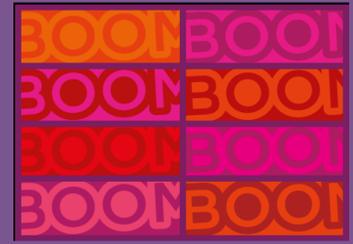


# Cycling as a way to Improve Cognitive Function in Older Adults

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## CycleBOOM

This project is funded by the EPSRC and is multidisciplinary involving four universities and researchers from Urban Planning, Psychology, and Geography.

- The project discussed here focuses on whether cycling can improve cognition and well being in older adults.
- It is well known and has been demonstrated previously that cycling has a positive effect on physical health, including for older adults (Pollock et al., 2014).
- Furthermore, cycling has been shown in laboratory conditions to improve cognitive function in older adults, particularly executive function (Johansen-Berg, 2014).
- We aimed to investigate the effect of cycling in the natural environment on older adults' cognitive function and psychological well-being.



## Considerations

- Ecological approach.
- Older adults not currently cycling regularly.
- Difficulties of getting older adults cycling.
  - LHI have revealed older adults sometimes do not cycle due to busy roads, fast cyclists, feeling physically restricted (e.g., head movements).
- Combined effects of engaging with the environment (e-bike participants) and physical benefits of cycling in this study (pedal cyclists)
- Does cycling increase other physical activity?
- Cognitive benefits due to a change in mood from cycling?
- Preliminary results suggest that there may be some improvement in executive function and inhibition after an 8 week period of cycling.



## Method

- As part of a larger study on mobility and ageing ([www.cycleboom.org](http://www.cycleboom.org)), adults over 50 years old participated in an eight week cycling intervention, cycling at least three times a week for half an hour each.
- A number of cognitive functions were measured before and after the intervention, including executive function (via the Stroop and Eriksen tasks), inhibition (Go-no-go) and vigilance (Auditory Reaction Time Task similar to the Elevator Task).
- Other tasks included: spatial reasoning tasks (mental rotation and navigation tasks), memory (MMSE, Letter memory, CERAD I and II), verbal fluency, mental arithmetic (plus-minus).
- Wellbeing was measured via the Psychological Well-Being (PWB) and Satisfaction in Life Scale (SL), as well as affect (PANAS), physical and mental health (SF-36) and physical activity (PASE).
- Preliminary cognitive data have been analysed<sup>1</sup>, comparing performance for participants using a pedal cycle (8), those on an electrically-assisted e-bike (8), as well as controls who did not cycle<sup>1</sup>.
- The participants were also interviewed about their cycling history (Life History Interviews; LHI) for the project.
- Participant age ranged from 50-83, with equal number of males and females.

## Discussion

- All participants that completed the trial indicated that they would continue to cycle.
- It is feasible to provide cycle training for older adults who have not cycled before (or recently) and for them to maintain participation in cycling in the urban environment.
- Currently, results suggest that cycling (without the physical exercise component) can aid cognitive function, especially executive function. However, the physical exercise component appeared to aid speed of processing as well as accuracy. More control participants are required to confirm it is not a practice effect.
- Physical exercise as well as stimulation from cycling in the natural environment has the potential to improve cognitive function.
- The trial will include more participants overall (40 pedal cyclists, 40 e-bike participants and 20 controls). With increased power, we anticipate these effects being demonstrated more significantly.

### References

1. Pollock, R. D. et al. (2014). An investigation into the relationship between age and physiological function in highly active older adults, *The Journal of Physiology*,
2. Johansen-Berg (2014). Imaging and manipulating brain changes across the lifespan. Reading Emotions conference talk.

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### Footnote

<sup>1</sup>Eriksen, Go-no-go and Stroop data have been analysed for participants that have already completed the trial. Individual case study analyses indicate that e-bike participants' performance improved on the executive function tasks but speed decreased suggesting a speed-accuracy trade off. However, pedal cyclists appeared to improve in accuracy and demonstrated faster reaction times after the intervention. In the go-no-go task, response times reduced after the intervention for both e-bike and pedal cyclists in the no stop signal trials suggesting faster reaction times in general. Currently there was no indication of change in accuracy in inhibiting a response when the stop-signal was presented.