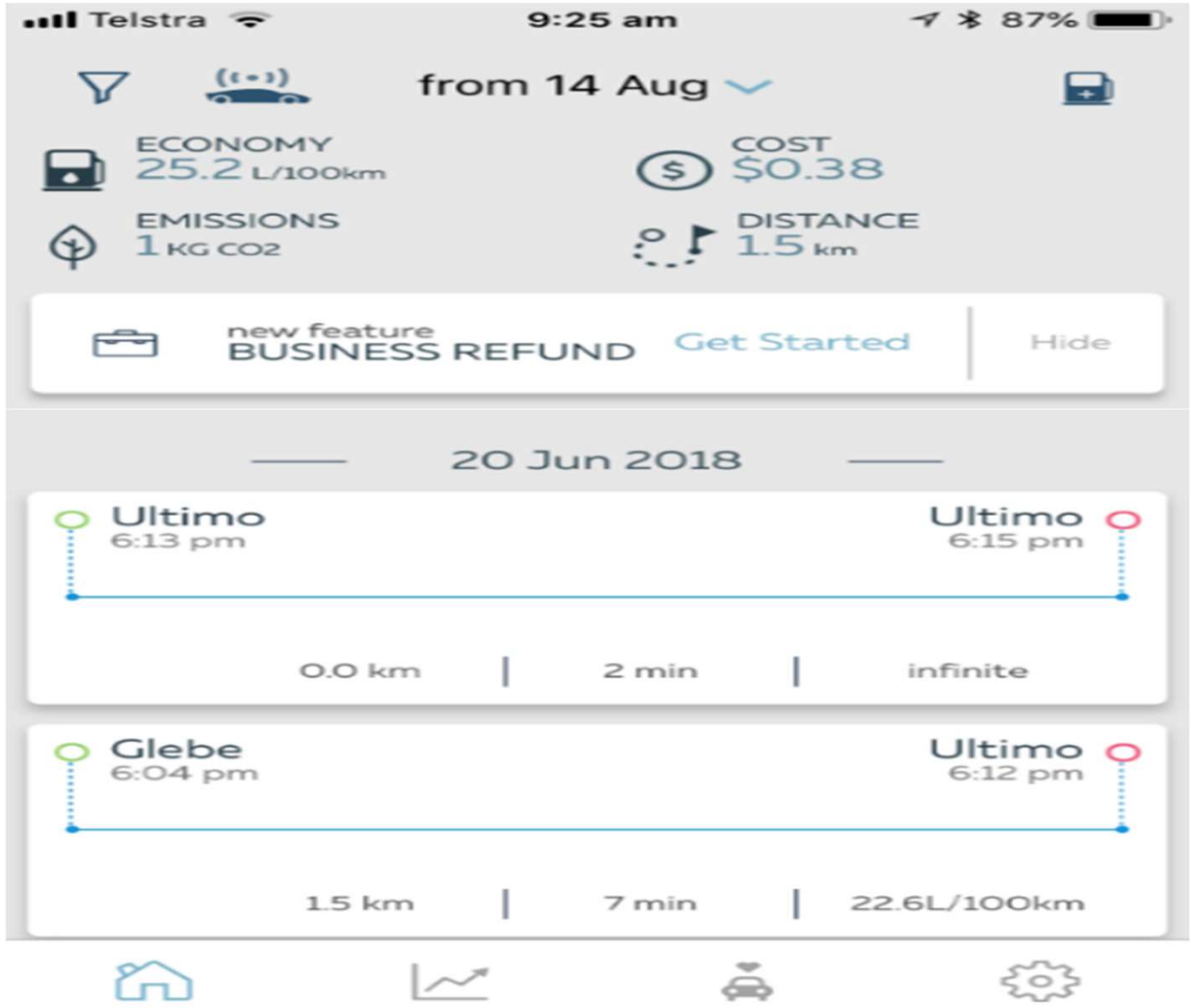
Trip summary

Real-time feedback

Post-trip notifications



Control group – no feedback



Outcome measures

Speed management

- Time speeding per 100 driving hours
  - 1km/h – 9km/h over the limit
  - 10km/h – 20km/h over the limit
  - 20km/h+ over the limit
- Positive delta speed
- Average free speed

Frequency and Severity of harsh braking

- X ≤ −0.45g per 1000 km,
- X ≤ −0.5g per 1000 km,
- X ≤ −0.75g per 1000 km

Behavioural indicators

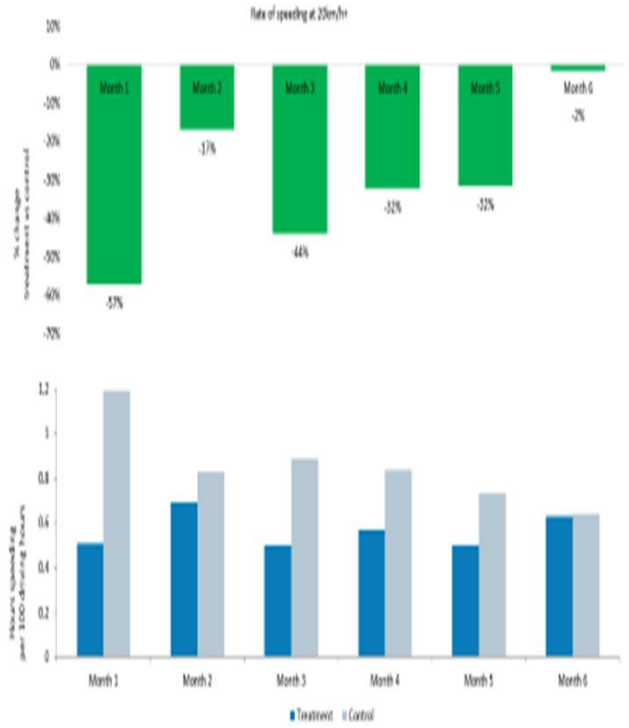
Frequency and severity of rapid acceleration

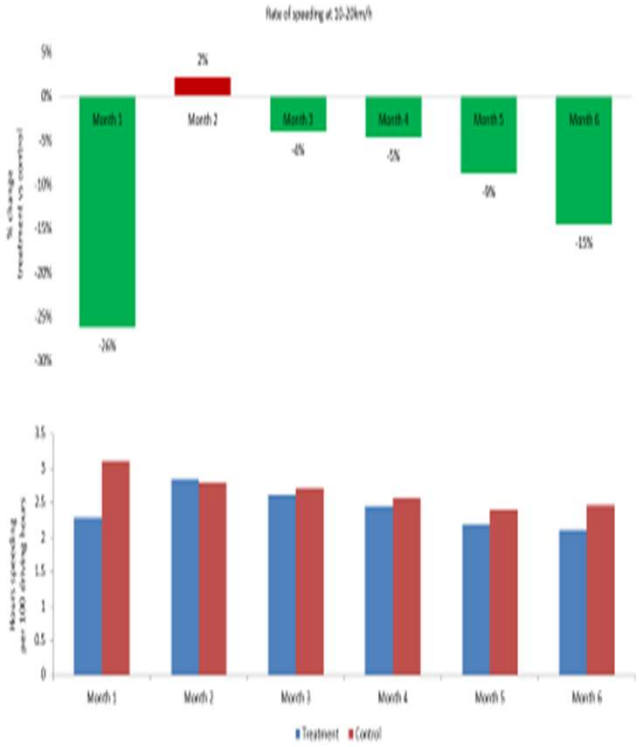
- X ≥ 0.35g per 1000km
- X ≥ 0.58g per 1000km

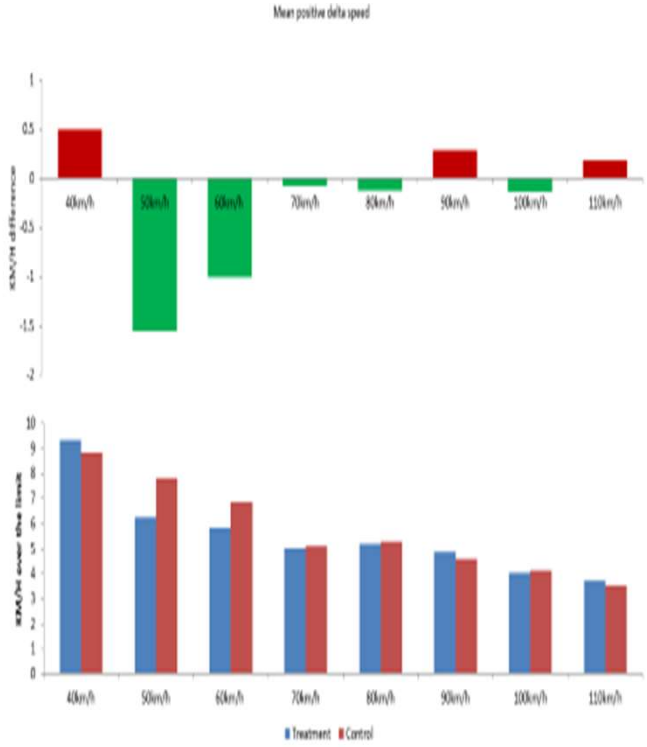
Frequency and severity of hard turning

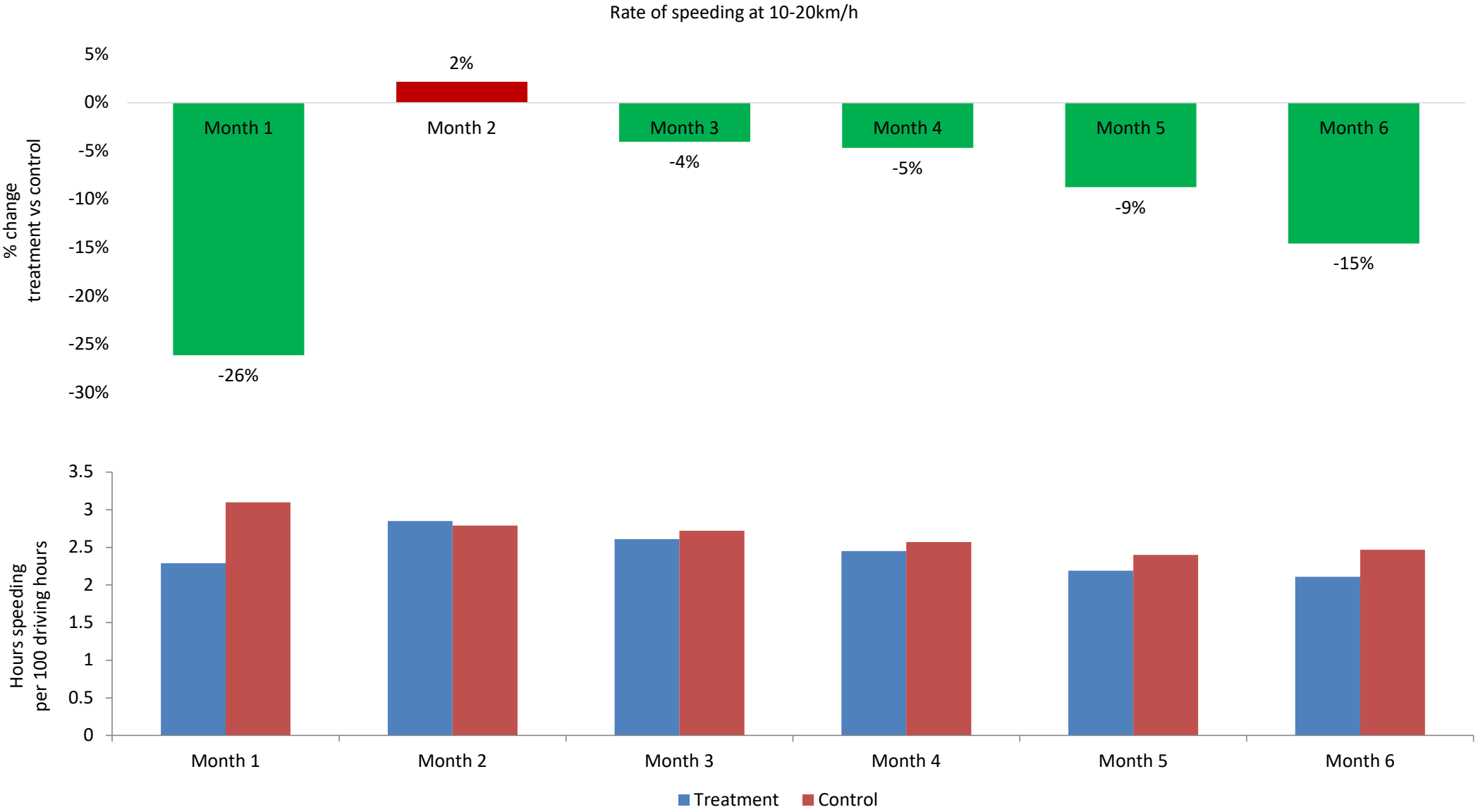
- Y ≥ |0.5|g per 1000 km

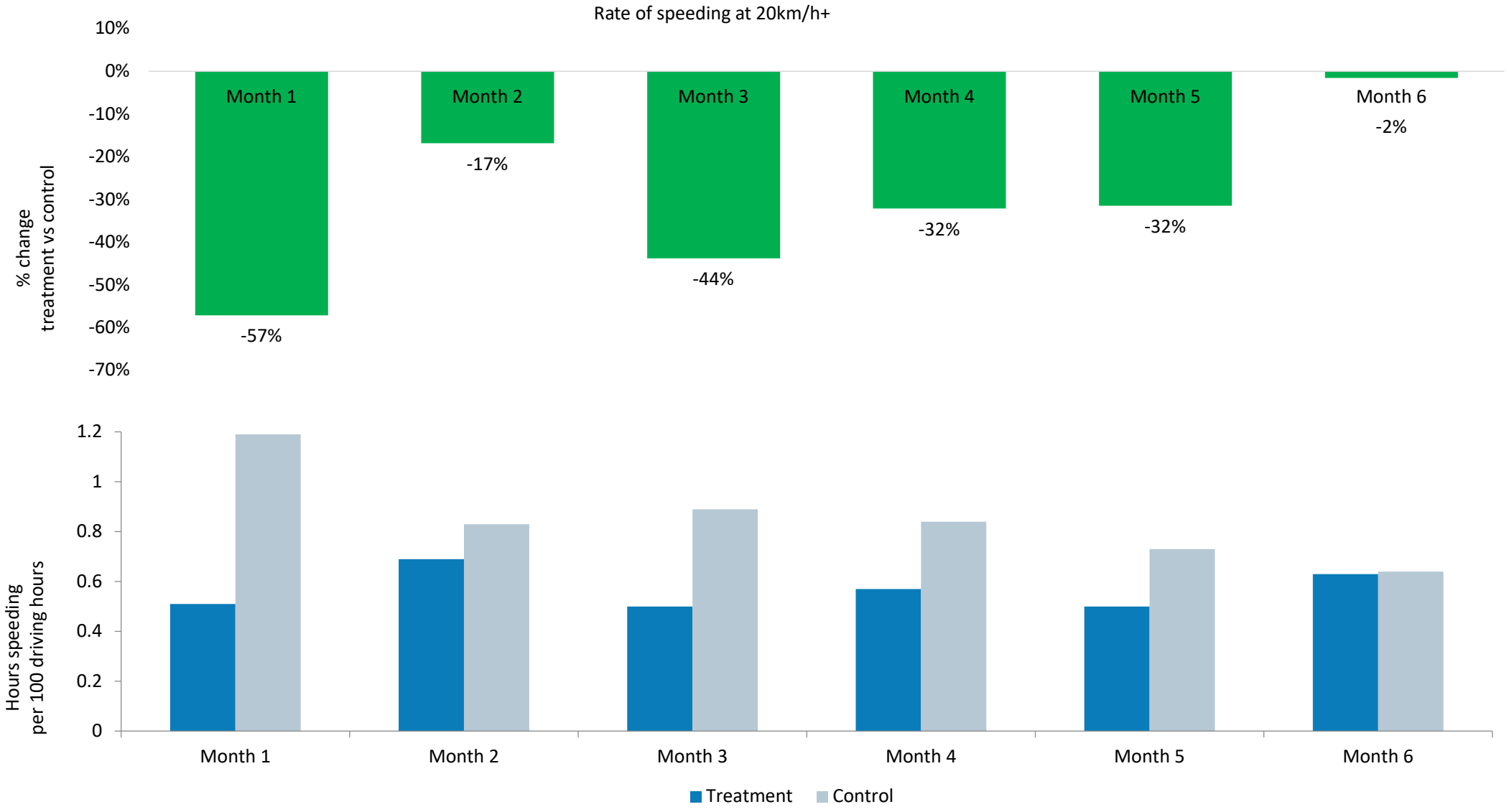
Results - speeding

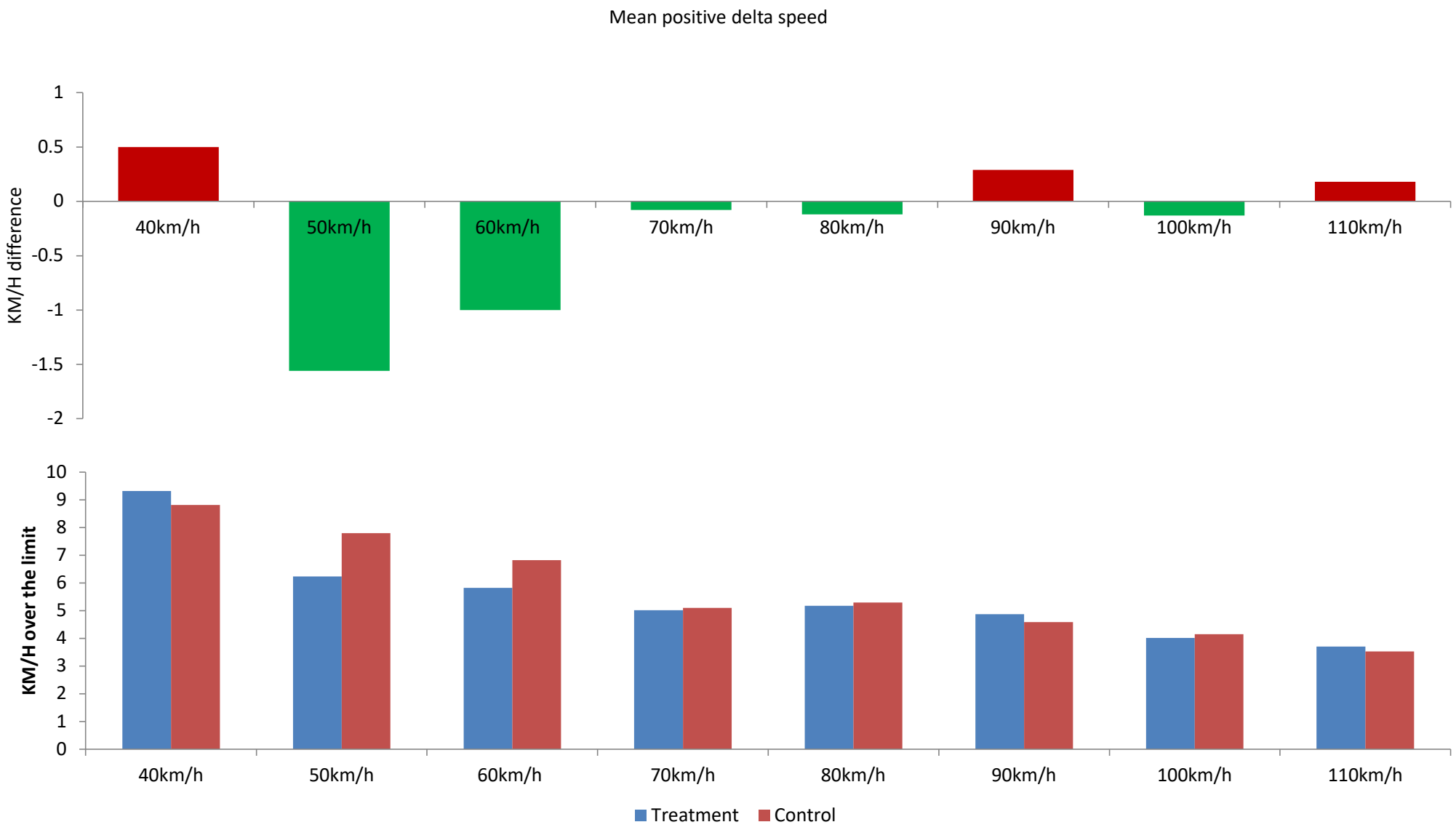




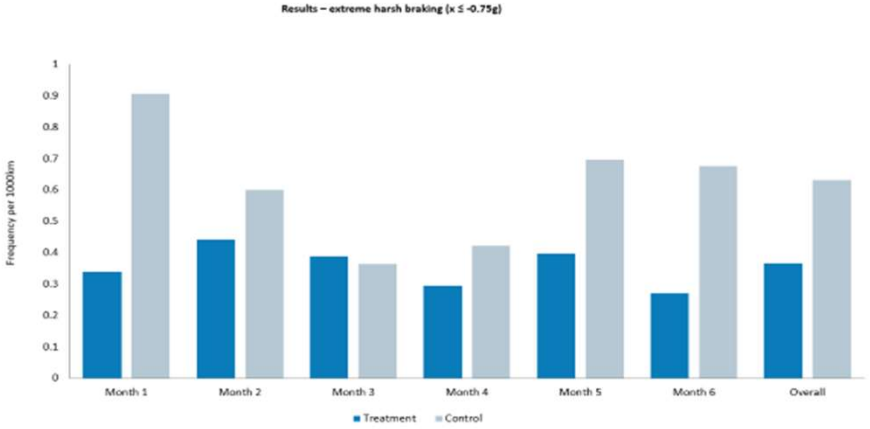


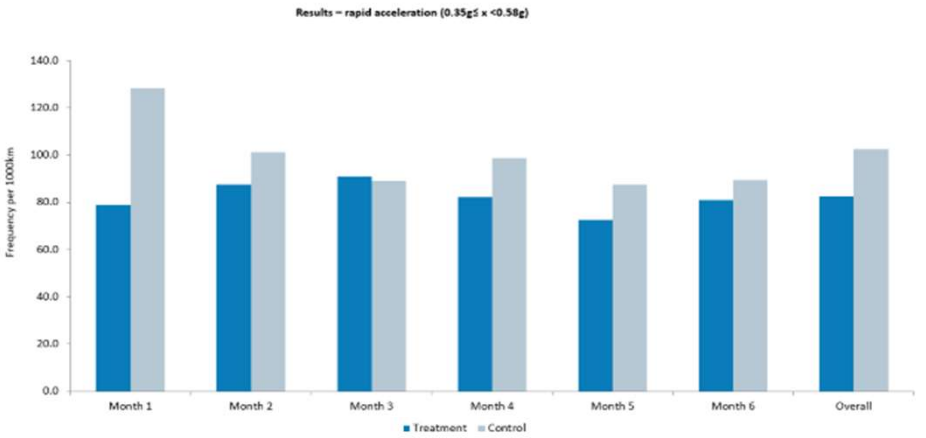

Rate of speeding at 10-20km/h
% change treatment vs control
5%
0%
-5%
-10%
-15%
-20%
-25%
-30%
Month 1
-26%
Month 2
2%
Month 3
-4%
Month 4
-5%
Month 5
-9%
Month 6
-15%
Hours speeding per 100 driving hours
3.5
3
2.5
2
1.5
1
0.5
0
Month 1
Month 2
Month 3
Month 4
Month 5
Month 6
Treatment
Control

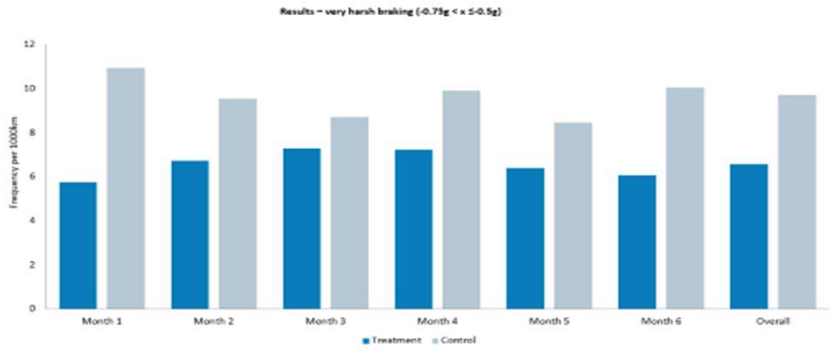

Rate of speeding at 20km/h+
% change treatment vs control
10%
0%
-10%
-20%
-30%
-40%
-50%
-60%
-70%
Month 1
-57%
Month 2
-17%
Month 3
-44%
Month 4
-32%
Month 5
-32%
Month 6
-2%
Hours speeding per 100 driving hours
1.2
1
0.8
0.6
0.4
0.2
0
Month 1
Month 2
Month 3
Month 4
Month 5
Month 6
Treatment
Control

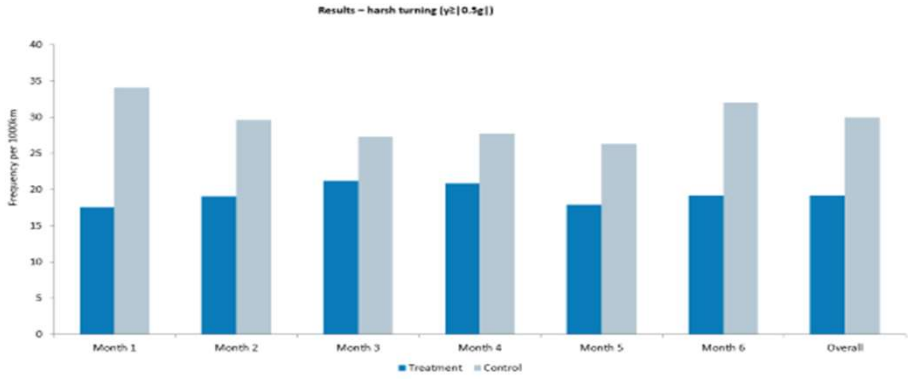

Mean positive delta speed
KM/H difference
1
0.5
0
-0.5
-1
-1.5
-2
40km/h
50km/h
60km/h
70km/h
80km/h
90km/h
100km/h
110km/h
KM/H over the limit
10
9
8
7
6
5
4
3
2
1
0
40km/h
50km/h
60km/h
70km/h
80km/h
90km/h
100km/h
110km/h
Treatment
Control

Results – braking, acceleration and turning

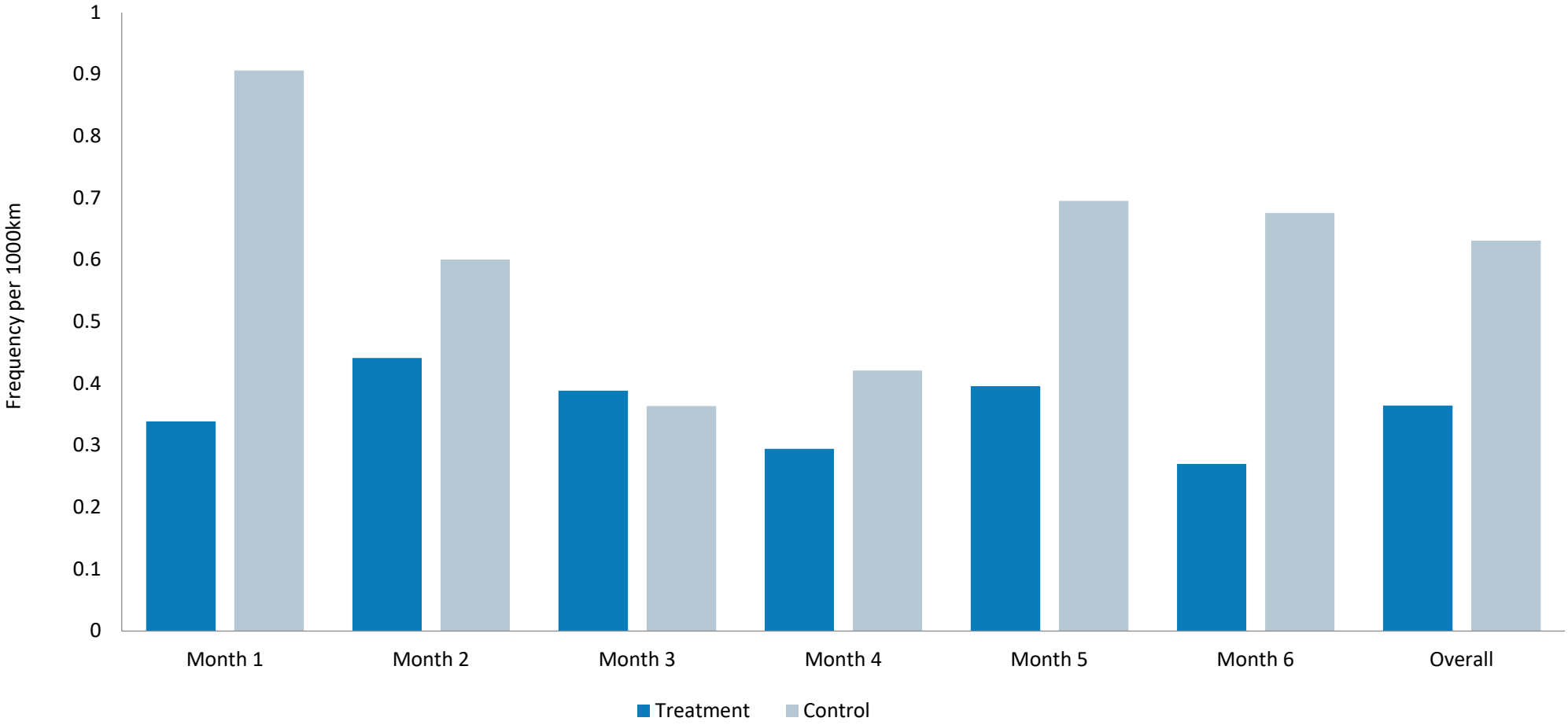




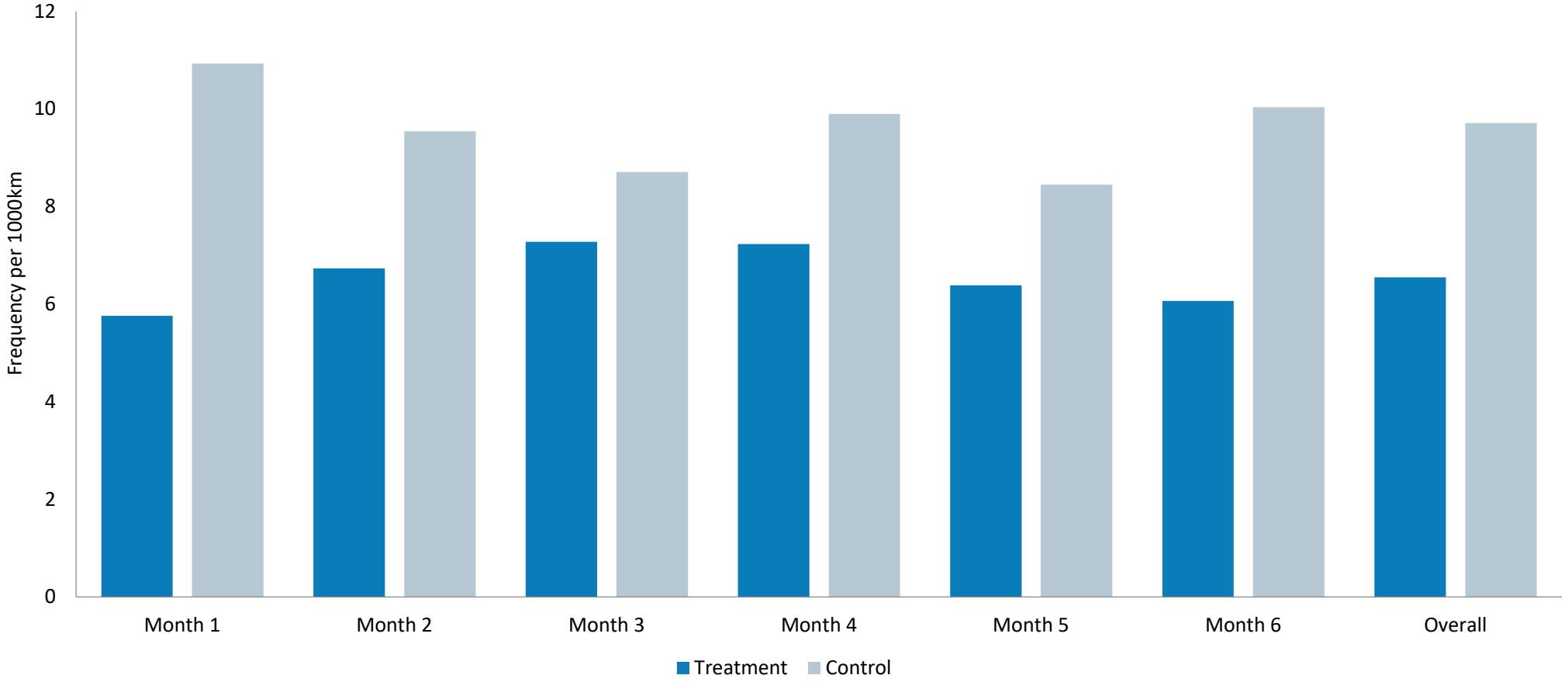




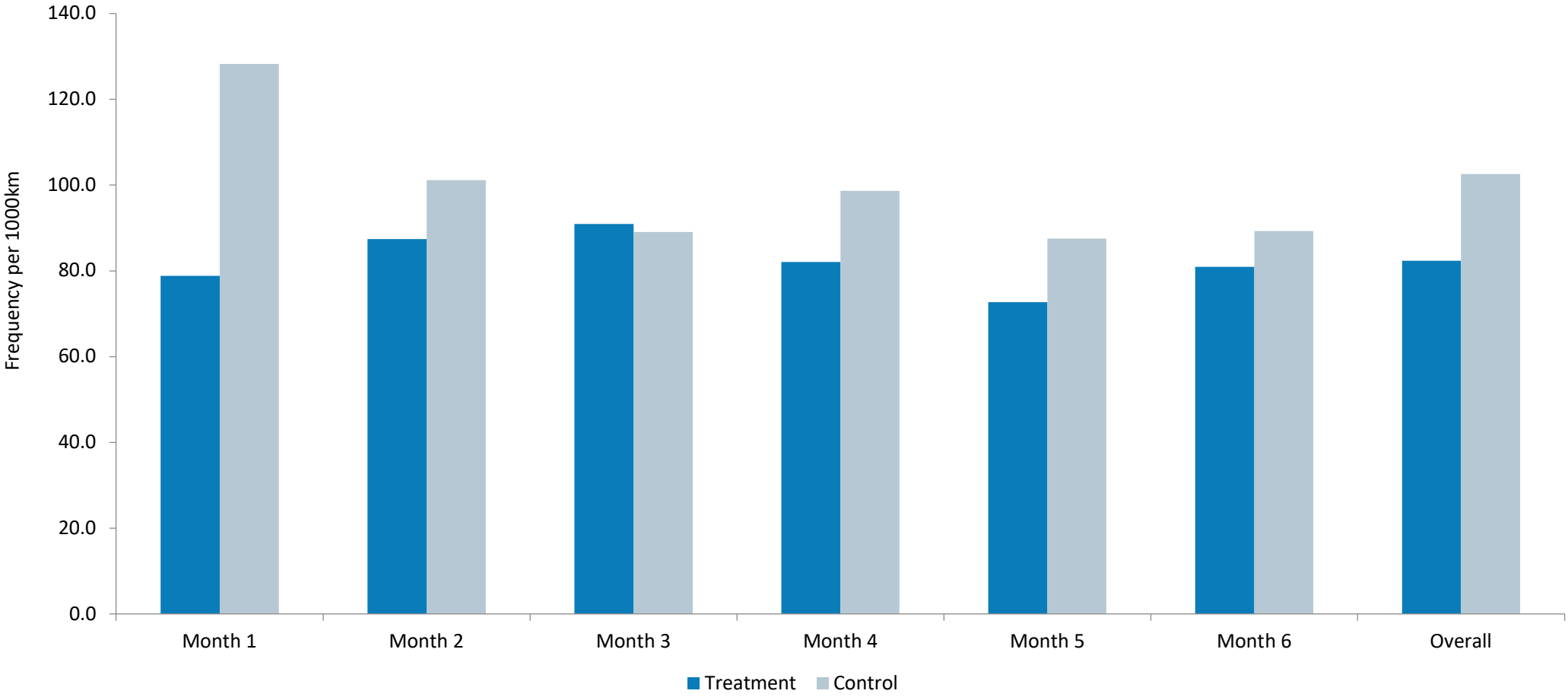
Results – extreme harsh braking (x ≤ -0.75g)

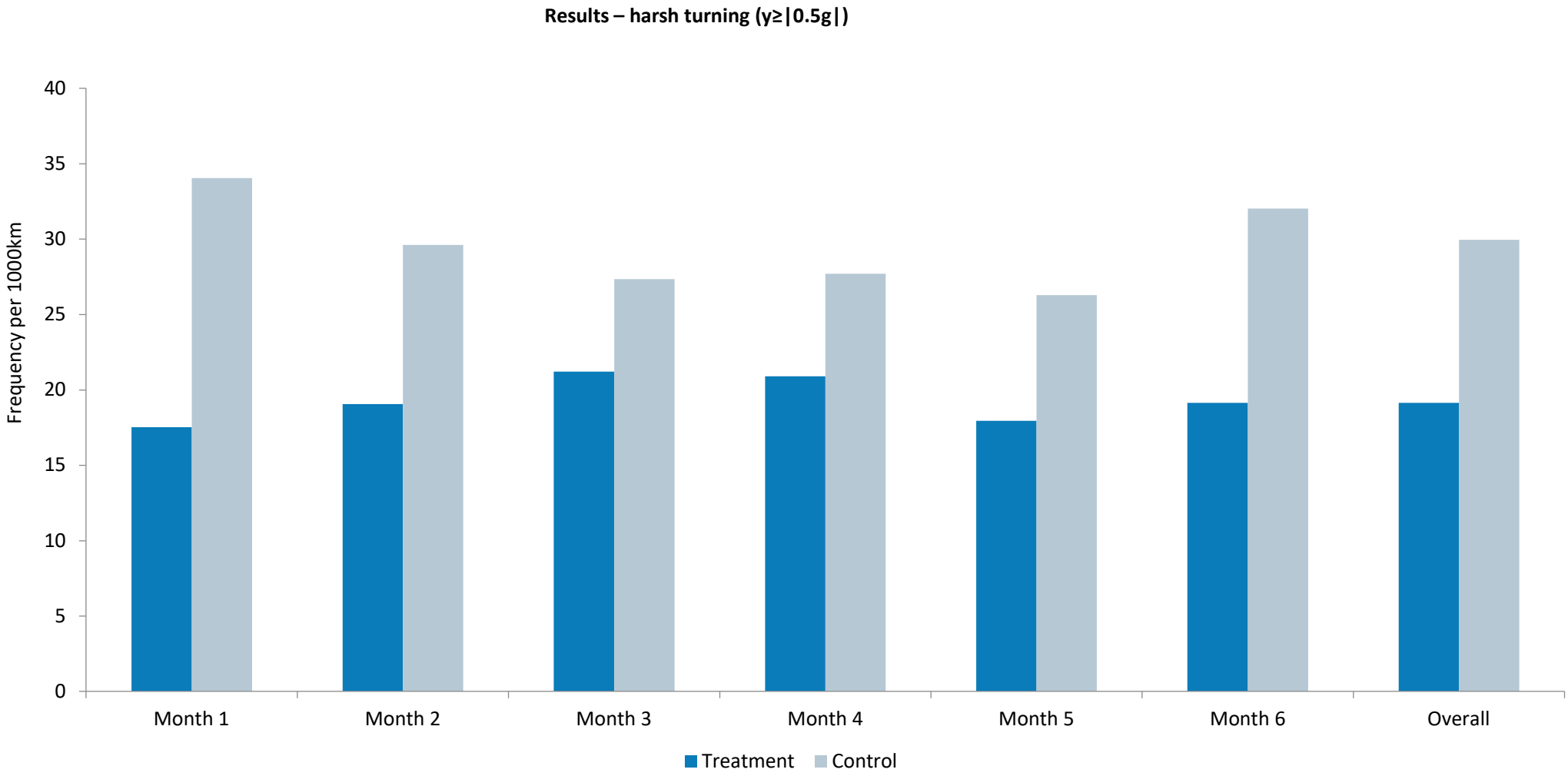


Results – very harsh braking (-0.75g < x ≤-0.5g)



Results – rapid acceleration (0.35g≤ x <0.58g)

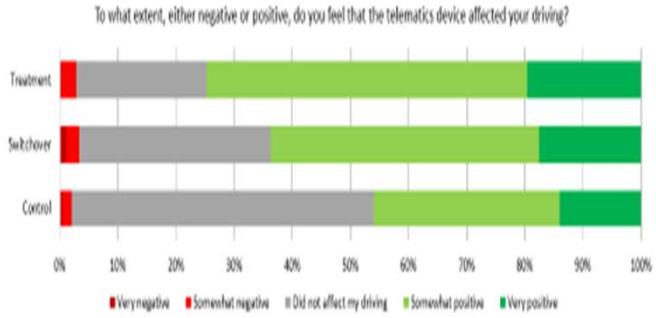


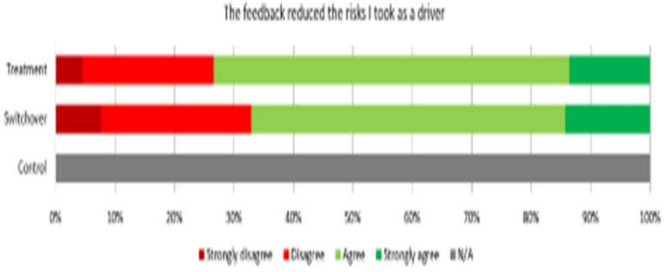

Results – harsh turning (y≥|0.5g|)
Frequency per 1000km
40
35
30
25
20
15
10
5
0
Month 1
Month 2
Month 3
Month 4
Month 5
Month 6
Overall
Treatment
Control

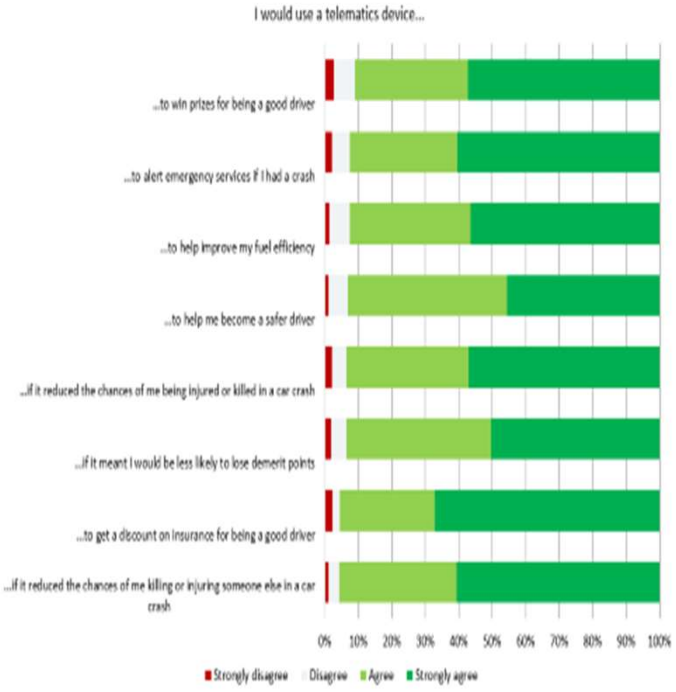
Results – pre and post intervention

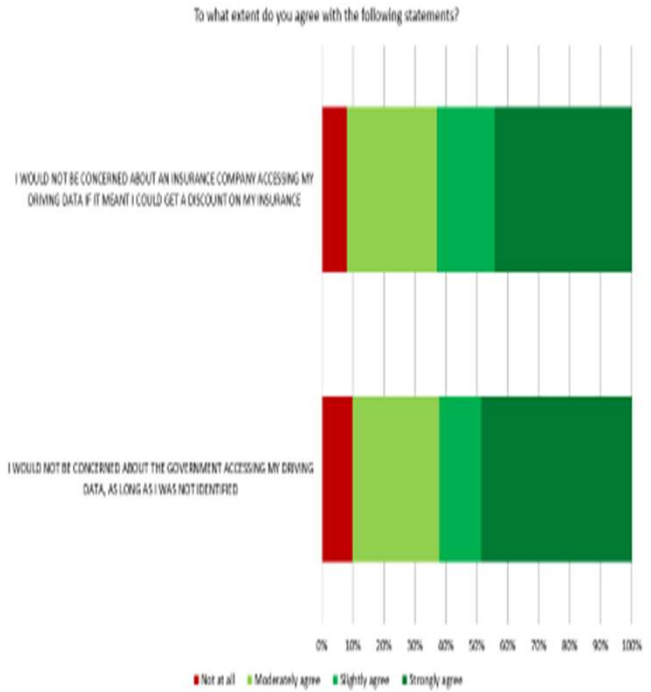
Behavioural indicator	Pre-intervention (4,105 driving hours)	Post-intervention (2,846 driving hours)	Change
Speeding hours per 100 driving hours (>1km/h over the limit)	17.08	15.12	-11.4%
Average free speed	68.05 km/h	67.83 km/h	-0.22 km/h
Average positive delta speed	5.87km/h	5.23km/h	-0.64km/h
Extreme harsh braking events per 1000 km (x≤-0.75g)	0.29	0.26	-10.3%
Very rapid acceleration events per 1000km (x≥0.58g)	2.31	1.44	-37.6%
Harsh turning events per 1000km/h (y≥|0.5|g)	21.28	14.14	-33.5%

Attitudes towards telematics use

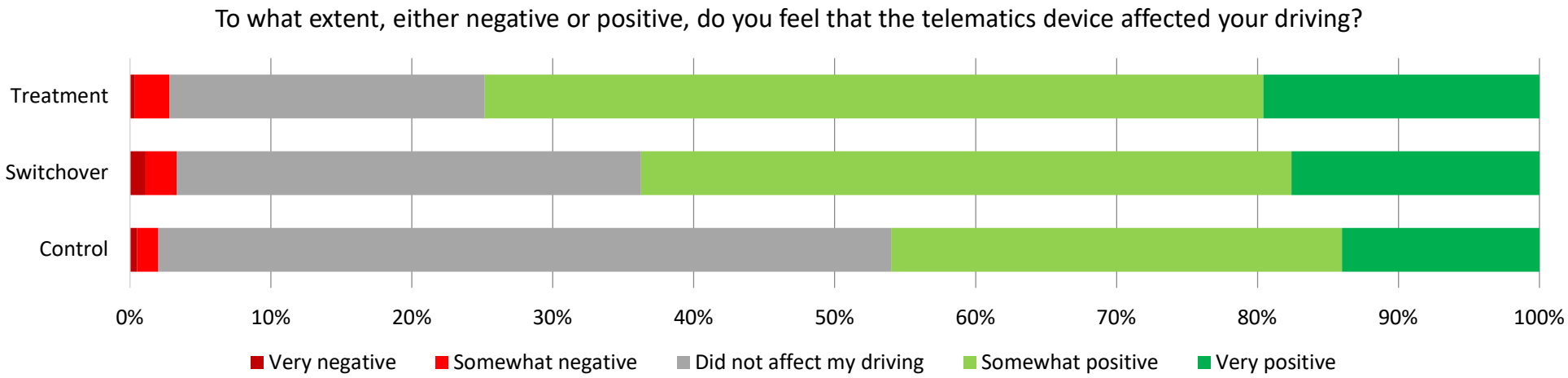


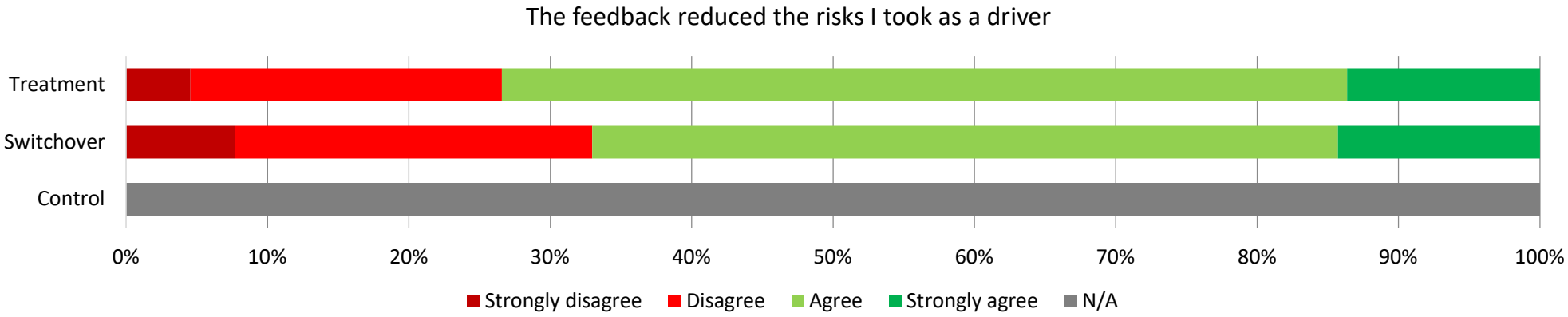


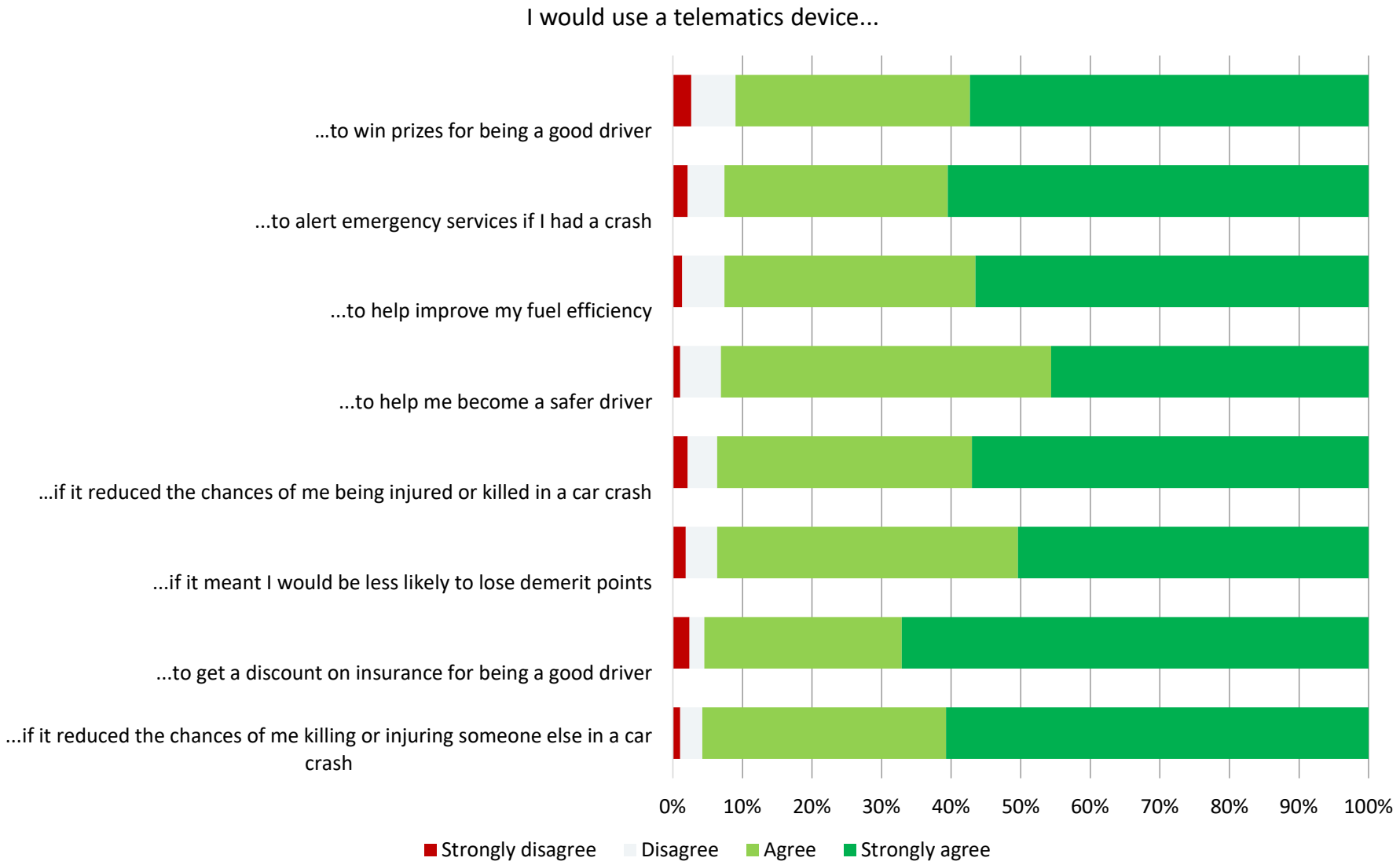


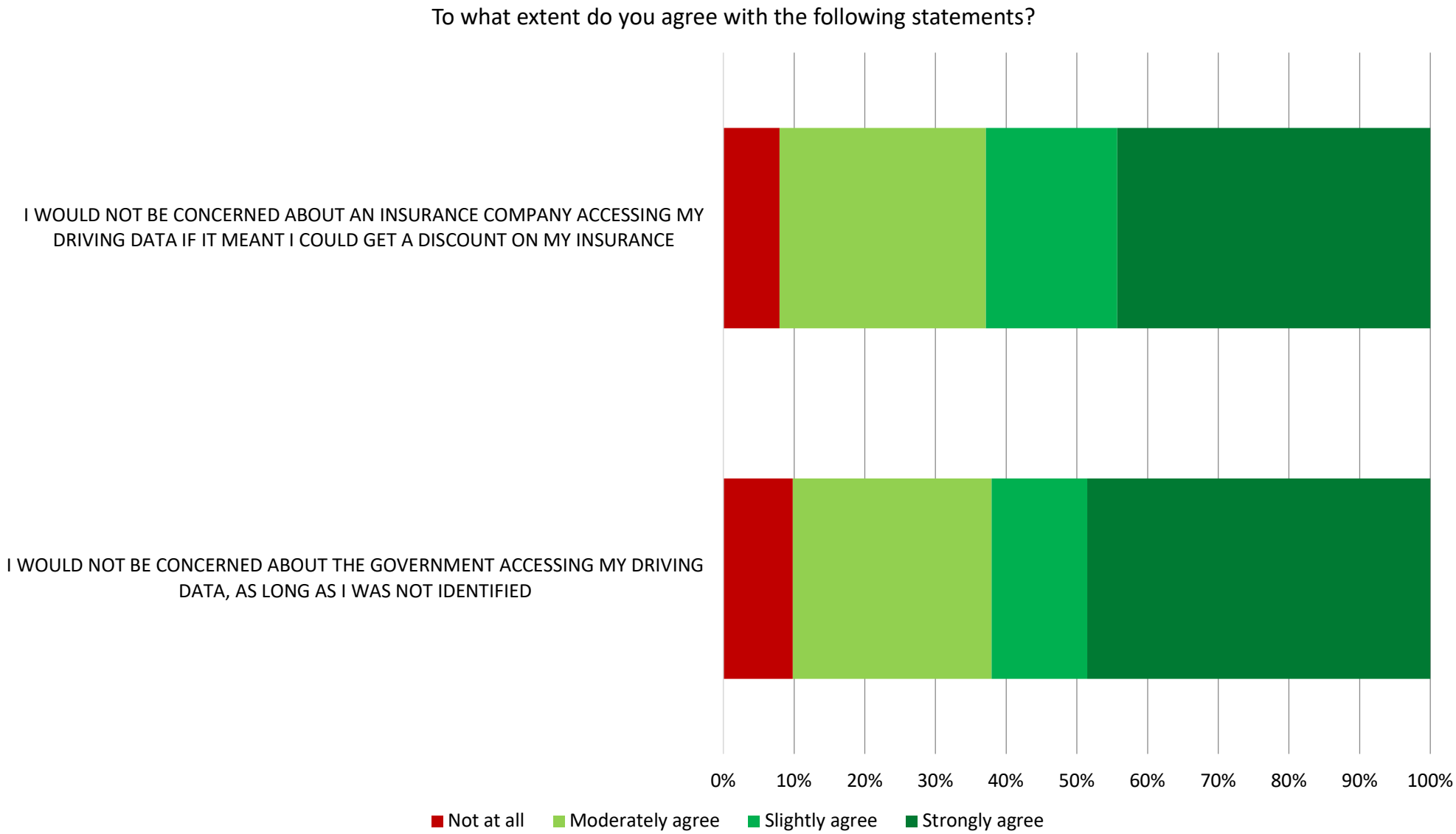


n=598 respondents


To what extent, either negative or positive, do you feel that the telematics device affected your driving?
Treatment
Switchover
Control
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Very negative
Somewhat negative
Did not affect my driving
Somewhat positive
Very positive


The feedback reduced the risks I took as a driver
Treatment
Switchover
Control
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Strongly disagree
Disagree
Agree
Strongly agree
N/A


I would use a telematics device...
…to win prizes for being a good driver
...to alert emergency services if I had a crash
...to help improve my fuel efficiency
...to help me become a safer driver
…if it reduced the chances of me being injured or killed in a car crash
...if it meant I would be less likely to lose demerit points
...to get a discount on insurance for being a good driver
...if it reduced the chances of me killing or injuring someone else in a car crash
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Strongly disagree
Disagree
Agree
Strongly agree


To what extent do you agree with the following statements?
I WOULD NOT BE CONCERNED ABOUT AN INSURANCE COMPANY ACCESSING MY DRIVING DATA IF IT MEANT I COULD GET A DISCOUNT ON MY INSURANCE
I WOULD NOT BE CONCERNED ABOUT THE GOVERNMENT ACCESSING MY DRIVING DATA, AS LONG AS I WAS NOT IDENTIFIED
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Not at all
Moderately agree
Slightly agree
Strongly agree

User concerns and frustrations

Privacy/access to data/tracking

"The only concern I had was whether the government/law enforcement could use it to prosecute me." "Security of the data and it being used against me, e.g. Speeding"
"Obvious concerns about privacy and use of data, especially if government or insurance agencies become involved. For example, if they were installed in every car, a driver with a poor driving record is crashed into by a driver with a good telemetric driving record, the assessment of the accident is biased already rather than being assessed for what has actually happened on the scene."

Product enhancement suggestions

"I don't have any concerns; however, I would like more detail. Perhaps more detail can be found on the other app, but I've read that the device and read faults in your car such as the engine etc. you can then take it to a mechanic and specifically request to fix that problem without them trying to say the problem is much worse and charging extra."

Distraction

"The light can become very bright, especially at night, which can be very distracting."

"The consistent changing of the lights (from blue to red, or vice versa) was very distracting – especially at night time."

Validity/accuracy of feedback

"Some of the feedback, i.e. turning speed, is annoying and seems overly conservative."

"Just improving sensitivity and maybe get it to recognise speed limits cause it would be telling me I was speeding in a 70 zone when I was doing 60-65."

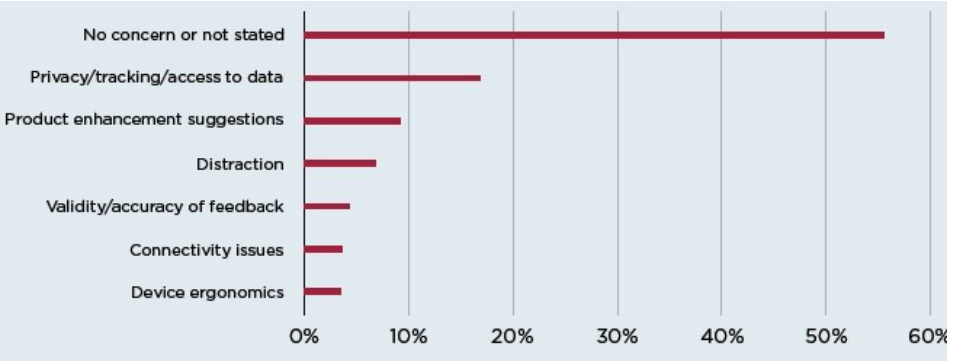
"Acceleration and braking feedback was b*llsh*t. You could barely accelerate without it giving negative feedback, same with braking. If everybody drove how the telematics device wanted us to drive traffic would be disgraceful and trip times would increase."

Connectivity issues

"There were some issues with connection through Bluetooth and sometimes it didn't record my trips properly."

"The only issue I had was that it would sometimes disconnect and my trip would not be recorded."

"The only main issue was the amount of space the app that connected took up on my phone."



Is telematics a game changer for young drivers?

Yes

- **Strong evidence of efficacy** – treatment group had (on average) lower frequency and severity of behaviours commonly associated with crash risk
- **Receptiveness** – young drivers are open to new technology, less concerned about privacy, tend to drive/own older vehicles lacking in advanced safety features

No

- **Attrition** – only 50% of participants continued to use the device at month 6
- **Distraction** – real-time feedback (from the LED light)
- **Cost** – young drivers unlikely to pay for own device despite recognising benefits of telematics-use
- **Longevity –** no evidence as to whether behaviour change is sustained beyond 6 months

Conclusion

- Telematics use has an **overall positive impact** on speeding, harsh braking rapid acceleration and hard turning
- Young drivers appear to be receptive to using telematics and it was widely perceived that increasing telematics use could improve road safety
- Things to consider for any future implementation:
  - Mitigation of distraction risk
  - Reassurance around privacy and data disclosure
  - Maintaining user engagement
  - Cost of telematics device

Full report

www.sira.nsw.gov.au/fraud-and-regulation/research/young-drivers-telematics-trial

NSW GOVERNMENT | State Insurance Regulatory Authority

Young, novice drivers and telematics feedback to improve safety related driving performance

Q&A

Thanks

to our presenters and attendees for joining us

Please stay on for the ACRS NSW Chapter AGM