The benefits of measuring driving exposure using objective GPS-based methods and subjective self-report methods concurrently.
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Driving exposure

• Traditionally measured through self-report methods

• Questionnaires
  – Retrospective estimation
  – Inaccurate due to difficulty with recall

• Travel diaries
  – Daily logs of driving
  – Greater level of information (e.g., purpose, start/stop times, origin/destination, number of trips)
  – Substantial burden for participants
Global Positioning Systems (GPS)

• **Accuracy/objectivity**
  – Accurate measurements of distance and start/stop times
  – Less involvement and burden for participants

• **Other advantages**
  – Small, unobtrusive, inexpensive, reliable
  – Greater level of information (e.g., travelling speed, routes, road characteristics)

• **Disadvantages**
  – Inability to obtain some information (i.e., trip purpose and driver identification)
  – More easily obtained with self-report methods
The present study

- Evaluate the use of GPS for data measurement with older drivers for a period of one week

- Concurrently use telephone-based travel diaries to obtain trip purpose and driver identification information
Aims

• **Achievability**
  – Any problems could be overcome

• **Accuracy**
  – Correspondence between odometer and GPS measurements of distance travelled over one week
  – Correspondence between trips reported in the travel-diaries and those recorded by GPS

• Favourable feedback from participants
Participants

• Recruited at the South Australian Royal Automobile Association’s (RAA) “Years Ahead” presentations

• Total sample of 54 older drivers
  – 23 females and 31 males

• Ranged in age from 75 to 90 years, with a mean of 80.3 (SD = 3.7)
Materials

• 747ProS GPS Trip Recorder
  – Small and can be mounted onto the dashboard
  – 64Mb internal memory
  – Accurate
  – Rechargeable battery (30hrs operation/300hrs standby)
  – Car charger
  – Motion sensor

• Cold starts
  – Reception acquisition of 35 seconds when first switched on
  – Less than 1 second from standby
  – Assisted GPS (A-GPS)
Materials

![Image of Trip Recorder and Car Charger](image-url)

The image shows a Trip Recorder and a car charger. The Trip Recorder is compact and has a black casing with a display screen and buttons. The car charger has a rectangular shape with a plug for connecting to a vehicle's power outlet.
Materials

• Data analysis program
  – Developed at the Centre for Automotive Safety Research

• Travel diary
  – Information recorded daily
  – Odometer readings at start and end
Results

• Trip Recorder provided standard exposure measures
  – Distance driven, time spent driving, number of trips, start/stop times, date of driving

• Also measures that cannot be obtained via self-report
  – Travelling speed, information on roads and driving routes
Segment 1: 171-24-160
Segment 2: 171-24-169
Distance = 247.23 m
Time = 10.00 seconds
Speed = 89.00 km/h
Results

- GPS measurements of distance corresponded with odometer measurements
  - Thus the GPS measurements were accurate
Results

• Of 1,218 trips recorded by the Trip Recorder, 82.5% were reported in the travel diaries
  – The purposes of a further 12.6% were identified
  – The purposes of 4.8% were not
Problems with data collection

• Several instances where the Trip Recorder was delayed in acquiring satellite reception

• Four trips was not recorded at all
  – However, 1,218 successfully recorded trips
Feedback

• 16 participants provided feedback
  – Taking part in the study was easy
  – Not bothered by being called up each day and having to report their driving
  – Not bothered by having the GPS in their cars
  – The GPS did not affect the normal processes of driving
  – Did not change their normal driving routines in any way because of the GPS
  – Tended to forget that the GPS was in their cars
Main conclusions

• GPS provides accurate standard measures of exposure, as well as more complex information

• Concurrent use of self-report methods is an easy way to acquire trip purpose and driver identification

• A daily telephone-based travel diary reduces the burden on the participant and so leads to consistent reporting

• GPS will advance the measurement of driving exposure, but self-report methods are still useful
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