Introduction and Overview

Background

Population across most of Europe is ageing. People living longer and birth rate falling. Push to encourage people to stay active for longer – reduce end of life morbidity. Mobility & independence important constituents of wellbeing in later life.

The Problem and Potential

To develop a better understanding of how the design of the built environment and technology shapes engagement with, and how this affects the current and future generations of older people.

Study Objectives

To develop a better understanding of how the design of the built environment and technology shapes engagement with, and how this affects the current and future generations of older people.

Questions

1. What specific, actionable and measurable impact do age-friendly urban design, cycling and technology have on social interaction, health and wellbeing?
2. How do design and technological interventions influence the social norms, physical environment and quality of life of older people?
3. What are the implications for cycling infrastructure and policy decisions and potential?
1. Recognition of heterogeneity of older cycling market.
2. Older cycling activities and needs are specific to times and places.
3. Older cycling is partial and resigned to specific times and spaces.
4. Cycling does pose gender challenge to older body.
5. Older cycling market is precarious.
6. Potential significant market.
7. Policy and programmes are needed across sectors to develop infrastructure and programmes to support cycling among an ageing society.
8. Alternative to younger population.
9. Interventions targeted at older population would also benefit younger and programmesto support cycling among an ageing society.
10. Cycling at best away from traffic, in fine weather for recreation.
11. Resilient cycling.
Life Course View on Cycling

Ageing is considered as a combination of life-long biological (personal capabilities), psychological (personal perceptions of capabilities) and social processes (perceived opportunities and support) that individuals encounter in specific cultural contexts.

Research Questions

- How is ability and willingness to cycle shaped by individual life events such as family and social relationships, employment and work, social, economic, and technological change?
- What are the different cycling trajectories?
- What are the reasons for cycling cessation, continuity and re-engagement?
- What are the recurring themes about cycling including its role in people’s lives and how changes are made to cycling as people age?

Life History Interviews

- Participants completed life history calendar in advance of interviews
- Semi-structured interviews – Present life situation and cycling
- Future outlook for cycling
- Change and continuity in cycling
- Experiences of ageing and cycling
- Summary reflection on lifetime cycling
- Viewing of cycle(s) and storage
- Mobile observations and video elicitation interviews

Findings Overview

1. Cycling trajectories
2. Ageing and changing life circumstances
3. Contrasting settings
4. Cycling practices, benefits and meanings

Three Cycling Trajectories

- Reluctant Riders – Characteristics
  - Accustomed to using car or other methods of transport
  - Only cycled on holiday on traffic-free routes
  - Tried cycling but sporadic and did not lead to confidence to cycle in range of environments
  - Cycling had “fizzled-out” due to vulnerability cycling or health conditions
  - Bicycles disposed of for taking up space
  - Some cycled during working life but not after retiring
  - Cycling considered good form of exercise nevertheless.

- Resilient Riders
  - Cycling consistently in the last five years or had increased level of cycling over this period

- Re-engaged Riders
  - Who had started cycling again in the years after a period of cycling cessation

Reluctant Riders: Dexter, 70s, North Fringe of Bristol

Dexter’s sole cycling experience was confined to his youth when he lived on a farm situated in a valley in South Wales. He got a car soon after becoming eligible and his travel had remained largely car-based ever since. He saw driving as integral to his routine of activities, clubs and hobbies as well as family relations and responsibilities. He had no expectations of cycling again and imagined he would be “really quite frightened” cycling in Bristol.

Jodi, 60s, Abingdon (small town south of Oxford)

Jodi stopped cycling when a student in London and then started driving to commute for her first job. She had continued to cycle locally on an occasional basis for leisure with her husband. This despite not feeling at all confident cycling on roads with traffic and classifying herself as “not a very good cyclist”. Having put on a lot of weight, Jodi was aware of the need to get more exercise but did not use her static exercise bike due to ‘laziness’ and was prevented from cycling by the condition of her bike and reduced confidence. She was positive about the potential of e-bikes but was concerned it might be a waste of a considerable amount of money if she did not end up using it.
Jerry, 50, North Fringe of Bristol

- Guards the time to cycle as the children became more independent.
- His cycling had built up once he got back on his bike. Lance had four bikes who didn’t feel capable or inclined to be riding once a week with a friend. Exercise and to get outdoors, having health. I’d go out with my wife and thought - aww, I was worried. Lance had a friend he had been riding with. He got a bike, but he had a difficult time when his cycling had been a time to relax, think things through, and this he felt, kept him going.

Patricia, 70, Yate (town north-east of Bristol)

- She summarized her cycling by saying that she had done more cycling as she got older. She had cycled increasingly as a child and teenager before stopping doing nothing when she had her first child. Her cycling had built up once more as the whole family took to cycling. She then had more time to cycle as the children became more independent. She had found a period of 3-4 years of doing almost no cycling as she worked very locally and didn’t have a bike. Her cycling picked up again when she started work in the centre of the city and was given a bike. Her cycling increased further when she had been riding with a friend and later with another older person on a cycling group.

Re-engaged Riders - Characteristics

- Predominantly motivated by getting fit and maintaining health.
- Refined routes, for whom the transition to retirement led to a desire to become more active in later age.
- For women, new-found freedom and a desire to become active had also prompted a return to cycling.
- Restarting cycling was often encouraged by a partner who cycled.
- Changing cycling habitats also opened up new routes.
- Cycling almost exclusively took place along off-road paths and quiet roads.
- Key question is whether cycling will be sustained and confidence develop to use cycling domains.

Ageing and Life Circumstances

- Turning points in cycling histories usually associated with health.
- Family.
- Employment/retirement.
- Income moves.
- "About 2008 they bought me an electric bike (only existing... it suddenly had small [electric] assistance... they bought me a bike and I chained it and rode it, doing about 25 miles a day, starting out with the hills and then the flat..."
- "...the bike was bought for you? Yeah, I just did something I thought was going to be something I could do..."
- "I’m probably since retired, 3 years been doing things like this, in [elision] year or so where you’re still competitive, so you know if I do something..."
- "... and there was a period in the middle where..."
- "I just didn’t enjoy it. I..."
- "I don’t enjoy it. We’ve always had a tennis racket, a golf club, swimming in the pool, but now it’s just cycling..."
- "...I just find cycling out..."
- "...you appreciate what it’s all about..."

Contrasting Settings - Bristol

- Public transport was a major issue.
- "...walking..."
- "...they were..."
- "...they were..."
- "...they were..."
- "...they were..."
- "...they were..."
- "...they were..."
- "...they were..."
- "...they were..."
Cycling Practices

- A-purpose cyclists
  - Confident to cycle in different environments
  - Prefer cycling to sit down more reliable, flexible
  - Helps to finesse up control
- City centre
  - Do not drive, do not access a car
  - Cycling is a part of normal activity and increases sense of community
  - Limit to how far they cycle outside local area
- Keen cyclists
  - Mainly cycling to work from workplace and cycling
  - Typically cycle on sheltered routes and alternate cycling to walk when needed
- Younger participants
  - Tend to use traffic routes accessible from their home
  - Cycling as part of regular exercise or social route
  - Sometimes ride with
  - Someone wanting to cycling together

Cycling Benefits and Meanings

- Positively about contribution to a healthy lifestyle
- Enjoyable exercise/sport
- Sense of achievement
- Relaxation and enjoyment of place
- Time for reflection
- Connection to place and to others
- Pride in encouraging others to cycle

Research Questions

The key question and sub-questions driving this part of the investigation were:

- How do specific features of the built environment and cycling technology affect cycling experience among older people and what is the impact on their health?
- How does moment-by-moment wellbeing relate when moving around by cycle?
- What factors/design elements support or detract from wellbeing when moving around by cycle?
- What strategies and tactics are employed by participants when moving around by cycle in order to maximise wellbeing?
1. When & Where

BOX 1
“...is a school along here. But mostly my time is just cycling with that. That’s one of the things that I do at this age. I just like it. It’s just taken me 10 years to get this far. You know, I can’t just take it for granted.” (George, 70s, Berkshire)

“Cars are the best for the journey, they’re not a bad problem, it’s good as it’s a bike lane going to the hospital... because I can write it and get the exercise and it’s good for my health.” (John, 70s, London, WB15)

Implications of when and where?
- Retired or semi-retired cited as a time of increased freedom.
- Limbo in where and when they ride in order to minimise journey stress.
- Limiting behaviour due to perceived stress and danger of certain places times.

2. Sharing Space

On shopping with colleagues and friend is a good way to get to know your place, and it’s also a good way to get the bike taken. It’s a way of involving the kids (Cody)

“Yeah, it’s all right, there’s always a path. The bike lane is a lot better than it was. It’s just a straight road into the area.” (Matthew, Cardiff)

2. Sharing Space

My bike movement of the journey so far, it’s not going to make any difference. It’s the bumps... I’ve got bumps you get in the road, you need both hands on the handlebars (monitors, 60s, spinning)

But really, the way my bike is up and down so it just increases the point. We prefer to take the road then take a route in to your condition. It’s get shaken up by it, it’s like, you really uncomfortable on it.” (Rebecca, 60s, Cardiff)

There’s nothing worse than going on a bike, and they’re much higher, it’s an awful bike ride.” (Polina, 60s, Cardiff)

3. Traversing Surfaces

This road surface is awful. Bumps everywhere as you can see. I have a front suspension but it doesn’t make any difference. It’s the road... I still get bumps you get on the road, you need both hands on the handlebars (monitors, 60s, spinning)

I’m really happy with the way my bike is up and down, so it just increases the point. We prefer to take the road then take a route in to your condition. It’s get shaken up by it, it’s like, you really uncomfortable on it.” (Rebecca, 60s, Cardiff)

How am I going to get my bike, and they’re much higher, it’s an awful bike ride.” (Polina, 60s, Cardiff)

4. Navigation and Expected Manoeuvres

There’s nothing more than going over the bumps. Howard there’s a path. They’re much higher, it’s an awful bike ride.” (Polina, 60s, Cardiff)

5. Navigation and Expected Manoeuvres

It’s not like driving, is it? When you know you’ve always got a lane. On the bike you’ve got loads of different things, haven’t you? Sometimes you have to get across a pavement, sometimes you’ve got a cycle lane, and sometimes you’re amongst the traffic, sometimes you’re in a dangerous spot in the middle of the road. It’s not like being in the car... is it?” (Jybbie, Cardiff)

6. Breaking the Rules

Heightened surveillance
Riding on pavements
Riding wrong way up streets
Dismounting and becoming A pedestrian

5. Navigation and Expected Manoeuvres

There’s nothing more than going over the bumps. Howard there’s a path. They’re much higher, it’s an awful bike ride.” (Polina, 60s, Cardiff)

6. Breaking the Rules

Heightened surveillance
Riding on pavements
Riding wrong way up streets
Dismounting and becoming a pedestrian
7. Cycling Capability and Adaptation

Turning

"I don't like looking over my shoulder, partly as a result of the accident I had in the car, lost some mobility turning right. It was turning right I need to stop, look around and then cut across, particularly, if I am tired and it's up Hill..." (Goeth, 60s, Bristol)

"It really hard as you get older to turn when you've got the arthritis you can't turn your neck all the way back without wobbling and the centre is actually not a lot of good because it is to... moves too much, ought to grip" (Chloe, 60s)

7. Cycling Capability and Adaptation

Balance/ Dismounting

"Most of this year I have been recovering from a cycle accident which did the knees in, well, the knee's went. Worst off the bike didn't make it any better. That's why I need to use the pavement to help prop myself up and push myself off with" (Eduardo, 50s, Cardiff)

"why you do do that (use the kerb) I found I felt more comfortable on the kerb and felt a bit safer..." (Gabi, Oxford)

7. Cycling Capability and Adaptation

Momentum

"It's really hard as you get going again after stopping off..." (Chloe, 60s, Bristol)

"I like looking over my shoulder, partly as a result of the accident I had in the car, lost some mobility turning right. It was turning right I need to stop, look around and then cut across, particularly, if I am tired and it's up Hill..." (Goeth, 60s, Bristol)

"I was lucky with the light... I will always try and keep momentum... My fitness has gone down, it really has. I'm on these... I'm not sure what it actually is, anything besides I'm very..." (Regan, 70s, Cardiff)

7. Cycling Capability and Adaptation

Conclusions

- Great potential for cycling to enhance physical, mental and social wellbeing
- Older users employ a range of strategies like taking alternative routes and travelling at different times to minimise journey stress - negatively impacts wellbeing
- Design guidance should be based on a broader range of imperatives
- Promotion of alternative and non-standard bike designs to mitigate effects of ageing

Findings Drawn From

Cycling and Wellbeing Trial

Ben Spencer

7. Cycling Capability and Adaptation

Structure

- Oxford & Reading locations
- Life history interview
- Assessment
- Pre-trial tests
- 8 weeks | 3 x 30min | Diary
- Post-trial tests
- Focus groups
- Exit survey

Research Questions

The key questions and sub-questions driving this part of the investigation were
To what extent does cycling improve older people's cognitive functioning, wellbeing (life satisfaction) and physical health and, how do specific features of the built environment and assistive technology (e.g., on a bike) affect cycling impact on wellbeing? What is the impact of the cycling trial on wellbeing and capability indicators?
What was participants' experience of cycling over the course of the trial and how did this affect wellbeing?
Recruitment

- Re-engaging with cycling
- Cycling curtailed in adulthood / diminished in later life
  - Deterioration in health
  - Safety concerns
  - Lack of confidence riding

Motivation to take part

- Structured programme / training
- Health and fitness
- Rehabilitation after illness
- Social cycling
- Everyday mobility
- Allure of the e-bike

Engagement with the trial

- Embraced: > 3 x 30
- Endured: Time, family, weather, health, mechanical
- Exited:
  - Medical condition (n=5)
  - Time (n=4)
  - Confidence (n=1)

Average: 3 hours p/w | 30 journeys

Experience – e-bikes

- Enjoyment and thrill
- Cope with ailments
- Safer – junctions / hills
- Greater distances
- Discovery
- Ride with others
- Varied (and zero) assistance

Experience – Pedal & E-bikes

- Mainly recreation
- Away from roads
- Social support
- Increased confidence
- More functional journeys

Reported Benefits – Pedal & E-bikes

- Weight loss
- Fitness
- Increased leg strength
- Endurance
- Better sleep
- Sense of achievement
- Improved self-esteem

Challenges – Pedal & E-bikes

- Infrastructure design and maintenance
- Legibility
- Traffic
- Route planning
- Paraphernalia
- Weather
- Storage and
  - parking

Challenges – e-bikes

- Weight and maneuverability
- Operation – keys, charging
- Perception – cheating
- Cost and security
Jo Baldock, 60s, Reading, E-bike trial

Cycling and Wellbeing Trial

Jo Baldock, 60s, Reading, E-bike trial

Meta-analysis Exercise & Cognition

- Older adults who are physically active report higher levels of wellbeing and physical function (Webb et al., 2005; Spirduso & Cronin, 2001)
- Aerobic exercise has been shown in laboratory conditions to improve cognitive function in older adults, particularly executive function (e.g., Erickson, 2011; Colcombe & Kramer, 2003)
- Benefits of cycling for regeneration in the brain (Erickson et al., 2011; Thomas et al., 2015)

Wellbeing and Cognition Trial

- Investigate the impact of cycling for an 8-week period on older adults’ cognition and well-being
- Analysed:
  - 36 Pedal bike participants
  - 38 E-bike participants
  - Levels of assistance
  - 22 Control participants
- Standard battery: Cognition and wellbeing are measured before the trial (pre-intervention) and after (post-intervention) – Change score

Cycling during the Intervention

- Both e-bike and pedal cyclists spent approximately 3 hours cycling each week
- Average weekly cycling duration

E-bike Participants: Assistance Level

- E-bike participants spent an average 15% of the time cycling with the electrical assistance off

Test Findings

- Physically activity levels before the trial did not correlate with the amount of time spent cycling during the trial
- Memory and attention scores did not benefit from cycling
- Test sensitivity
- Ceiling effects
- Stable
- Spatial reasoning improved after the cycling trial for both e-bike and pedal cyclists
Pedal cyclists improved on the letter updating task, a measure of executive function, after the cycling trial. H HJ HJW JW B WBC

Pedal cyclists improved on the verbal fluency task, a measure of executive function, after the cycling trial. Say as many words beginning with the letter 'F'.

Pedal and e-bike cyclists improved in their mental health score after the cycling trial.

Executive Function - Letter Updating Task
Executive Function - Verbal Fluency
Wellbeing - Mental Health

Exit Survey
- Over two-thirds of the participants thought that their wellbeing had improved a little or a lot.
- 58 per cent reported that they had cycled and intended to increase or maintain their level of cycling.
- A further 27 per cent reported that they had stopped but were actively planning to start cycling.
- 19 went on to purchase an e-bike and a further 12 purchased a pedal cycle.

Conclusions
- Our results suggest cycling has a positive effect on cognitive processes and wellbeing.
- This may not be simply to do with increased physical exercise (and therefore increased cerebral blood flow) but also the opportunity cycling provides for older people to engage with the outdoor environment.

Wellbeing – Mental Health

Outdoor Space & Buildings

Age-friendly Cities’ Approach

People Powered Age-friendly Cycling

Recommendations: Towards Age-friendly Cycling Mobility

Global Age-friendly Cities: A Guide

Calls for attention to the needs of the most vulnerable people in society, including older adults and children, in order to increase the number of people who become or remain physically active. Recognises the important role cycling (and walking) in achieving this ambition.

Cycling Mobility

Wellbeing – Mental Health

Calls for attention to the needs of the most vulnerable people in society, including older adults and children, in order to increase the number of people who become or remain physically active. Recognises the important role cycling (and walking) in achieving this ambition.

Outdoor Space & Buildings

Cycling Boom

Calls for attention to the needs of the most vulnerable people in society, including older adults and children, in order to increase the number of people who become or remain physically active. Recognises the important role cycling (and walking) in achieving this ambition.

Outdoor Space & Buildings

Calls for attention to the needs of the most vulnerable people in society, including older adults and children, in order to increase the number of people who become or remain physically active. Recognises the important role cycling (and walking) in achieving this ambition.

Outdoor Space & Buildings

Calls for attention to the needs of the most vulnerable people in society, including older adults and children, in order to increase the number of people who become or remain physically active. Recognises the important role cycling (and walking) in achieving this ambition.

Outdoor Space & Buildings
Transportation
Recognize the full potential of cycling as a mobility aid for older cycling
seamless integration with other modes.

Housing
Safety and convenient cycle storage and street access are important to ensure cycles are easy to retain and use.

Social Participation
Engaging and supporting potential and existing older cycling as a way of providing a sense of empowerment through social networks and independence.

Respect and Social Inclusion
Developing a culture of respectful interaction to strengthen older people’s place within the community through participation in planning.

Civic Participation and Empowerment
Cycling-related activity can be a conduit for engaging older people in meaningful activity and contribute to their community.

Community Support and Health Services
Recognize the broad health benefit of cycling and move beyond cycling as physical activity.

Communication and Information
Communication strategies must challenge age stereotypes of decline and dependency and promote positive images of older and ageing.

Summary
All of this will require a substantial shift in culture if cycling is to be embedded in the lives of an increasingly older population.

Thank You