

# Design for Wellbeing: Ageing & Mobility in the Built Environment

cycle  
BOOM

**EPSRC**  
Pioneering research  
and skills

Lifelong Health  
& Wellbeing  
Research for Healthy Ageing

Call 2012

Announced March 2013

Commenced October 2013

Complete September 2016

- **Understanding the relationship between the built environment, mobility and activity in older populations**
- **[Providing] Evidence based and user-centred design and engineering approaches, in the context of the whole system, that are driven by a desire to increase and enable mobility and activity, decrease isolation and enable greater independence**
- **Understanding what environmental designs encourage activity/inactivity and how these can be engineered to facilitate older users to increase their physical activity**



**cycle  
BOOM**

DESIGN FOR LIFELONG  
HEALTH & WELLBEING

# Maintaining momentum - ageing and cycling in Oxford (and Abingdon)

BSG Conference | Stirling | 7 July 2016  
Dr Ben Spencer | Oxford Brookes University  
on behalf of the cycle BOOM team

**EPSRC**  
Pioneering research  
and skills

Lifelong Health  
& Wellbeing  
Research for Healthy Ageing

OXFORD  
**BROOKES**  
UNIVERSITY

CARDIFF  
UNIVERSITY  
PRIFYSGOL  
CAERDYDD

 **University of  
Reading**

 **UWE  
BRISTOL** University of the  
West of England

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HEALTH & WELLBEING

### Objectives

1. To understand cycling among the older population and how this affects independence, health and wellbeing.
2. To advise policy makers and practitioners how our environment and technologies can be designed to help people to continue to cycle in older age or to reconnect with cycling. [Read more...](#)

# Focus



# Participation

Total number of applicants	=	544
Total number of participants	=	247
Total number 'dropped out'	=	20
Final participant set	=	<b>227</b>
		<b>[95%]</b>

# Integrative analysis of multiple data sources

	Biographical interview [Audio]	Mobile Observation [Video]	Video Elicitation Interviews [Video]	Hours of data
<b>Oxford</b>	<b>83</b>	<b>11</b>	<b>23</b>	<b>117</b>
<b>Reading</b>	35	4	7	<b>46</b>
<b>Bristol</b>	26	14	18	<b>58</b>
<b>Cardiff</b>	30	18	18	<b>66</b>
<b>Hours of data</b>	<b>174</b>	<b>47</b>	<b>66</b>	<b>287</b>

*Plus photos; STRAVA traces; Cycling & Wellbeing Trial 'Diary of Cycling Experience' (DoCE); associated cognitive tests/PA & wellbeing measures; and, 'exit survey'. (n=91)*



Scoping  
secondary  
data  
sources

International  
study visits

**Mixed  
methods  
approach**

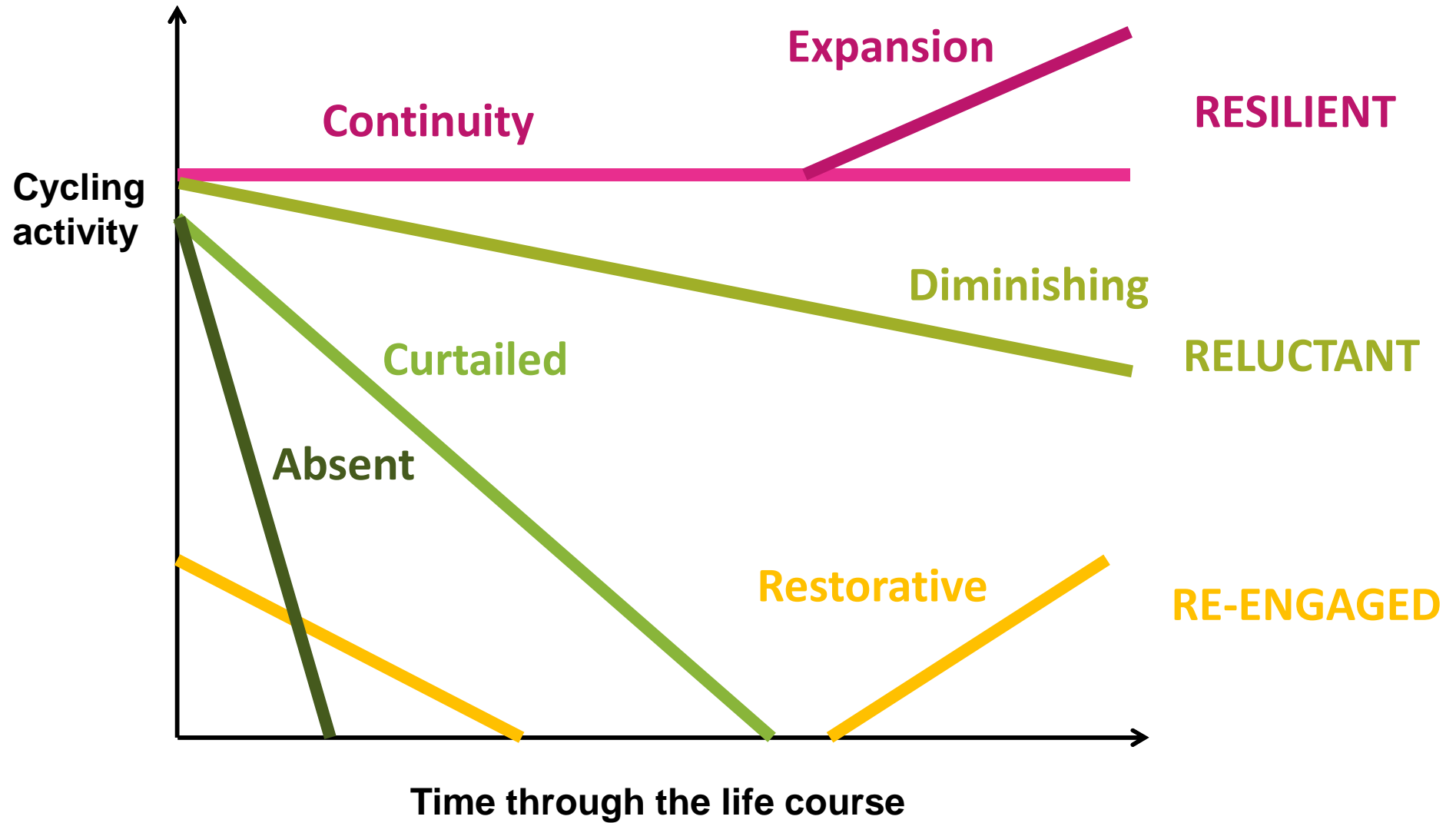
(E)Cycling &  
Wellbeing  
Trial

Urban  
Design Audit

Life history /  
Biographical  
interviews

Mobile  
methods |  
Micro-  
ethnography

# Pathways of development in mid and later life







Scoping secondary data sources

International study visits

Urban Design Audit

**Mixed methods approach**

(E)Cycling & Wellbeing Trial

Life history / Biographical interviews

Mobile methods | Micro-ethnography

# Unspecified rides : background



- ‘New mobilities paradigm’ exploring mobile bodies in mobile contexts
- Approaches that diverge from traditional methods – research ‘on the move’. (Sheller and Urry, 2006)
- Mobility not just movement between point A and B (Cresswell, 2006)
- Interest in affect, place, meaning, culture and representation
- Video elicitation interviews : in-depth review of rides to preserve details
- Participant chooses route: familiar journey, similar timing, everyday experience

# Post-ride Video Elicitation Interview

## Strategies and tactics:

- route choice
- road position
- manoeuvres
- transgressions
- infrastructure
- environment

## Experience of route:

- sensory
- affective
- social

## Wider experience



# Participant Profile: Oxford

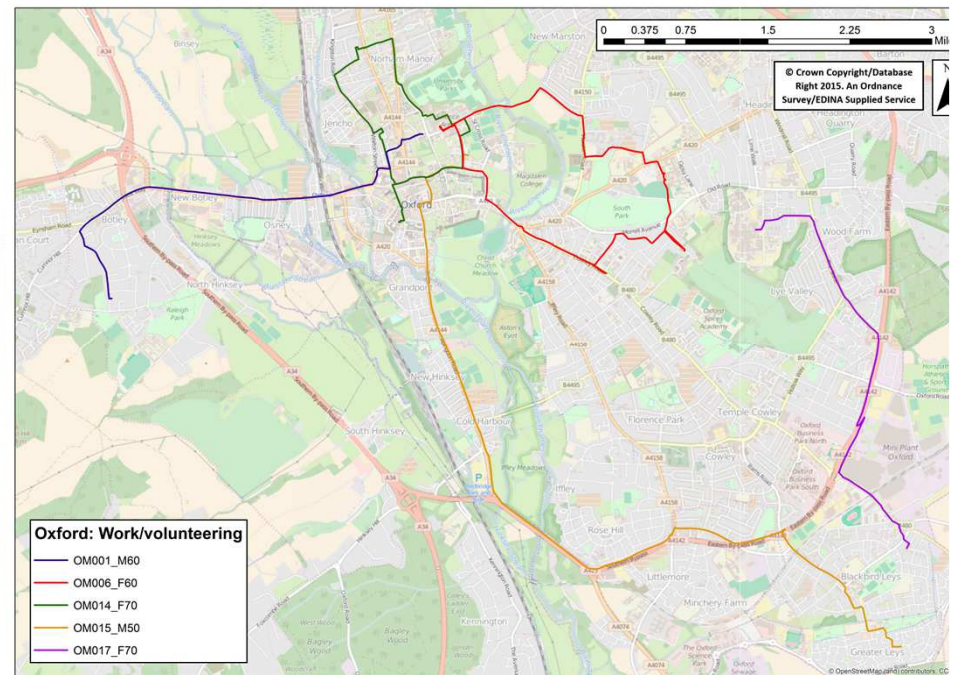
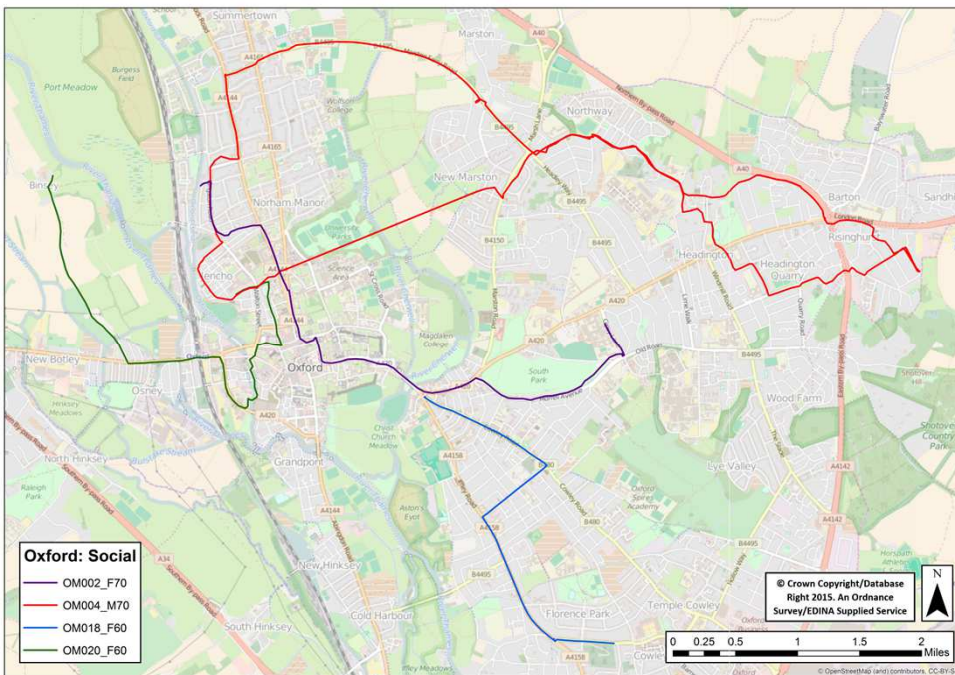
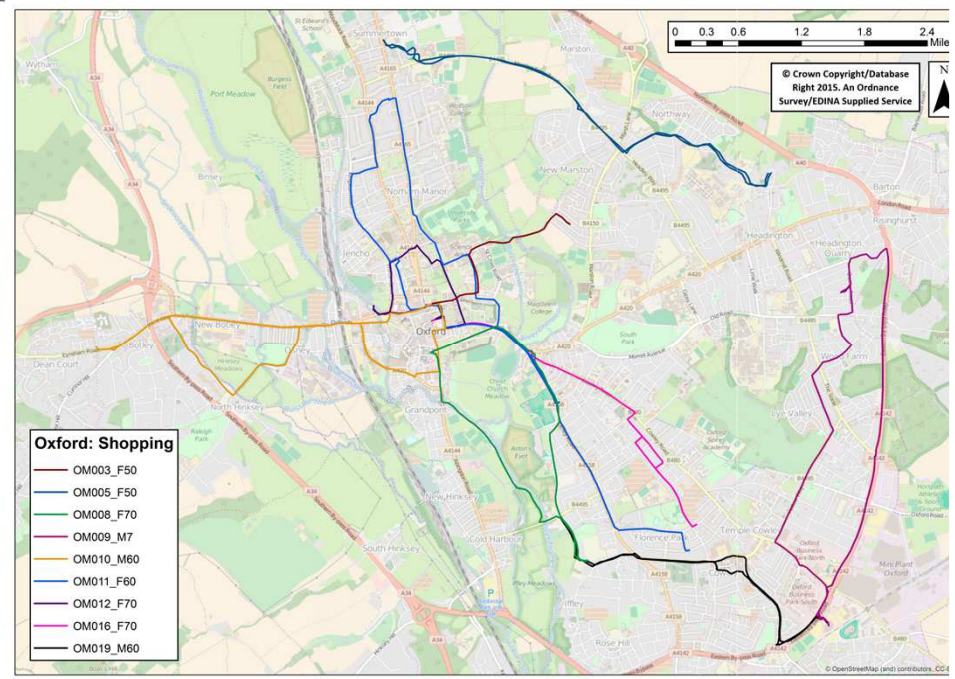
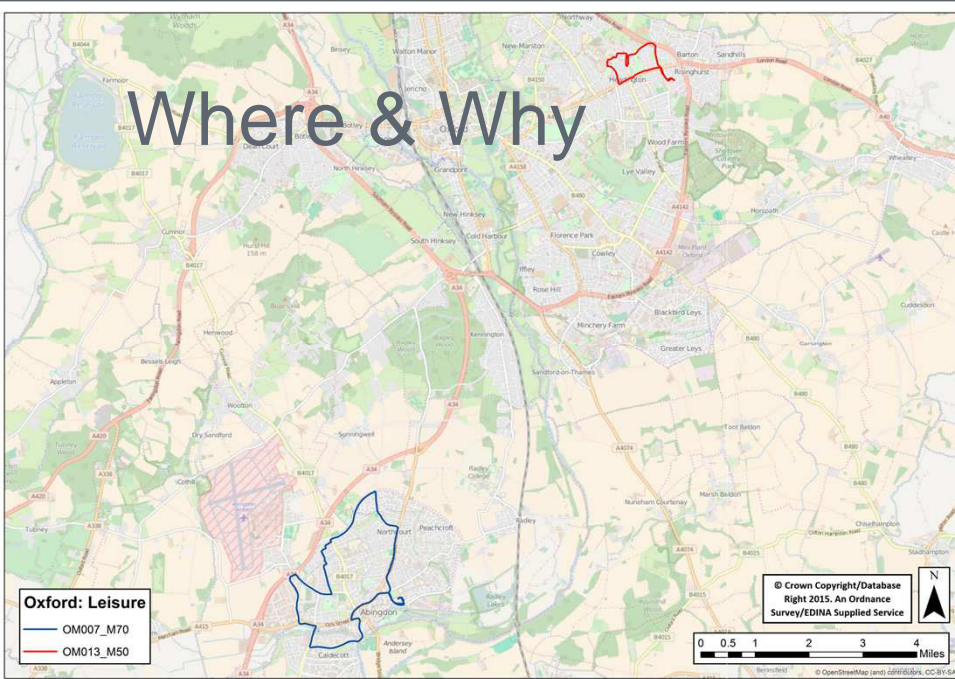


	Age 50s		Age 60s		Age 70+		Total	
	<i>M</i>	<i>F</i>	<i>M</i>	<i>F</i>	<i>M</i>	<i>F</i>	<i>M</i>	<i>F</i>
<b>Resilient Riders</b> [Mobile observations]	2	2	3	4	3	6	8	12
<b>Re-engaged Riders</b> [Pedal trial]	1	7	5	5	1	1	7	13
<b>Re-engaged Riders</b> [E-bike trial]	1	6	4	5	3	1	8	12
<b>Total</b>	4	15	12	14	7	8	23	37

“some students are dreadful cyclists, not all of them... whizzing around unpredictably”  
Lindsey

- Experienced, committed and confident riders
- Try to perform ‘civilised cycling’ and are critical of transgressive cycling of ‘others’
- Strategies to minimise journey stress (time and space)
- Ageing bodies and reduced range of movement, coupled with poor design, means that riders employ different tactics including making their own (rationalised) transgressions

# Where & Why



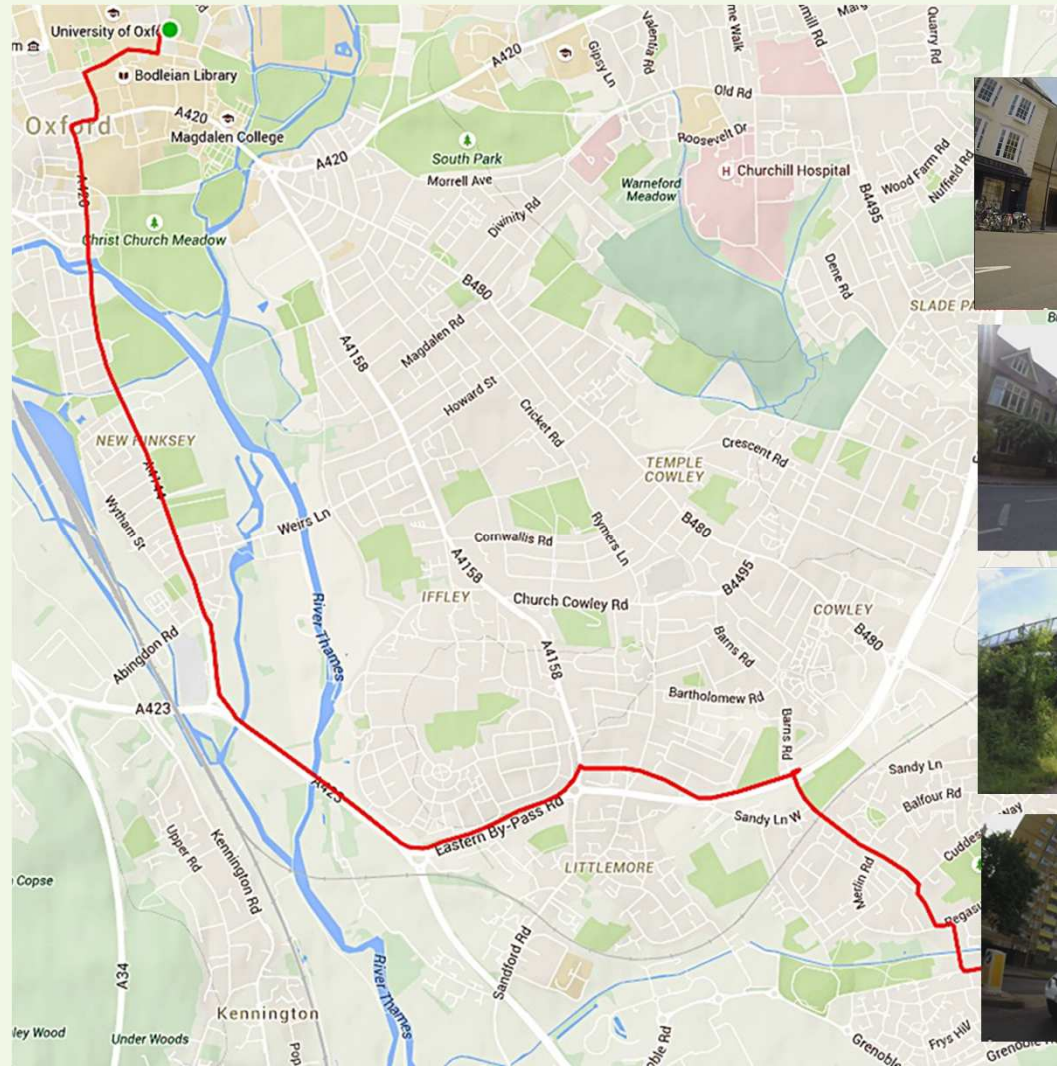
Sean | 8.5 km | 5 pm | 30 mins | 18 kmh



Journey home from work:

City to suburbs  
City centre  
Arterial road  
Ring-road cycle track  
Residential neighbourhood

50s  
Ride 15 years  
'Steady & skilled'





- Bike choice – knees
- Route choices ‘throw the dice’
- Micro-detailed knowledge of route
- Manoeuvres
- Attentiveness versus ‘vegging out’
- ‘Stress busting’: reflect on the day
- Visual spectacle: ‘A bit of a tourist still’
- Sociality: ‘Cycle Socializing’
- Personal safety ‘bottles and bricks’



- Lindsey VEI 34:00 pavement cycling at traffic lights

# Rationalised transgressions



“Very often do a quick escape round to the left, safer to get round that corner before this lot start especially if there is a bus... nasty junction... slow lights... not a very good thing to do, probably get me a black mark with the police but doesn't feel too bad to me...

Not a fixed decision... no idea, thought I'd gone behind her, that's what puzzles me...

I have to say a lot of people jump those lights...

[Cars drivers] would be glad to be rid of me... worried if going left or straight...

I feel a lot safer if I jump the lights...

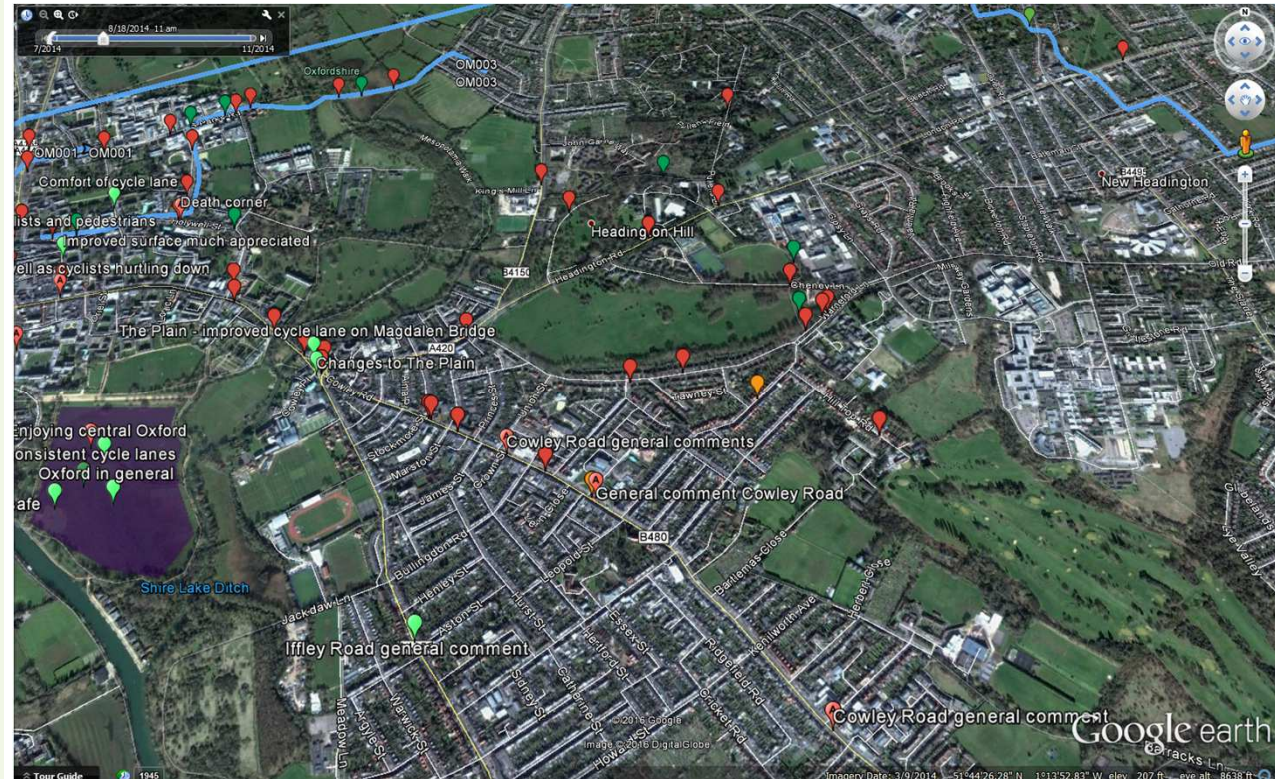
On green I'm not good at left signs...

Shame they couldn't put a left turn bicycle path... round the pavement there”

# Impact on wellbeing: positive experience

## Preferred environments

- River and canal tow paths
- Meadows cycle track
- Descending steep hills
- Ring Road cycle track
- Marston Ferry Road cycle track
- Iffley Road

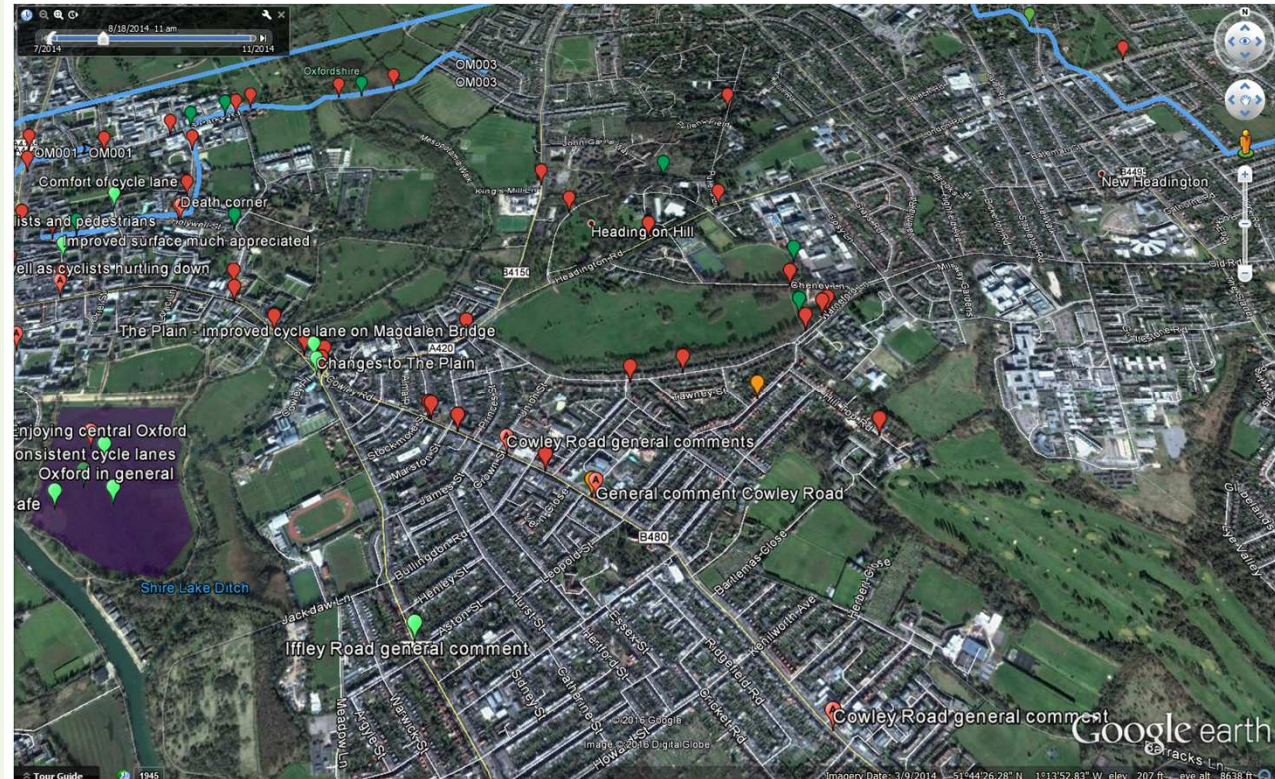


# Impact on wellbeing: negative experience



## Challenging environments

- Arterial roads:
  - Botley Rd
  - Cowley Rd
  - Abingdon Rd
- Junctions:
  - St Giles
  - The Plain
  - Large roundabouts
- Parked cars
  - Parallel parking
  - Car parks





## Bike Design

- **Mirrors:** And I think particularly reflexes and also flexibility - you can't really twist as much as you would like to or to look back, that's one of the big things, and often I've thought 'well what about a mirror?'
- **Crossbars:** To help with (dis)mounting, balance and putting feet down – choosing bikes with lower cross bars / step through frames
- **Posture:** upright for seeing and being seen (Sean)
- **Gearing:** simple but sufficient
- **Saddles:** transformational experience (Janice)
- **Range of bikes:** Shopper, hybrid, racer
- **E-Bikes:** considered or bought: 'sold! A complete convert!' (Vivian)
- **Trikes:** Mentioned as a possibility as a comprehensive solution to balance, storage and dismounting issues.



Scoping secondary data sources

International study visits

Urban Design Audit

Mixed methods approach

(E)Cycling & Wellbeing Trial

Life history / Biographical interviews

Mobile methods | Micro-ethnography

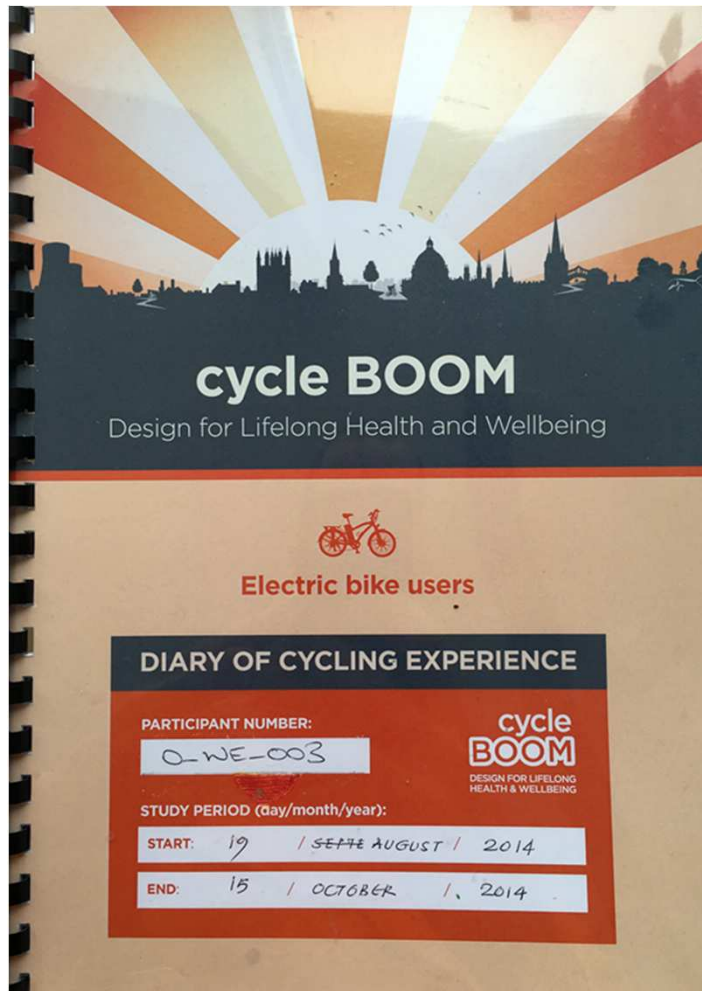
# (E)cycling - eight week trial: background



Objective: to test the impact of (re)discovering cycling on physical activity, mental health and wellbeing in older adults.

*“work on well-being and mobility should consider both the objective and the subjective and the hedonic and eudaimonic dimensions of well-being, and should pay detailed attention to the multiple ways in which well-being and its linkages to mobility are context-dependent and shaped by the particularities of time and place” (Nordbakke & Schwanen 2014)*

# (E)cycling - eight week trial



Life History Interview  
Cycling assessment  
Cognition and wellbeing tests  
1.5 hours riding per week  
Diary of physical exercise  
Cognition and wellbeing tests  
Focus group  
Follow-up survey  
Documentary films



# Participant Profile: Oxford



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Acknowledge:

‘Allure of the e-bike’

Positive antecedent state towards cycling or physical activity.

Health [maintain-improve-overcome]

Alternative mode [speed / reliability / flexibility / environment / finance]

Access outdoors – exploration

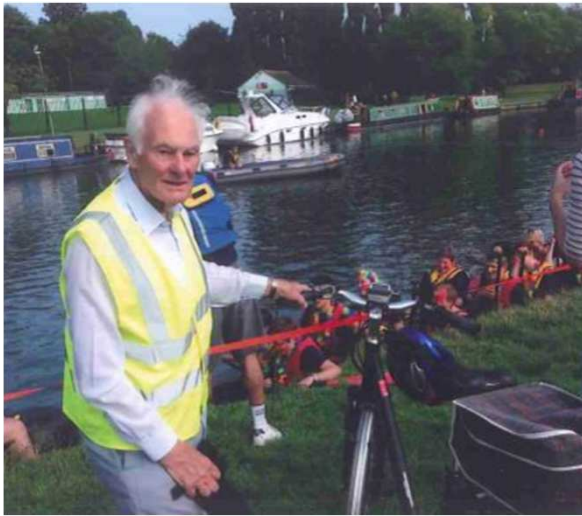
Regain confidence cycling

Structure and support

Social riding

Overcoming hilly terrain [e-bike]

Time /(in some cases) disposable income



- Abandoned
  - Ruby: technical
- Persevered
  - Livy: traffic, infrastructure
  - Colline: skills, weather
- Embraced
  - Ulrick: affect, social
  - Harvey: horizons, exercise

*"I felt that I'd really accomplished something... If you'd suggested this to me a year ago I'd have dismissed the possibility of cycling this distance out of hand." Harvey DoCE*

*"same amount of exercise but more pleasure because going further than my usual boundaries" Sophey FG*

- Geographies – rediscovered | extended | deepened | still partial
- Additional journeys
- Replacing car trips
- Increased use [Learning effect > novelty (Fyrhi & Fearnley 2015)]

## *Varying effort*

*“I haven't used e-bike power on this journey as it is flat and smooth so gives me a better exercise with the power off.” Mel DoCE*

## *Feeling safer*

*“felt safe on the e-bike... setting off from a stop especially when on an up incline.” Colline DoCE*

## Overcoming topography

- “Excellent for me geographically as the return journey from town includes quite an incline, which I can now cope with effortlessly.” Aline DoCE
- “The Motus E-bikes' ability to maintain an improved hill-climbing speed is unpopular with traditional cyclists who dislike being overtaken especially by an ageing fat-man...[!]” Terry DoCE

# E-bike challenges: technology



*"I suppose most people who don't know think e-bikes are electric bikes, but they are completely different, this is what you've got to get over to people - still got to ride in the normal way not resting feet on the pedals" Brandon FG*

*"So many comments about 'laziness'." Aline DoCE*

*"You know, eee-bike?! Oh" Colline FG*

Image / nature

Weight / balance

Manoeuvrability

Initial cost

Security

Stranding

Controls / battery

Technical support

# E-bike challenges: environment



*"have to say Oxford wasn't a very encouraging place to make me want to go out and cycle" Sophey FG*

*"infrastructure, most obvious thing, if you haven't cycled for a while, how poor the conditions are for cyclists in terms of availability of cycle paths etc" Brandon FG*

*"Very nervous about cycling on roads so pushed bike until I got to traffic-free track" Livy DoCE*

*Researcher: Oxford... second cycle city in UK.... good city to cycle in?*

*Colline: Pah! Rubbish*

*Brandon: That is from someone who doesn't cycle that often, I probably use car more than bike, but no, completely bad*

*“Extremely bumpy sections of cycle track have convinced me that it is safer to ride with the cars than try to avoid being with them” Ulrick DoCE*

*“I fell off after my wheel hit a change in surface... no injuries other than a broken fingernail and dented ego!” Livy DoCE*

## *Tracks*

*“Footpaths and cycle tracks are rough and very uncomfortable to use. Roads in general are smoother...cycle paths do not get nearby undergrowth cut back very often. This sometimes results in slippery algal growth. Rainfall and autumn leaf-fall is a dangerous combination as the cycle paths do not get cleaned.” Terry DoCE*



# E-bike experiences: Health & Wellbeing



*"I felt that I'd really accomplished something... If you'd suggested this to me a year ago I'd have dismissed the possibility of cycling this distance out of hand." Harvey DoCE*

*"same amount of exercise but more pleasure because going further than my usual boundaries" Sophey FG*

*"On Sunday I took the bike out for the afternoon to cheer myself up. Gloomy day but the countryside around is lovely so felt better when I came back!" Alysia DoCE*

- Enjoyment, thrill, freedom and control
- Achievement
- Mental health
- Greater (cycling) confidence
- Spatial awareness and control
- Social contact
- Fitness and weight loss
- Pain / Aches / Tiredness / Cold / Colds / Crashes!

# E-biking experience: Brian and Gill [4:30]



Excerpt from Brian Hook Wellbeing film  
4:30 – effect of trial on his Wellbeing

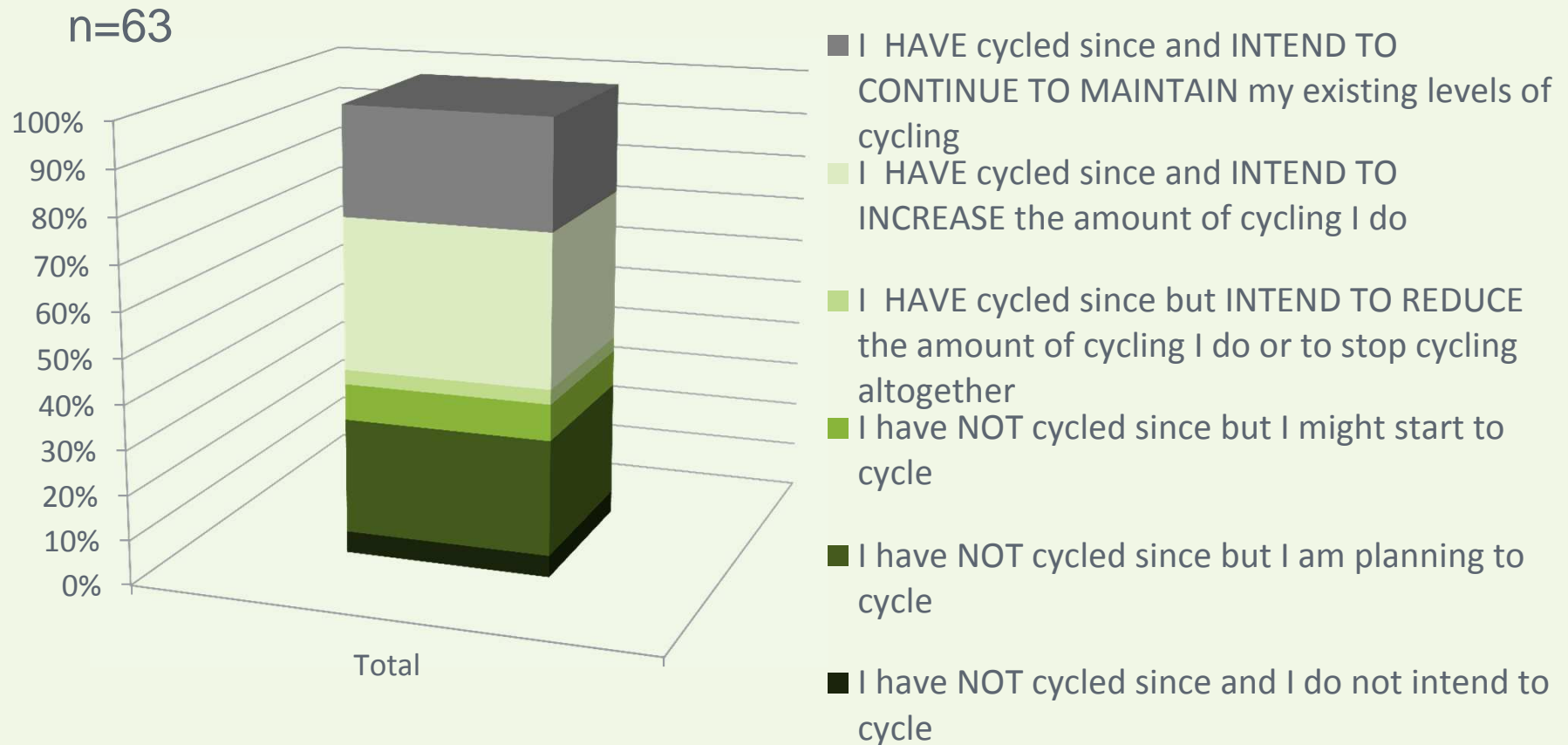
# Initial test results: E-bikes and Pedal



- Both groups of participants - **enjoyed** the trial, feel physically fitter and better more generally
- **Improvement** on accuracy in the cognitive tests measuring executive function
  - **92%** E-bike; **72%** Pedal
- Reaction times reduced for most (responding quicker)
  - 67% E-bike; 57% Pedal
  - When reaction times increased, higher accuracy
- Practice effects? Very little change (positive or negative) in control group

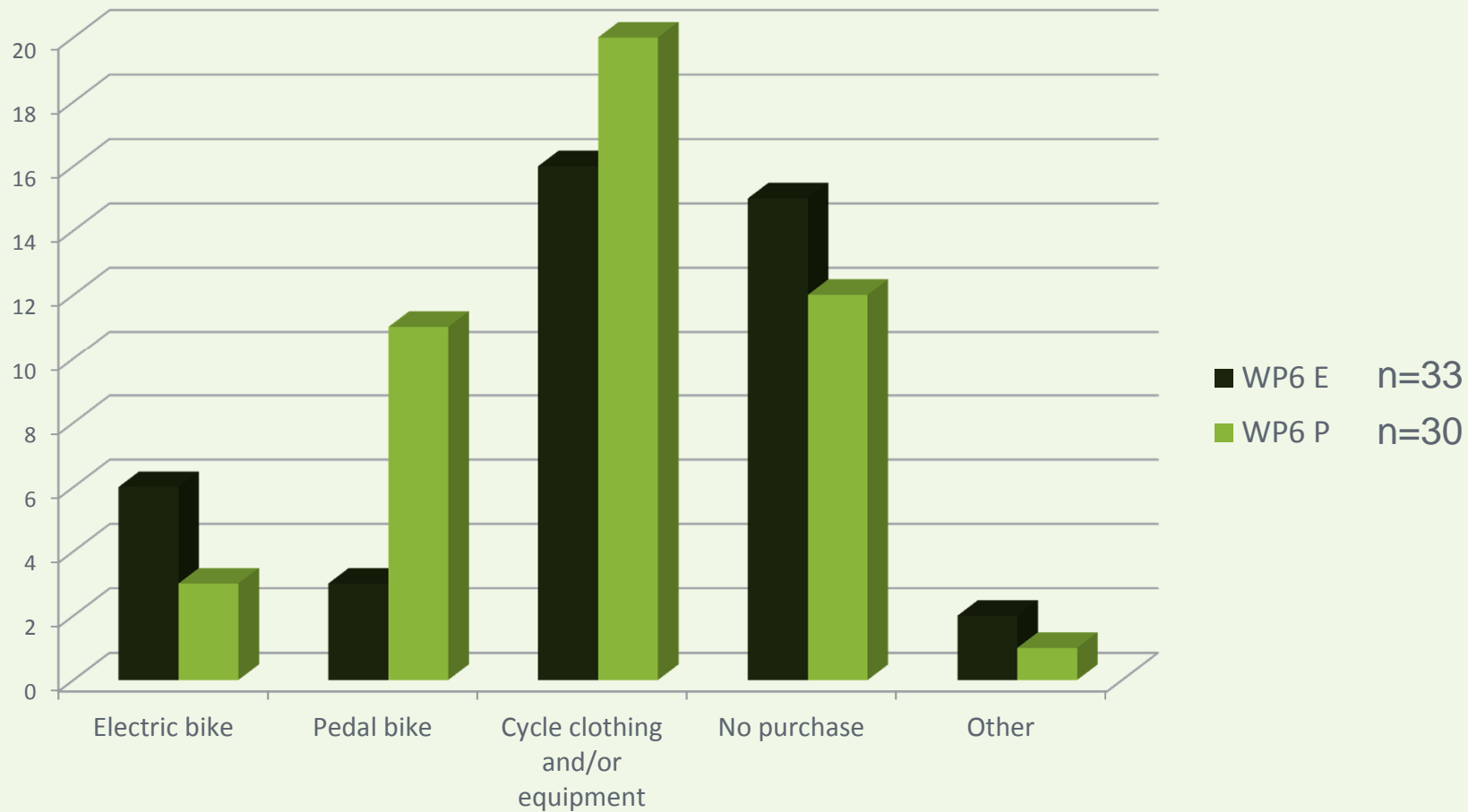
# Cycling since the trial, and future plans

Q. Please select the statement that best represents your cycling activity SINCE COMPLETING the cycling trial AND your plans over the next 12 months



# Cycling purchases since completing the trial

Q. Since completing the trial have you or anyone in your household purchased any of the following



- Both pedal cycling and e-bike use can improve psychological well-being and some executive functions for older adults
- Cycling currently 'partial' in terms of timing and location due to poor infrastructure and 'precarious' due to lack of social support
- Resilient and re-engaged older cyclists employ a range of strategies to minimise journey stress: routes / times / manoeuvres / technology
- Ageing cyclists and infrastructure: some older cyclists find it harder to employ tactics due to reduced range of movement – poor design & maintenance therefore a bigger barrier

## Cycle tracks:

- Separated from motor traffic and pedestrians
- Space for comfortable side-by-side cycling
- Surfaces flush and free of potholes, leaves, broken glass, ice... (and roads)
- Traffic-free routes along green and blue spaces
- High quality in new/re-development, enhance a fine-grained network of cycle routes

## Infrastructure design

- 20mph zones in urban areas and smaller settlements
- Vehicle speed reduced without (uncomfortable) vertical deflections
- Momentum of cycling maintained - not start-stopping
- Clear where cyclists are “meant to be”, signposted and legible on the ground
- Design guidance based on a minimum range of movement



## Storage and charging

- New build housing and residential homes should include generous and secure storage space at frontages with easy access to street
- On-street storage for cycles provided in areas where domestic storage is difficult
- Increased, generous cycle parking and E-bike charging points provided at shopping areas and other hubs

# Supporting cycling: social interventions



[Schaeffler Bio-Hybrid](#)

[The Guardian 5 July 2016](#)

- Information about bike types and equipment (not focussed on wealthy, young, fit, male sports cyclists)
- Silver Cyclist programmes: social events, route advice, skills training
- Opportunities to try-out / borrow E-bikes & E-bike specific training
- Community transport and public bike hire schemes to include a wider variety of cycle types including E-bikes
- Cycling on prescription
- Funding for (E)bike purchase (via personal health plans?)

@cycle\_BOOM

[www.cycleboom.org](http://www.cycleboom.org)

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**Thank you**

**Questions, comments?**

Final cycle BOOM conferences:

**London**

Monday 26<sup>th</sup> September 2016

**Manchester**

Wednesday 28th September 2016

Cresswell, T. 2006. On the move: mobility in the modern western world. Taylor & Francis.

Fyhri, A. & Fearnley, N. 2015 Effects of e-bikes on bicycle use and mode share. Transportation Research Part D: Transport and Environment 36, 45-52

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Ageing and Society, 31, 758-781

WHO 2007 Global age-friendly cities : a guide