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## Understanding pathways of development in cycling in later life

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### Abstract

The 2011 UK census revealed large increases in the numbers of people cycling to work in some major urban areas. Whilst this is a positive change, such changes should provoke consideration of the inclusivity of cycling in general. Adults over 65 years undertake 1% of their journeys by bicycle, compared with 2% by those under 65. This compares unfavourably with figures from Germany and Denmark. This paper reports research into the individual pathways which give rise to outcomes of cycling or not, over the age of fifty. A growing body of travel behaviour research concerns how behaviour changes in proximity to life events. A number of life events can occur in later life which entail changes in social roles, time use and travel requirements and alter the feasibility of cycling as a mode of travel. These disruptions can arrive in parallel with age-related changes which alter the capacity and motivation to be physically active. 37 adults aged over 50 from the Bristol area were interviewed to collect personal histories of cycling. The sample was varied in the level of cycling activity reported in the previous last 12 months. The personal histories were used to construct a typology of pathways of cycling development through middle and later adulthood. The personal histories and typology are foundations to better targeted interventions to support cycling in later life by distinguishing pathways through which outcomes arise and identifying processes of re-engagement, dis-engagement or adaptation.

### Introduction

For those aged 65 and above in Great Britain (GB) only 1 per cent of journeys are by bicycle, while modal shares of 9%, 15% and 23% respectively are recorded in Germany, Denmark and the Netherlands (Pucher & Buehler, 2012). At the same time, nearly a half of adults aged between 65 and 74 in GB do not meet physical activity guidelines (HSCIC, 2013). Cycling offers the potential for increased amounts of physical activity in later life and other benefits, so it would be valuable to better understand why levels of cycling are so low in the older population in GB.

This paper presents findings from the Cycle BOOM project<sup>1</sup>. Older adults are under researched group when it comes to academic studies of cycling which leaves policy and practice without knowledge to develop measures that could shape physical and social environments to be more supportive of cycling in later life. The research is a multi-disciplinary project incorporating cultural and urban geographies, urban design, cognitive psychology and travel behaviour research and aims to develop knowledge on the extent, practice, experience and potential of cycling in the older population of the UK.

The paper first summarises what existing data sets can tell us about the extent to which older people cycle and the potential for this to increase. It then introduces the theoretical framework and methodology, before presenting analysis and interpretation of new data which provides insights on individual pathways of cycling in later life. Instead of simply seeking to find out the reasons why most older non-cyclists do not cycle and a minority of older cyclists cycle, we have conducted biographical interviews with a sample of older people with diverse cycling histories and have explored the reasons why they have started and stopped cycling over their lives with the view that this can be informative about how to sustain cycling of cyclists into older age and to encourage resumption of cycling among those that have stopped cycling.

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<sup>1</sup> Cycle Boom has been funded as part of a UK research council research programme on ageing and well-being under a specific call for research on how mobility in later life could be supported through design of the built environment and technologies.

**Cycling in later life in the UK – existing data**

National data shows that cycling modal shares are low for all age groups in GB, but particularly low for those over 50 years. Younger adults record the highest cycling mode share but the 40-49 age group records the highest average cycling distance per year of 92 miles, with 53 miles recorded for 50-59 age group and 33 miles for 60-69 age group. In Germany, Denmark and the Netherlands no decrease in cycling rates is seen in older age groups (Pucher and Buehler, 2008).

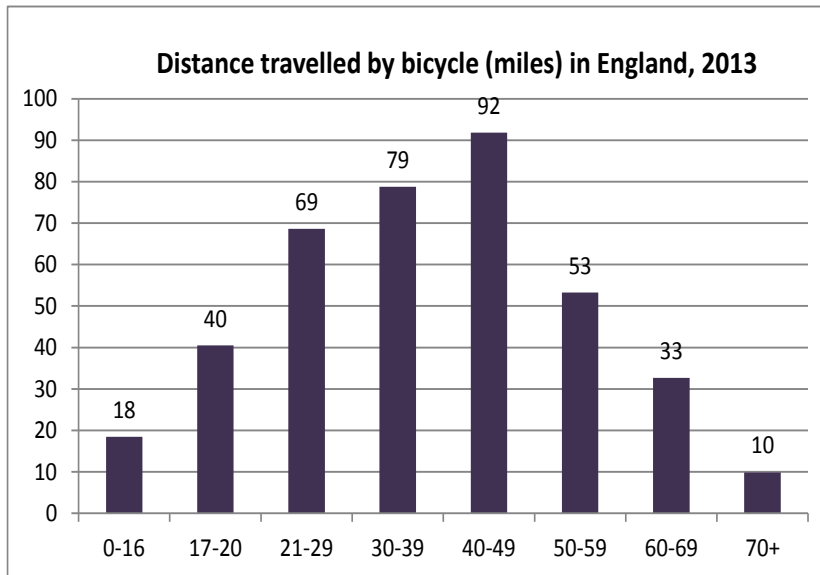


Fig. 1: Bicycle share of distance travelled by age group

The potential for a greater number of older people to cycle is demonstrated by noting that over a quarter of 60-69 year olds own a bicycle (27%) and 17% had ridden a bicycle during the last year. However, only 3% reported making a bicycle trip during the week in which they were surveyed. The data shows that while bicycles are only used for about 1 in 100 trips for those aged 50 and above, a reasonably high proportion of this age group has some engagement with cycling (1 in 4 of those aged 60-69 owning a bicycle).

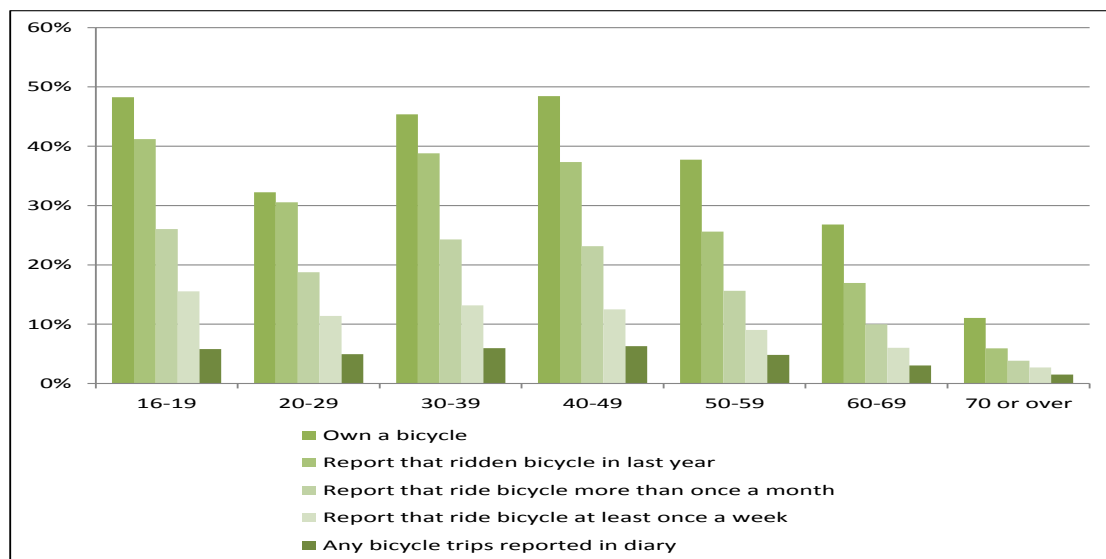


Fig. 2: Bicycle ownership and self-reported bicycle trip frequency by age group

The small proportion of older adults reporting frequent cycling raises the risk that it is assumed that a very small minority of the older population has capability or interest in cycling. The larger proportion that have a bicycle or make occasional, infrequent cycling trips

suggest a more appropriate focus for research is the older people who engage in cycling to some extent and to examine what encourages and discourages them from cycling over time.

Examining how engagement in cycling in older age varies with personal characteristics shows that for 60-69 year olds, those who are wealthier, live in rural areas, live in a home rather than a flat, have a car and are male and white are more likely to own a bicycle. Bike use is more likely among those who are male and white and live in rural areas but wealth, having a car and type of home are not important. The difference in likelihood of cycling between young adults (16-59) and those aged over 60 is larger in cities (about 3 times) than in small towns and rural areas (about 2 times) which suggests that older people find city environments less sympathetic for cycling.

Table 1: Profile of older cyclists (60-69)

Characteristic	Own bike (%)	Report bike trip (%)
Across all aged 60-69	27	3.0
Live in metro area   rural area	16   38	1.0   3.5
Live in purpose-built flat   detached home	12   37	2.9   3.5
Own 0 cars   2 cars	14   36	3.5   2.9
Highest   Lowest income quintile	41   22	3.6   3.7
Female   Male	20   34	1.9   4.3
Non-white   White	7   28	1.6   3.1

The differences between younger and older adults in attitudes towards cycling could explain the differences in amount of cycling. The older group are more likely to report having a disability/health that restricts their cycling and are less likely to be confident cycling on roads.

Table 2: Attitudes to cycling

Agree with statement	16-59	60+
Disability/health making it difficult to cycle	6%	43%
Not kind of person who rides bicycle	30%	48%
Confident cycling on roads	41%	22%
Too dangerous for me to cycle on roads	57%	72%
Cycle (more) if more dedicated cycle paths	55%	42%
Rather cycle than use public transport	40%	18%
I (would) enjoy cycling as a leisure activity	72%	45%

It seems that those aged 60 plus are less physically able and confident to cycle. However, it is unclear what enables those that continue cycling to manage this and for those that stop, it is unclear when this happens and why, and if they could be encouraged to resume cycling. The Cycle BOOM project has sought to obtain greater understanding about pathways of development of cycling in later life.

### Life course perspective

A growing number of travel behaviour studies look at how behaviours change around life events (Müggenburg et al, 2015). The basic premise is that life events can involve changes in the circumstances of someone's life including context, resources, the roles people play as well as the values or self-concept they hold. These changes instigate processes of adaptation which can result in a change in behaviour. For instance researchers might be interested in the travel behaviour changes as people transition from paid employment into

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post-working life. Similar research is being conducted in the physical activity field looking at how physical activity is affected by life events and transitions (Hirvensalo & Lintunen 2010).

The life course perspective (LCP) has been adopted to underpin this area of inquiry. This is a multi-theoretical framework, principally developed within sociology that is used in a number of research fields to study the course of individual lives over time. The life course is conceived of as a collection of developmental trajectories that unfold through life shaped by a series of socially-defined events and roles. The life course is embedded within a historical and socio-cultural context.

Life course studies are typically directed towards understanding the gradual and more abrupt changes which re-orientate a trajectory. They also consider the longitudinal mechanisms through which later outcomes are shaped by earlier experiences. The framework integrates the concept of human agency to explain the intrinsic directing of the life course, that is the individual making choices that respond to challenges encountered in accordance with personal goals. Such choices are made within the external opportunities and constraints that transpire from a particular socio-historical location in which the life course is embedded. The LCP is compatible with ecological models of human behaviour; offering a longitudinal framework to consider the impress of multiple layers of behavioural influence over the life span.

In accord with the LCP, individual cycling behaviour was conceptualised as a developmental trajectory that encompasses a person's thoughts, feelings, capabilities and activities related to cycling. The cycling outcome in later life is viewed "dynamically as the consequence of past experience and future expectation as well as the integration of internal motive and external constraint" (Giele and Elder, 1998). Research objectives were more specifically to illuminate and explain change and continuity in cycling trajectories through the anticipated and unanticipated events of mid and later life, and how this is influenced by factors of the built environment and bicycle technology.

### **Methodology**

Biographical interviews were used to elicit personal narrative accounts which described and explained the changes and continuities in cycling. Biographical interviews have been used in travel behaviour research to investigate walking and cycling over the life course (Jones, 2013), changes in cycling during a three year programme of major investment (Chatterjee et al 2013) and the impact of entering parenthood on travel behaviour (Lanzendorf, 2010).

Interviews were semi-structured and covered participants' past and present engagement with and future orientation to cycling. As far as possible participants were interviewed in their home and the interview involved looking at their bike and storage. Prior to the interview participants completed an events history calendar which informed the interviewer about key events in the life course and gave a preliminary indication of engagement with cycling. These collected information on residential, education, employment, transport and hobbies, as well as cycling history. As well as acquainting the interviewer with details of the life history prior to interview this also served to prime the participant to think about their cycling history.

### **Study area**

Biographical interviews were conducted with older adults in Bristol, Cardiff, Reading and Oxford. This paper reports analysis and findings of the 37 older adults interviewed in Bristol that will serve as a foundation to the analysis of the broader data corpus. The Bristol sample was gender balanced with broadly an even spread of adults in their fifties, sixties and seventy years and above.

Recruitment materials were disseminated through local community groups and venues, local media and cycling groups. Interested persons completed a screening questionnaire and from this a selection were invited to participate according to the recruitment criteria (which required getting a mix of participants by gender, age, local area deprivation and current engagement with cycling). Participants were recruited incrementally; later participants were selected with reference to those who had already participated, allowing later recruitment to focus on under-represented groups.

### Data processing

Using the interview audio and life history grid the interviewing researcher wrote a condensed summary which distilled the chronology of life events together with changes and continuity in cycling and the participant's reasoning of them. The interviewer then composed a reflective memo which summarised the phases of cycling and non-cycling, circumstances of change and captured their reflections from meeting and interviewing the participant on what had shaped the participant's later life cycling engagement and outlook for cycling. Composition of these summaries and memos was guided by the analytical principles of the life course perspective and together served as a distillation of the cycling life history. These were an aid for communication of the cases and deliberation between the interviewer and co-researchers. Earlier cases were reviewed and revised in light of reflections prompted by later interviews.

Next the commonalities and differences in the developmental pathways of cycling through middle and later life were examined across cases. Re-engagement, continuity, decline, curtailment and absence were identified as common pathway types. These were taken as preliminary types into which the participants were placed. The composition of each group was then examined in turn, considering the fit of each case within the group. This resulted in a five group typology of developmental pathways of cycling in mid and later life (Absent, Curtailed, Diminished, Continuous, Restored).

Some ambiguity was recognised in deciding whether particular cases should be placed in the Curtailed or Diminished group, or in the Restored or Continuous group. Placement was resolved with consideration of how closely cases resembled cases within the original group or a prospective group. This is discussed further in the findings section. These deliberations highlighted areas of convergence which was used to arrange the typology on a diagram and theorise about the relationships between the groups.

Table 3: Characteristics of the Bristol sample

	Male	Female
<b>Age</b>		
50-59	4	5
60-69	10	7
70+	5	5
<b>Residential IMD</b>		
1	6	7
2	6	2
3	3	4
4	3	2
5	1	2
<b>Cycling in last 12 months</b>		
None	5	4
Rarely	1	1
Occasional	1	3
Regular	12	9

### Findings

Each case was unique in the ordering and timing of changes and continuity in cycling. Participants tended to have a well-developed sense of how their current cycling status had arisen, when and why it stopped, or why it had continued. In general there was much stability in cycling behaviour through mid and later life and often through life events and transitions. These continuities were punctuated by a small number of positive and negative changes which could be depicted as step changes or more gradual changes in cycling activity. Most changes were explained in terms of some alteration in the circumstances of everyday life related to relocations, changes in time use and health status.

The typology that resulted from the categorisation is presented as a diagram in Figure 3. The following commentary describes the composition of the groups, illustrated with quotes

and case descriptions. The hashed rectangles denote the presence of commonalities and differences within and between groups and are explained within the text. Solid lines indicate potential and desirable progressions individuals may make between the groups. Hashed lines are potential regressive progressions.

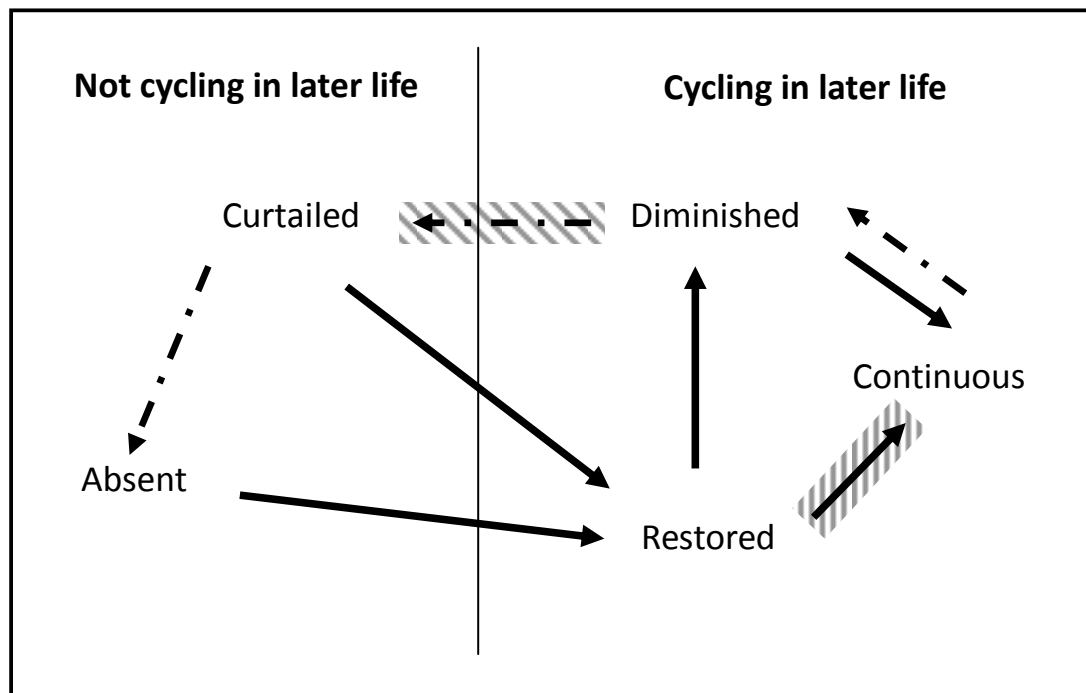


Fig. 3: Typology of cycling development pathways in mid to later life

Working from the left of the diagram, the first group comprises those who had no engagement with cycling for the duration of middle and later adulthood.

Absent

Only two cases were classified as Absent within the Bristol sample. Given the earlier findings from secondary data, however, it can be assumed that a significant proportion of the older adult population would fit into this type.

Dexter [M70+]

*“I’ve had a car since 1962 and never used anything, apart from the bus, since...*

*you do think about it but to be quite honest I’d be frightened to ride a bike in Bristol, I would be frightened, physically frightened...if there was cycle paths, you know a good system of cycle paths where I didn’t have to cross a main road I’d think well, I’d buy myself an electric bike perhaps, I don’t think I’d be capable of doing a push bike, I’ve never, even when I was younger felt comfortable on bike, it was always a struggle, something that had to be done and that was it, but I’ve never felt comfortable.”*

Whilst Dexter was almost certain that he would never cycle again, the other member of the group, Charles, had aspirations to cycle again, despite a long term absence of cycling.

Charles [M50-59]

*“I wasn’t using it so I thought why not get rid of it ... now my intention was not to never own a bike again, but here I am 25 years later, and it has been that. Partly because another place I worked was Hewlett Packard which was a lot of international travel so I just didn’t have any need for the bike”*

*“Tricky, I’m looking for another job so my perfect world would be preferably to walk to work but if it was a cycle that would be fine as well. That would be perfect if I could do a job that I enjoy and not have to drive...if the numbers worked out sensibly and wasn’t too big a difference in pay I certainly would be quite happy to cycle to work because I could then do the fitness part of it as part of my day to day work and not have to worry about...”*

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### Curtailed

Seven participants (five females, two males) were classified as having a cycling history that had discontinued in their recent past after some period of regular use beyond early adulthood. For most members of this group engagement in adulthood had been sporadic, fairly brief and irregular. For example, Yasmeen (F74) had two spells of a few years bike use; borrowing a bike for volunteering in her thirties and then at the end of her career which was prompted by finding it increasingly difficult to drive and park in the city centre. Her cycling ended following a hip-fracture and subsequent diagnosis with osteoarthritis. Sheena (F53) had been gifted a bicycle and thought about cycling regularly to get to work but had not managed this and had stopped the occasional leisure cycling she did. Moving to live in the city where previously living in the countryside (with less traffic) had discouraged Clarissa (F69) from continuing to cycle. Vera (F50s)'s cycling subsided when her partner stopped cycling. The support of others to cycle was prominent in the accounts of this subgroup be it through donation of a bike and proposing cycling as a shared activity.

For a smaller number of those with curtailed trajectories there had been more lasting periods of cycling in adulthood. For example, Andre's (M56) participation in occasional cycling events broadened into a decade of commuter cycling when he moved from London to live and work in the urban fringe of Bristol. Andre's cycling curtailed in the course of a minor stroke and onset of osteoarthritis.

Andre [M50s]

*"I had high blood pressure... I had arthritis in my hips...and then I had a minor stroke January last year but I was hardly using the bike at all by then, I'd started getting the bus to work and that was sort of the end of my cycling days...[so were you advised not to cycle?] no I've never been advised not to, it was more of a personal decision, because I've now got a dodgy knee...these days I'm lucky if I can run for the bus..."*

*"I would like to start again but I would need something akin to a very low Boris bike [something you could step through?] yeah step through on... ..there's a bike shop in town and I have seen the sort of bike I would like and if I ask nicely I could get an interest free loan from [work] to buy it....it's like a step through, without a shopping basket on the front...I might try cycling to work again, I would definitely ride it up to Tesco's."*

A more unifying feature, illustrated by Andre and Yasmeen, was for curtailment to be related to the onset of a health condition, or incident in which their physical capacity to cycle was compromised (e.g. car accident or a general decline in fitness). In some cases the curtailment of cycling activity was presented wholly as due to some change in health. For instance progression of her arthritis was offered as the sole factor which brought to an end Julia's (F80+) cycling along a former railway cycle path, an activity she had established after she was widowed.

Others identified changes in health and physical capacity had occurred whilst their cycling was changing due to developments in other aspects of their life. For instance Gareth's (M67) cycling history comprised periods of regular cycling to work and every few years a cycle ride/challenge undertaken with friends. Later in his career his local commute to a fixed site was replaced with responsibility for visiting multiple sites over a regional area. Gareth was subsequently injured in a car collision (as car driver). Gareth thought that at the time he had not been using his bike very often. Whilst he had physically recovered he had not ridden since and felt his confidence to ride had been undermined. This case illustrates how a curtailment event may arrive when cycling is already in decline.

Gareth [M60s]

*"I'd think I can't cycle because I have all this to do"...and I had an alternative...I went to the gym and I found a workout and a shower preferable so cycling would have dropped to almost nothing apart from the occasional ride with my old spokes mates...then in my early sixties it dropped to almost nothing and then I had the car crash"*

*"we talked a bit about the car crash and my nervousness of driving for a while but yeah the bike is still there, it's in good condition...I think it might be partly the nerves about getting back on the bike but it might also be I need a bit of a kick, a motivational thing so like*

*the sun is shining, the allotment needs digging there is no reason you can't get on your bike, or one of my cycling group saying "we need a cycle somewhere"...I need a push really"*

### Diminished

A group of six participants (four females, two males) had in common an acknowledgement of some decline in their frequency of cycling. The group, varied with respect to the amount of current cycling activity. There are participants like Edith (F60s) who still used her bike for some of her journeys but who reflected that following an employment and residential change she cycled less often, and Reginald (M60s) who had hired a bike the previous year on holiday but had not used his own bike in over two years.

Reasons given by those cycling less were that changes in the schedule and activity space of their everyday life made cycling less convenient or desirable for travel and a growing unease about cycling in certain conditions, times or topography.

Angie [F60]

*"My cycling life has really shrunk actually, not because I can't or don't want to, for some reason, particularly at the moment because I'm doing a lot of things to do with work I have needed to the car to go and buy stuff, like today I had to collect a mower and some manure so you know, car*

*"I suppose I used to go on the roads more, I think that I am less confident and I think that's partly to do with I don't do it so much, and also an age thing ... you know you feel more vulnerable, you know turning your head to see what's coming and you use a lot of peripheral vision when your cycling and hearing and those things tend to become a little bit less acute."*

For Rona (F70) who used an electric bike, concerns about the range of the battery, the loss of former cycling companions and a reducing social network more generally diminished her cycling. Reginald's cycling had been recurrent through working life, altered by redeployments to different sites. Having used his bike solely as a means to get to work Reginald rode on a couple of occasions after he had fully retired for leisure, but had not kept this going.

Reginald [M60]

*"then it went in the garage, I used it occasionally, I used to go up to [volunteering], having retired and got time so I did that but anything else local, Tesco's or to the shops just walk. just once or twice I went out for a cycle ride for exercise, to keep fit because not being on my feet every day, I consciously wanted to keep fit ...so I thought I'll go out cycling but ...me bum hurt...it was so, it was uncomfortable and it was more stressful than walking and trying to find different routes for interest because I didn't like going there and back again for fun, it's ok for commuting but if I'm doing something I like to do it in a circle, so I just used it for going to the hospital a couple of times a year [volunteering] and then I stopped doing that and it's stopped now for the last couple of years. About a year ago was the last time I used my bicycle...and apart from on holiday last year when we hired bikes..."*

Floria (F60s) had returned to cycling in middle adulthood to cycle with her partner. She had attempted to use her bike in her local area for functional and leisure cycling for a few years, but had only cycled on holidays abroad, having not been able to gain the confidence to tackle cycling in her local area.

The boundary between the Diminished and Curtailed groups is subtle; allocation was made based on description of current cycling and outlook for cycling. Participants placed in the Curtailed group expressed a definitive notion that their cycling had stopped, their most recent use of a bicycle was probably their last, and reasoning for this. Participants identified as Diminished made some reference to cycling activity having become sporadic and lessened with respect to some previous level of activity. Time elapsed since most recent cycling extended to years in some cases but nevertheless there was an ongoing concept of potential cycling. The future outlook in this group was broadly that involvement with cycling would remain irregular or there was some stated desire to reverse the decline. The Curtailed group were a mix of some who accepted that the hiatus was final and those with speculative notions or planned intentions to recommence cycling.



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### Restored

A group designated Restored consisted of eight participants (three female, five male) who reported a definitive reengagement with cycling in their fifties and sixties. Apart from one woman in her early 50s, group members are at the older end of the sample. Predominantly the cycling in this group was ongoing, performed for leisure and fitness and occupied a place in a weekly routine. The common response on how their cycling would develop for those in the Restored group was the intention of cycling as long as they could.

Group members demonstrated lifetime cycling which we classified as either sporadic or recurrent. All had used a bike in youth and for some this period of engagement extended some way into early adulthood. In every case the restorative change followed an absence of cycling for at least one decade and in most cases multiple decades. Within this group are a predominant subgroup of males, all retired, who felt their cycling had been displaced and prohibited for much of their working lives by the spatial constraints and requirements of work travel. Reengagement with cycling was explained with reference to transition out of work into retirement in conjunction with health issues and the opportunities and constraints these had brought (predominantly these were injuries and musculo-skeletal conditions).

Lance [M60]

*"I had a young family and the number of people I'd heard about getting killed, it just didn't feel safe...It felt more dangerous cycling around Yate even though all the people I'd heard about had been killed in London it felt like drivers were more aware of you there...there was a different mentality.*

*I was really only a day at a place so couldn't really ride there and needed to take equipment...[Sold bikes] thinking I would never ride them again ...took up running...when I packed up work, I thought "ooh I can ride my bike again"*

Ramona (F70s) and Patricia (F70s) surmised that the combination of raising a family and work had precluded their cycling for a large part of adult life. In later life concerns about getting fit and staying active had prompted a return to cycling for the first time since youth. Both had partners who cycled and with whom they cycled on occasion. They had also had recent periods of significant illness during which they cut back or put on hold cycling before then returning to it.

Leona (F50) worked full-time and did not anticipate her retirement. Her case history, like some of the males in this group, demonstrated the influence of the orientation of residential and employment locations on cycling trajectory. Living in a remote rural location had restrained her cycling for a couple of decades to occasional leisure riding. Her cycling recommenced following a residential and then job change to a business park on the peri-urban ring road of Bristol. This presented a domain in which she felt comfortable cycling. Other mediating factors she identified were the facilities and culture for cycling she encountered at her new place of work together with her awareness that she was largely sedentary in her work.

Leona [F50]

*"as a child fairly level, then a big stop while I was at uni, then started again and then there was another stop and then since I've had this new bike it's probably grown and as I say I probably cycle more now than I ever have done in my life."*

*"it's very much a fitness thing, cos at work I'm sitting down all day ....., it's only been the last 15 months....I started work there then, it's a 6/7 mile cycle ride which is actually no further to when I worked in the city centre previously...there is absolutely no way I would have cycled from here into the city.... it's quieter, traffic's quieter, ..... and it's also the attitude of work, if I'm not at my desk until 9.15 it doesn't matter whereas before I was in financial services and it did .....they have this sustainable travel policy...there are changing facilities, showers.....I am a fair-weather cyclist, I must admit, October comes and the bike goes in the shed for winter.....some of the ring road path is unlit"*

### Continuous

Eleven participants (eight male and three female) were identified as having continued to cycle for a substantial period in the latter part of their lives. The gender balance probably

reflects the balance of long-term cyclists in the wider population. Lifetime cycling was classified as constant, recurrent and in one case sporadic. In the main, absences of cycling extended to a decade or less.

Cycling for work was a prominent feature of all male cycling histories. Some like Alfie (M60s) and Jerry (M50s) had a journey between home and work that was stable over many decades. For others like George (M70s) and Stanford (M60s) residential and employment changes meant cycling had alternated with other commute modes through working life.

The histories of those who had retired revealed different processes by which cycling was maintained; towards the end of his career John (M60s) changed jobs, reduced his working and started volunteering. Over this period his cycling changed from predominantly cycling for work to using his bike for local trips, increasingly cycling for fitness in place of running and completing some fundraising rides for charity. In contrast George (M70s) was cycling only occasionally for leisure when he retired and emigrated. He then bought a new bike and cycled regularly with a group of expats whilst abroad. After about ten years George returned to the UK and continued to use his bike for local trips to visit family and 'escape' on his own for a few hours.

Alfie [M60s]

*[did retirement affect your cycling?] Not really because I started doing other activities right away I started volunteering so that was 2.5 miles to get to that [So the journeys you made..?] they just changed a bit, I stopped doing that journey into [work] and did other journeys instead but they were similar, within the bounds of Bristol, just different journeys ...Now I can do it any day of the week... whereas before I might have done a detour on my way home or gone on a Saturday...it's no trouble to cycle down there but then you've got cycle up [hill] ...I used to look upon it as a sort of fitness challenge to cycle up, now I tend to push up or avoid it by taking a slightly different route, more of a gentle climb ...*

Long periods of commuter cycling were less a feature of the female cases. Goldie (F60s), a non-driver, had cycled to and from her early shift and other local trips, since her relationship ended a decade earlier. Diane (F60s) had in the last couple of years embarked on a pattern of occasional cycling to work having previously only cycled infrequently on family holidays.

Diane [F60s]

*"we were like 11 so it was just child cycling...just going round the streets and then I had a huge gap from that time until about twenty years ago, I hadn't been on a bike since then til I went on holiday in Brean I've always remembered I got on a bike and sort of wobbled a bit...no it was before that, I'd say about 25/30 years ago, a hired bike"*

*"I notice oh, oh that's an older one, their older cos I think I'm a woman on a bike, and I'm a black woman on a bike but then I think well I'm an older woman on a bike so maybe that's a bit odd for the other ones to see ...but I didn't care but a bit of me thought well everyone used to seeing me driving for forty years now and here I am now at my time of life cycling but it's quite liberating, very liberating."*

Finally Chloe (F60s) had a six month spell of cycling to and from part time work prompted by theft of her car. She reverted to car use for most of her travel when it was replaced but then embarked on riding for fitness and went on to complete long distance challenge rides.

Some deliberation unfolded over whether the timing of Patricia and Diane's returns to cycling meant they should be placed in the restorative or continuous group. This highlighted the more general difficulty of resolving a definitive developmental pathway from the interview data as recollections about the timing of changes and circumstances were sometimes vague. Hence the boundary between the continuous and restored group is not always clearly demarked. The implications of the typology and findings associated with the groups are discussed next.

### Discussion and implications

The typology provides a provisional basis to theorise about the myriad pathways of individual development in cycling in mid and later life. It enables the analytical step of discerning from 37 individualised histories the influence of bio-psychosocial processes of ageing on cycling

outcomes. The potential contribution of this research lies in understanding how accumulated experience of social and physical settings make one pathway and not another more likely, and from this to identify measures to support extension and resumption of cycling through mid and later life. Referring back to the diagram, the arrows denote potential transitions between types which were identified from the sample. This section discusses the opportunities to shape cycling through mid and later life.

The life histories were replete with descriptions of how developments in health and functional capacity had, and continued, to shape engagement with cycling. Some restorative and continuous life histories provided evidence of how older adults used cycling, as a low impact form of exercise, in rehabilitation, in management of weight and other chronic health conditions and as a mentally restorative activity. One consequence of the medical advances that have extended life expectancy is that a large proportion of mid and later life adults are in routine contact with health care services for treatment and management of a range of health conditions. An avenue for policy intervention is to look at ways cycling might be promoted to mid and later life adults through this contact with services. As well as routine advice to be active, this could include encouragement to maintain or re-establish cycling curtailed due to a health condition. This would need to consider the concerns that health care professionals could have advising patients to cycle and how to develop programmes for supported/social cycling for different patient groups.

After a hip fracture and subsequent diagnosis of osteoporosis, one participant concluded the risk of injury made it irresponsible to continue cycling. This suggests health developments can prompt older adults to reappraise their capability for cycling. Appraisal of capability is, however, likely to be shaped by the affordances of the proximal environment for cycling. Other cases had an awareness of a contraction in the temporal and spatial domains in which they cycled as they chose to avoid situations which felt hazardous or pressured. Domains contracted in terms of avoidance of peak periods, arterial routes, schools and other trip generators and cycling after dark and through winter months. Design and management of built environments to cater for a wider range of functional capacities for cycling is needed to counter perceptions that cycling in later life is irresponsible.

New possibilities and challenges for cycling can be presented at the time of changes in routines, roles and resources of everyday life that accompany transitions from work to retirement (either distinct moves into retirement or gradual). Case summaries depicted pathways of development that were both positive and negative. The case of Reginald exemplifies how the loss of a regular commute can be a precarious transition when cycling has been performed exclusively for work travel. This loss of cycling might be addressed by promotional activities which prompt cycle commuters to think about continuation of their cycling beyond retirement. Measures might support adaptive changes by enabling them to diversify their cycling experiences and develop spatial knowledge, contacts and aspirations for cycling.

Retired participants discussed new patterns of time use and the more localised mobility this entailed. Most recognised flexibility, brought about by retirement or downshifting, which allowed them to choose when and where they cycled. There were examples of successful adaptive changes, for example, joining a cycling group or establishing a routine of cycling, which maintained cycling. Some new cycling journeys were established, including trips for part-time work, volunteering and supporting relatives.

Restorative changes were not exclusive to retirement; there were illustrations of people reengaging with cycling in the course of locational changes later in careers (both residential and employment). For Leona an employment change presented a commute journey she felt capable of cycling at a time she felt compelled to address her own physical inactivity at work. The facilities and workplace culture of cycling were salient to her as enablers of this change. Measures to promote cycling as a commute mode should attend to the changing opportunities, constraints and motivations that could arise in mid and later life for cycling. Motivation and possibility of cycling may emerge where demands of parenthood diminish and individual's gain more discretion over travel in later employment careers. Alternatively there could be life developments in which the obstacles to cycling mount, including responsibilities for grandchild or elder care, career progression which entails longer distance travel and health issues which undermine physical capabilities for cycling.

There were frequent examples of the importance of social contacts for later life cycling. For instance, there were a number of participants who had established cycling with another as part of a post working life routine. Those with curtailed or diminished trajectories often felt the lack of someone to cycle with who was conveniently located and had a compatible schedule. Differences in capability and ambitions between partners were sometimes felt to be a hindrance to pursuing shared cycling, whilst travel with non-cycling family members limited cycling for functional trips for regular cycle users. There were both experiences and aspirations for recreational cycling with younger familial generations, although this could be inhibited by logistics of getting bikes and people to a location for cycling. Whilst there were participants whose experiences and expectations for cycling were mostly as a solitary activity, having someone to cycle with came across as a key enabler of current cycling and prospects for cycling. As well as the motivational and social aspects, the presence of another could act as reassurance in case something went wrong.

Enabling adults to forge these contacts for cycling through groups, events and networks can support the continuance and restoration of individual cycling careers as well as supplying visible demonstrations of older groups engaged in cycling. Recognising that local areas can hold increasing importance for daily life in later life, such measures might be more effective if oriented towards residential neighbourhoods than other social spheres, e.g. work environments.

Discussions of current cycling and outlook quite often elicited appraisals of the bike(s) available to them. Some had bought or modified a bike to have a better fitting bicycle or specialised bike. Others were aware that their current bike was a poor fit or not in good condition but were unsure that their level of engagement justified an upgrade. Advice on purchasing and modifying bicycles that is sensitive to the needs and preferences of older adults could support continuance and restoration of cycling. As part of a wider effort to address the socio-economic disparities in cycling there should be targeted measures to address the affordability of upgrading a bicycle for adults in lower income brackets.

## Conclusion

A life course perspective and biographical methods have been engaged to reveal and interpret changes and continuities in engagement with cycling through more advanced stages of life. Disclosed through individual's retrospective reasoning of developmental pathways, this has revealed how cycling has been shaped by the bio-psycho-social processes of ageing in particular through life events and transitions. This contributes knowledge on the pathways through which older adults move into, continue or move out of engagement with cycling. Importantly, this highlights that it would be an oversight for efforts to promote cycling to discount mid and later life adults as a potential market for cycling.

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