



*'Instead of "closing down" at our ages...
we're thinking of exciting and challenging
things to do': older people's
microadventures outdoors on (e-)bikes*

Article

Accepted Version

Spencer, B., Jones, T., Leyland, L.-A., Van Reekum, C. M. and Beale, N. (2019) 'Instead of "closing down" at our ages... we're thinking of exciting and challenging things to do': older people's microadventures outdoors on (e-)bikes. *Journal of Adventure Education and Outdoor Learning*, 19 (2). pp. 124-139. ISSN 1472-9679 doi: <https://doi.org/10.1080/14729679.2018.1558080> Available at <http://centaur.reading.ac.uk/81221/>

It is advisable to refer to the publisher's version if you intend to cite from the work. See [Guidance on citing](#).

To link to this article DOI: <http://dx.doi.org/10.1080/14729679.2018.1558080>

Publisher: Taylor and Francis

All outputs in CentAUR are protected by Intellectual Property Rights law, including copyright law. Copyright and IPR is retained by the creators or other copyright holders. Terms and conditions for use of this material are defined in

the [End User Agreement](#).

www.reading.ac.uk/centaur

CentAUR

Central Archive at the University of Reading

Reading's research outputs online

1 **‘Instead of “closing down” at our ages... we’re thinking of exciting and**
2 **challenging things to do’: Older people’s microadventures outdoors on**
3 **(e-)bikes**

4 Ben Spencer¹, Tim Jones¹, Louise-Ann Leyland², Carien M. van Reekum²
5 and Nick Beale¹

6
7 ¹School of the Built Environment
8 Faculty of Technology, Design and Environment
9 Oxford Brookes University
10 Headington Campus
11 Gipsy Lane
12 Oxford OX3 0BP

13
14 ²School of Psychology and Clinical Language Sciences
15 University of Reading
16 Earley Gate, Whiteknights Campus
17 Reading RG6 6AL¹

18 Corresponding author: Ben Spencer Email: bspencer@brookes.ac.uk Tel: +44 (0)1865
19 484061 ORCID: 0000-0003-4806-8509

20
21 Biographical notes

22
23 Ben Spencer is a Research Fellow at Oxford Brookes University with a background in
24 exploring the links between urban design, health, wellbeing and mobility, particularly
25 from a gerontological perspective. He has experience of mixed-methods research with

¹ Now at Institute of Neurology, Faculty of Brain Sciences, University College London,
Queen Square, London WC1N 3BG

26 an interest in mobile methods applied to walking and cycling. Following his PhD on
27 Playful Public Places for Later Life Ben worked on the RCUK cross-council funded
28 cycle BOOM project on older people's cycling (www.cycleboom.org) before moving
29 on to the ESRC Newton Funded Healthy Urban Mobility project (www.hum-mus.org).

30

31 Tim Jones is Reader in Urban Mobility at the Faculty of Technology Design and
32 Environment at Oxford Brookes University. His work focuses on urban mobility,
33 particularly walking and cycling, and its connection with environmental sustainability,
34 health and wellbeing and social inclusion. He was Principal Investigator of the EPSRC
35 cycle BOOM study Grant No. EP/K037242/1 (2013-2016).

36

37 Louise-Ann Leyland completed her PhD on Visuocognitive Processing in Hemispatial
38 Neglect after Stroke and was a Postdoctoral Research Associate on the cycle BOOM
39 project and Teaching Fellow in the School of Psychology at Reading University. She is
40 now a Postdoctoral Research Associate at the Dementia Research Centre, Institute of
41 Neurology, Faculty of Brain Sciences at University College London.

42

43 Carien van Reekum is Professor of Psychology and Neuroscience at the School of
44 Psychology and Clinical Language Sciences at the University of Reading. Her research
45 examines psychological and brain mechanisms supporting emotion and well-being, with
46 a focus on ageing. As a Co-Investigator of the cycle BOOM study, she was able to
47 pursue her interest in the development of interventions to promote well-being in older
48 age.

49

50 Nick Beale has worked as a research project manager at Oxford Brookes since 2013.
51 Prior to that he had over 15 years' experience working in the private sector, focusing on
52 environmental research and consultancy in the low carbon energy sector.

53

54 This research was part of the cycle BOOM project (www.cycleboom.org), funded by
55 the Engineering and Physical Sciences Research Council (EPSRC;
56 <https://www.epsrc.ac.uk/>) under the UK Research Councils' Lifelong Health and
57 Wellbeing Programme (Grant Number EP/K037242/1). We would like to thank the
58 participants in the cycle BOOM study, the research team and funders.

59

60 No potential conflict of interest was reported by the authors.

61

62 **‘Instead of “closing down” at our ages... we’re thinking of exciting and**
63 **challenging things to do’: Older people’s microadventures outdoors on**
64 **(e-)bikes**

65 This paper explores how people aged 50 and over, who were returning to cycling
66 as part of an eight-week health and wellbeing trial, created their own cycling
67 microadventures. Applying a stage model of the process of adventure to
68 qualitative data generated from personal diaries and focus groups, we examine
69 how older people anticipated and prepared for their microadventures, the
70 challenges and discoveries they experienced, the benefits they gained and how
71 electrically assisted ‘e-bikes’ can provide further opportunities for adventure. We
72 conclude that cycles are a mode uniquely placed to facilitate microadventures and
73 that e-bikes, in particular, offer further potential to enable older people to (re-)
74 connect with place and other people. But, while this type of activity can provide
75 benefits in terms of health and wellbeing, we argue that more supportive physical
76 and social infrastructure is required to provide opportunities for more people to
77 undertake microadventures close to their homes.

78 Keywords: cycling, ageing, microadventure, e-bikes, health and wellbeing

79 **Introduction: Cycling Mobility and Micro-adventures**

80 The UK population is ageing (Office for National Statistics, 2017) prompting
81 concern over the impact on national health and care services. UK Policy makers are
82 seeking ways of encouraging individuals to stay active for longer to enhance quality of
83 later life and reduce end of life morbidity. On the international stage, the World Health
84 Organisation (2015) promotes a ‘healthy ageing’ agenda. This recognises the
85 importance of the interaction between an individual’s physical and mental capacities,
86 their changing functional abilities ‘that enable people to be and to do what they have
87 reason to value’ and their external social and physical environment. This policy
88 suggests ways in which ‘healthy ageing’ can be facilitated across different contexts and
89 policy domains.

90 Mobility is important for older people’s physical and mental health and
91 wellbeing as it can provide autonomy and enjoyment (Harper et al., 2016; Musselwhite,
92 2017; Nordbakke & Schwanen, 2014; Ormerod et al., 2015; Ziegler & Schwanen,
93 2011). Furthermore, exercise and social connections from activities in the outdoors have
94 been identified as having wellbeing benefits for older people including reduction in
95 isolation and depression (Abraham, Sommerhalder, & Abel, 2010; Boyes, 2016; Cutler-
96 Riddick, 2016; Spinney, Scott, & Newbold, 2009; Sugiyama & Thompson, 2007).
97 Cycling is one form of mobility that promotes exercise and access to the outdoors and
98 could support improved health and wellbeing among the older population (Østergaard,
99 Jensen, Overvad, Tjønneland, & Grøntved, 2018; Saelens, Sallis, & Frank, 2003; World
100 Health Organization, 2002). Despite the potential of cycling to improve older people’s
101 mobility less than 1 per cent of people aged 65 and over report cycling in the UK
102 compared to, for example, 9 per cent in Germany (Pucher & Buehler, 2012). Cycling in
103 the UK typically requires sharing the public highway with motor traffic and a
104 demanding sensory information ~~over~~ load that requires, at times, intense concentration.
105 The majority of older people therefore do not contemplate cycling in any form because
106 of fear of traffic danger and an unwillingness to expose themselves to the risk of cycling
107 in traffic (LifeCycle, 2010; World Health Organization, 2002). This means that cycling
108 remains the preserve of a minority of ‘hardened’, typically male, younger and middle-
109 aged cyclists, who have established ‘coping strategies’ to tackle cycling in this
110 environment (Pooley, 2013) or who relish the visceral feelings and risks of riding in
111 these conditions (Fincham, 2007; Larsen, 2014). Other cyclists will vary their route to
112 include different types of spaces which are less complex and demanding, and hence
113 better suited to their capabilities. These often offer greater opportunity to interact with

114 landscape and other people, in contrast to the controlled and ‘anodyne’ experience of
115 travelling by private motorised transport (Jones, 2012).

116 The concept of adventure is contested and difficult to define (Hickman, Stokes,
117 Beard, & Inkster, 2017; Pike & Beames, 2013; Swarbrooke, Beard, Leckie, & Pomfret,
118 2012). Core characteristics of adventure expand from novelty, excitement, daring and
119 risk to include the interdependent and overlapping aspects of uncertainty of outcome,
120 danger, challenge, anticipated rewards, stimulation, escapism and separation,
121 exploration and discovery, absorption and focus and contrasting emotions (Swarbrooke
122 et al., 2012, p. 9). Adventure is subjective and unique to each individual who engages
123 with activities in a physical, intellectual, spiritual and/or emotional way (Swarbrooke et
124 al., 2012, p. 14). Hopkins and Putnam emphasise that ‘adventure can be of the mind and
125 spirit as much as a physical challenge’ (1994, p. 6). Humphreys also advocates a mind-
126 set towards adventure rather than formulaic rules governing what constitutes a
127 legitimate adventure (2014) and advocates ‘microadventures’ (2018) that are ‘short,
128 simple, local, cheap’ as offering the potential to be ‘fun, exciting, challenging,
129 refreshing and rewarding’ (ibid.).

130 Cycling adventures are often considered in the context of extreme challenges,
131 such as endurance events or testing expeditions, often abroad in mountainous regions
132 and typically involving young or middle-aged men. Less consideration is given to the
133 potential for less time and resource intensive cycling microadventures in the local
134 vicinity of the home. Rawles (2013) reflects on her own experiences of cycling and the
135 concept of the microadventure to analyse how local cycling can provide experiences of
136 challenge, exploration, achievement and engagement with people and place locally
137 without the need for the financial resources and physical fitness required for more
138 traditional and carbon-intensive ‘expedition’ type adventures. In the field of outdoor

139 education Roberts argues that microadventures, focussed on the everyday rather than
140 expeditions, can provide more inclusive and sustainable experiences (2018). However,
141 no attention has been given to the potential of cycling microadventures in enhancing
142 older people's mobility, physical and mental health and wellbeing.

143 This article examines how cycling can facilitate microadventures among the
144 older population using data from a large-scale study investigating cycling and
145 wellbeing.

146 **Approach and methods - The cycle BOOM study**

147 The UK Research Council funded cycle BOOM study (2013-2016) sought to
148 understand the mobility, health and wellbeing benefits of cycling among the older
149 population and those approaching older age (Jones, Chatterjee, et al., 2016). Part of the
150 study involved a cycling and wellbeing trial (CWT) to investigate the impact of cycling
151 outdoors on health and wellbeing. This involved 74 participants aged 50 and over², who
152 reported that they had not cycled for at least five years or whose cycling had
153 significantly declined during this period. They cycled at least three times a week for
154 thirty minutes over an 8-week period. This intervention length was chosen as having
155 been successful in improving cognitive and brain function in a meta-analysis of
156 previous studies (Colcombe & Kramer, 2003). Participants also took part in cognitive
157 tests and well-being measures before and after the trial and recorded their experiences
158 throughout the trial in a diary – see Leyland et al. (2018, under review) for more details
159 of well-being measures and the results of cognitive tests. Potential participants

² Conceptions of old age vary between different societies and disciplines. The uniqueness of individual experience over the life course, the effect on ageing and the resulting heterogeneity of older people is widely recognised, see for example (World Health Organization, 2015), however, those in older age are often identified chronologically, starting at 50 or 65 years. A starting point of 50 years was used to enable understanding of how our participants approached and planned for older age.

160 responded to advertisements in the local press and flyers posted at shopping and
161 community centres in the Oxford and Reading areas. Prospective participants were
162 asked to complete a short screening questionnaire that was used to ensure that the final
163 selection of participants represented a balance of sexes, broadly equal age categories
164 (50-59, 60-69 and 70+), represented different socio-economic backgrounds and that
165 they resided in a mix of urban and rural locations. The 74 participants who were
166 selected and agreed to take part were between 50 and 83 years of age (mean age of
167 pedal cyclists 63 years, e-bike cyclists 62 years) and from a range of backgrounds and
168 locations.

169 All prospective participants first had to undertake a cycle training assessment
170 and skill development programme with an accredited cycle trainer to ensure that they
171 were capable of cycling safely on the public highway. Upon satisfactory completion,
172 participants were then loaned an electrically assisted 'e-bike' (n=38) or were supported
173 in the purchase a conventional pedal cycle or the maintenance of their own (n=36).
174 Raleigh e-bikes were used that were powered by a battery linked to an electric motor in
175 the bicycle transmission system. This type of e-bike requires the rider to pedal to
176 receive assistance and the level of power assistance is regulated by using a handlebar
177 mounted computer display panel and controller (Jones, Harms, & Heinen, 2016).

178 Prior to starting the trial, participants took part in a semi-structured biographical
179 interview (Chatterjee, Sherwin, & Jain, 2013; Lanzendorf, 2010) of approximately one
180 hour to understand their engagement with cycling throughout their life. Participants
181 prepared for the interview by completing a life history grid which identified key themes
182 across their life course (Harrison, Veeck, & Gentry, 2011). This included residential
183 locations, family structure, transport modes and leisure activities. This approach was
184 used to help participants 'anchor' cycling activity against key life course episodes. The

185 participants were then issued with a Diary of Cycling Experience (DoCE) and asked to
 186 complete it after every cycling activity. This recorded basic journey characteristics
 187 including type, frequency and duration (see Figure 1) and they were also asked to write
 188 briefly about their experience. At the end of each week they were invited to provide
 189 further reflections/physical in written format (or even photographs and sketches) to enable more
 190 extensive, emotional and embodied qualitative data to be generated (Jacelon & Imperio,
 191 2005; Milligan, Bingley, & Gatrell, 2005).

Week beginning (date/month):
 Monday 1 / SEPT

WEEK 3

	1: Cycling/physical activity description <small>Please give brief description</small>	2: Start time <small>Write in to nearest minute</small>	3: End time <small>Write in to nearest minute</small>	4: Level of intensity <small>M=Moderate V=Vigorous</small>	5: Purpose <small>P=Practical R=Recreation</small>	6: (If a journey) From <small>Write in street name and area</small>	7: (If a journey) To <small>Write in street name and area</small>	8: (If cycling) Cycle used <small>P=Pedal E=E-bike</small>	9: (If e-bike) Proportion of time in each power setting <small>Insert per cent (%)</small>					10: Personal reflection on cycling/physical activity <small>How did you feel? What was good/hot so good? Were you alone or with others?</small>	
									Off	Eco	Tour	Sport	Turbo		
MON 1 56 FT.	WALKING.	15-00	16-30	M	P	OX14 BXT									DO NOT ENJOY WALKING AT THIS TIME BUT FEEL I WANT TO CHANGE. WIFE TO IMPROVE BY DOING MORE BUT SO SEEM COMPARED WITH CYCLING ALONE. ABOUT 20-3 MILES.
TUES 2	CYCLING (ride 1) CYCLING (ride 2)	09-48 18-48	11-07 19-24	M M	R R	OX14 BXT OX14 BXT		R	0	0	75	24	1	SWIMMING MARKING. GOOD TO BE OUT. SUPER RIDE ALONE WITH GILL WHO WANTED RIDE WITH ANKLE FOOT OK. START FEEL BUT FLAT AND	
WED 3 CONT. USE OTHER	SWIMMING (OUTDOOR) CYCLING.	14-30 16-14	15-05 17-01	M V	R R	HINSEY OUTDOOR POOL OXFORD								RELAXING, NOT SEVERAL FRIENDS NOT SEEN RECENTLY	
THU 4	BADMINTON CYCLING.	10-00 15-15	12-00 16-45	V M	R P	HINSEY OUTDOOR POOL OXFORD OX14 BXT		R	0	0	0	99	1	RETURN ROUTE HOME VIA THAMES PATH TO LANDFORD. BETTER THAN BRING ROUTE EVEN ACROSS WEAVER TRACKS SEE UNDER	
FRI 5	CYCLING PICKLEBALL	09-25 19-30	13-26 21-45	V V	R R	OX14 BXT		R	1	99	0	0	0	BUT GROUP OF 2 THIS WEEK - ALL GOT SOME GOOD GAMES. PUNISH. CAN ONLY THINK ANYONE WOULD USE THIS BEAR COOL UNDER THEM WANTED TO DO MOST OF THE WORK. SLOWEST RIDE.	
SAT 6	NO ACTIVITY														WITH GILL WHO CAN GO FASTER THAN ME. BY RIVER LEGS TIED AT END ONLY PLAYED FOR 1 HOUR IN SESSION. RIDE TO INFLUX OF NEW PLAYERS. TOO MUCH STANDING OUT TIME. LIKE MORE ACTION.
SUN 7	CYCLING (ride 1) CYCLING (ride 2) SWIMMING (OUTDOOR)	10-16 14-01 15-40	12-32 16-37 16-00	M V M	R R R	OX14 BXT OX14 BXT HINSEY POOL OXFORD		R	0	0	100	0	0	ONLY 25 MINS CYCLING IN THIS PERIOD MAINLY PUNISHING THROUGH GATE. HR. IS 18 MINS ONCE IN TWO WHEELS. REMEMBERED AT HINSEY POOL BEFORE SWIMMING BUT REST E SUNBATHING (14-30-17-02)	

8 | DIARY OF CYCLING EXPERIENCE

192

193 Figure 1: Example of completed cycling and wellbeing trial Diary of Cycling
 194 Experience (DoCE)

195
 196 A total of 70 participants completed basic information about their journeys and
 197 62 also wrote in more extensive accounts of their experience and several also included
 198 photographs and sketches. Shortly after completing the trial, 9 pedal cycle and 7 e-bike
 199 participants were invited to take part in two separate (audio-recorded) focus group

200 discussions to explore their experiences. All participants were also invited to complete
 201 an online exit survey following the CWT, this was completed by 73 of the group.

No. of Pedal cyclists (mean age standard deviation proportion female)	36 (63yrs 7.47 55%)
No. of E-bike users (mean age standard deviation proportion female)	38 (62yrs 7.00 53%)
Total pedal and e-bike participants (mean age standard deviation proportion female)	74 (62yrs 7.21 54%)
No. of Diary of Cycling Experience basic data completed	70
No. of Diary of Cycling Experience detailed accounts	62
No. of Focus group participants (of which e-bike trial participants)	16 (7)
Total online 'exit survey' responses	73

202

203 Table 1: Summary of participation in the cycling and wellbeing trial

204

205 The research did not stipulate where, when or with whom this cycling should
 206 take place to provide participants with the opportunity to engage with whatever cycling
 207 they wished. The CWT took place on a rolling basis from August 2014 to December
 208 2015 and therefore provided seasonal contrast. Ethical approval was obtained from the
 209 University of Reading Research Ethics Committee (Registration No: 14/31) and Oxford
 210 Brookes University (Registration No: 140813). Participant names have all been
 211 anonymised.

212 The following section provides results from a thematic analysis (Braun &
 213 Clarke, 2006) of participants' diaries, the focus group discussions and exit survey.
 214 Analysis was undertaken by immersion in the data by transcribing the text from the
 215 DoCEs, focus groups and exit survey into word documents. These were read repeatedly
 216 by two researchers on the team and coded against themes. The results of this coding
 217 were then summarised by theme and agreed by all authors.

218 The themes were based on the sequence of stages constituting the 'process of
 219 engagement in adventure' devised by Swarbrooke et al. (2012, p. 15). These four stages

220 are, firstly, *anticipation and preparation*, which includes consideration of dangers and
221 rewards and the development of appropriate skills; secondly, *challenge*, where skills are
222 applied; thirdly, *discovery*, including development and learning from the experience and
223 finally, *benefit*. These stages provide a simple framework which can be applied to a
224 wide variety of adventure experiences unlike, for example, Walsh and Golins' (1976)
225 more tightly focussed Outward Bound Process or subsequent derivatives (such as
226 McKenzie, 2003) which relate to educationally orientated organised activities.

227 In the case of the cycle BOOM CWT there was a good fit between the
228 Swarbrooke et al model and participant's consideration of whether to commit to taking
229 part in the trial, the training provided and other personal preparation, the flexible nature
230 of the experiences and the potential health and wellbeing benefits explicitly framed as
231 an aspect of the trial to be studied.

232 Swarbrooke et al differentiate their stages of the process of adventure from the
233 characteristics and qualities of adventure, such as novelty, risk and uncertainty which
234 can take place at different stages and can vary in importance depending on the particular
235 nature of the adventure. In the analysis presented below the stage of *challenge* has been
236 separated into *external challenges* provided by the physical and social environment and
237 *personal challenges* that participants had developed in relation to their cycling. This
238 differentiates two distinct types of challenge that were evident in the data.

239

240 **Findings**

241 *The experience of the trial as microadventures*

242 Analysis of diaries revealed that participants mainly used pedal cycles and e-
243 bikes for recreation in green spaces away from traffic or on quiet roads. Most rides
244 started and ended at the participant's home and involved their immediate surroundings.

245 A few participants did take their bikes in the car or on the train to cycle in locations
246 further afield, but this was exceptional.

247 *Anticipation and preparation*

248 Participants reported being motivated to take part in the CWT because it offered
249 a structured programme that could support their transition back into cycling for personal
250 fitness and to lose weight; for rehabilitation after an illness; to ride socially with friends,
251 a partner or grandchildren; or a combination of reasons (Jones, Chatterjee, et al., 2016).
252 These show similarities with older people's motivations for engaging with outdoor
253 activities more generally (Sugerman, 2003) but anticipation of their cycling as a form of
254 adventure was not made explicit at this stage.

255 The cycle training assessment and skill development programme was reported as
256 helping participants to (re)gain confidence cycling. They were described as 'excellent in
257 giving me confidence to safely get back on a bike again' (Anonymous response to the
258 Exit Survey). Even those who had a long previous history of cycling and who regarded
259 themselves as experienced cyclists found the sessions provided useful new information
260 and skills. For example, Colline³ stated that it 'completely changed the way I cycled,
261 very different to cycling proficiency [undertaken when young], found it valuable, I was
262 terrified of Oxford traffic and it did help to an extent' (Female, 65, e-bike user, Oxford).

263 Many participants performed some kind of 'desk-based' route planning in
264 advance of starting to cycle. Some participants identified that this process started when
265 as soon as they knew they had been selected for the trial. Henry (Male, 62, pedal cyclist,
266 Reading) explained how 'I always know roughly where I'm going before I set off... I

³ Pseudonyms have been used for all participants.

267 used opencyclemaps.com [sic] (sometimes) to see cycle routes and footpaths before
268 riding; or deciding where to go. I combine this with Google maps.’

269 Participants often started by carrying out shorter rides in familiar areas close to
270 home accompanied by a partner or friend and then used this to prepare to ride longer
271 distances in different or more challenging environments. Aveline (Female, 64, e-bike
272 user, Reading) reported how she ‘Spent [first] week getting used to [e-]bike. Receiving
273 instruction from my husband.’

274 Common among participants was the arrangement or purchase of equipment to
275 facilitate cycling often at the start of the trial. Raymund described how the first week
276 ‘took quite a lot of preparation – with not only cycling clothes – but also the safety gear
277 – (high vis waistcoat – reflective cross belt – helmet)’ (Male, 83, pedal cyclist,
278 Reading). Other participants added equipment as they gained experience of what was
279 useful to them. In her fifth week of cycling, Nikki for example, explained how she had
280 made a significant investment in a ‘new jacket, mirror, puncture kit, inner tube – over
281 £100!’ (Female, 67, pedal cyclist, Oxford). Some participants were also inspired to
282 purchase new bikes after discovering that their current cycles no longer suited their
283 needs.

284 *External challenges*

285 The physical and social environment provided what might be termed ‘external
286 challenges’ for participants in different measure. In meeting these challenges, the level
287 of engagement in the trial followed one of three clear trajectories: first, there were those
288 that *embraced* the trial and rode more than the requested three sessions of 30 minutes
289 per week; second, there were those that *endured* the trial and struggled to complete the
290 requisite amount of hours because of competing interests/time pressure, family
291 commitments, poor weather, health issues (particularly colds and flu) and minor

292 interruptions such as mechanical issues and punctures; and third, there were those that
293 *exited* the trial (n=12) before completion because of the onset of a medical condition
294 (n=5); because they no longer had the time to take part (n=6); or in a single case,
295 because the participant continued to lack confidence in cycling (Jones, Chatterjee, et al.,
296 2016).

297 Participants that embraced the trial reported that the structured programme had
298 motivated them to maintain their cycling in the face of poor weather, time pressures and
299 technical difficulties. For example, Colline stated ‘I used the bike this week for local
300 errands and had to force myself out at the end of the week as the weather was very wet
301 and windy. Not good cycling weather.’ (Female, 65, e-bike user, Oxford). For some, the
302 experience of getting into the outdoors was not as bad as they had anticipated. Mo
303 explained that for him ‘As the weather is turning colder now it is becoming increasingly
304 difficult to go out on the bike. However, when I do I always feel the benefit.’ (Male, 57,
305 e-bike user, Reading) and Crystal ‘Quite a heavy drizzle when I set off, but it was fine.
306 Glad I did it.’ (Female, 52, pedal cyclist, Oxford). However, most participants, even
307 among those that embraced the trial, identified themselves as fair weather cyclists who
308 were not keen to ride in cold, wet or windy weather and sought to organise their cycling
309 to coincide with better weather whenever they could.

310 Apart from the unpredictable British weather, the key challenge for both pedal
311 and e-bike users was poor quality ‘cycle infrastructure’ and lack of protection from
312 motor traffic. Most participants found cycling near traffic a significant challenge,
313 particularly along busy main roads and in urban centres. Purpose-built cycle
314 infrastructure on such roads was generally regarded as insufficient, being narrow,
315 inconsistent and poorly maintained. Even in Oxford, which has claimed the status of a
316 ‘Cycling City’ since 2012 (Oxford City Council, 2017) and which boasts the UK’s

317 second highest levels of cycling. Brandon (Male, 70, e-bike user, Oxford) summarised
318 the problems for people returning to cycling, ‘infrastructure, most obvious thing, if you
319 haven't cycled for a while, how poor the conditions are for cyclists in terms of
320 availability of cycle paths etc.’ Drivers were also reported to be unsympathetic to
321 cyclist’s safety, for example, Mo stated that he was

322 Feeling rather frustrated at the way that some car drivers treat cyclists. I was nearly
323 knocked off twice on Wednesday. Both times at roundabouts where cars don’t give
324 cyclists priority to the right. Cycling in Reading I am afraid is rather dangerous. I
325 need to find a quieter area with proper cycle paths. (Male, 57, e-bike user,
326 Reading).

327 Negative experience of interacting with vehicles led to some participants
328 planning routes ahead to avoid traffic, using quiet residential streets and paths through
329 green spaces and along waterways, Daphne summarised this approach as discovering
330 ‘towpath good, road bad!’ (Female, 67, e-bike user, Reading).

331 As many of the participants grew in confidence they felt better able to ride in
332 traffic, but many avoided it wherever possible due to it being too frightening. Reflecting
333 on her experience at the end of the trial Livy said, ‘I wouldn’t say “never again” I’d still
334 hire a bike in a traffic-free area... but on-road cycling isn't for me’ (Female, 51, e-bike
335 user, Oxford). Local cycling was therefore difficult for her due to the ‘obstacle of
336 getting out of Oxford [and the] convoluted way needed to get to places for pleasant
337 cycling. [I] want to pick my bike up and throw it about 20 miles somewhere else, [I]
338 feel imprisoned in Oxford on the bike’. To overcome this issue and to expand their
339 potential cycling environments some participants had put their bikes in cars or on trains
340 to reach other destinations, although this wasn’t always easy to do.

341 Purpose-built shared pedestrian and cycle paths away from motor traffic were
342 appreciated, such as parts of the National Cycle Network (Sustrans, 2017). However,

343 even here, participants recounted difficulties knowing where they should cycle and that
344 this led to problems interacting with pedestrians in places because of poor legibility.
345 Signage also made way-finding difficult leading to unexpected and unwanted
346 microadventures, Darren reported ‘Cycle Route 5 is not particularly well-sign-posted.
347 Just after Iffley Lock I missed a turn and instead followed the riverside footpath to
348 Sandford Lock. Given recent rain this proved an unfortunate choice’ (Male, 66, pedal
349 cyclist, Oxford).

350 Other issues included the quality of cycle track surfaces, difficulty negotiating
351 barriers, junctions, steps, bridges and gates along paths separated from traffic that
352 required participants to stop and dismount and therefore hindered smooth riding. This
353 was both in rural and urban contexts, Venita described how in Oxford, ‘Sustrans Route
354 5 good, goes past my door, bits of it in poor repair, not that old’ (Female, 60, pedal
355 cyclist, Oxford) and Theodora made the point that cycle tracks should be ‘maintained,
356 glass swept, overhanging branches removed’ (Female, 73, pedal cyclist, Oxford). Some,
357 such as Marti, went as far as to say that ‘dedicated and shared cycle routes are worse
358 than the roads, not maintained’ (Female, 53, pedal cyclist, Oxford).

359 Several participants reported falling off their bikes and experiencing minor
360 physical injuries as Aurelia’s testified, ‘Bruised and grazed elbow and knee. Bruised
361 ego!’ (Female, 58, e-bike user, Reading). However, a few injuries were more severe.
362 One participant, Victoria, damaged her knee and required a check-up in hospital
363 (Female, 68, e-bike user, Oxford) and Cary required stitches (Male, 66, pedal cyclist,
364 Reading). All had the motivation to continue with the trial although it was not always
365 clear whether this was a commitment to completing the research or a strong enough
366 desire to keep cycling. Some did report varying levels of confidence afterwards. Crystal
367 reported ‘Really nervous after my fall on Sunday. Seat feels too low.’ (Female, 52,

368 pedal cyclist, Oxford) and two weeks later she updated ‘Did the required 1.5 hours but
369 did not feel like doing anymore. My confidence is very low after my fall’.

370 Those using e-bikes reported the sheer enjoyment and thrill of their cycling, for
371 example, Padraic exclaimed ‘I’m enjoying the e-bike – it is really good fun’ (Male, 59,
372 e-bike user, Reading). E-bike users also found that they could overcome some of the
373 challenges of riding pedal cycles. Many explained how power assist allowed them to
374 cope with physical ailments that made ordinary pedal cycling more challenging, Aline
375 ‘Suffered last week from painful right knee ... so using more power, which definitely
376 seems to help.’ (Female, 67, e-bike user, Oxford). Some felt that they got more out of
377 their cycling by being able to go further on an e-bike with the same effort, Sophey
378 explained ‘I’m going a lot further already than would have done on bike so “same
379 amount of exercise but more pleasure” because [I’m] going further than my usual
380 boundaries’ (Female, 59, e-bike user, Oxford). However, in some cases the additional
381 weight and high centre of gravity was reported as being a disadvantage of e-bikes due to
382 its lack of manoeuvrability in relation to steps and other barriers, the additional
383 challenge of lifting it into a car for transport, turning it upside down to undertake repairs
384 and a danger of it toppling over when stationary.

385 Logistical challenges included the lack of time available for cycling, for
386 example, work, volunteering and/or care responsibilities meant time was constrained,
387 Sophey revealed: ‘Another week of working 7 days so not able to go exploring on the
388 bike as I’d hope to when I started this trial.’ (Female, 59, e-bike user, Oxford). Other
389 challenges included having to organise cycling related ‘paraphernalia’ typically locks
390 and lights and additional gear during the winter such as gloves and extra layers (and
391 even tissues for runny noses!)

392 *Personal challenges*

393 Participants described specific personal challenges that they had developed
394 relating to their cycling. These were sometimes based on geography, for example,
395 accessing places. Venita described how ‘I fulfilled a long-held challenge and cycled
396 from Church Hanborough into Oxford and back.’ (Female, 60, pedal cyclist, Oxford)
397 whereas for Fran it was topography ‘When I am in Oxford I have started to give myself
398 a few challenges such as including a few steep hills that for me are relatively steep
399 certainly get me out of breath and heart racing’ (Female, 61, pedal cyclist, Oxford).
400 These were often qualified, recognising personal capabilities, Nikki reflected, ‘A big
401 achievement for me, not much for others! Found going there [Charney Bassett] good,
402 coming back (against the wind) harder and legs ache now!’ (Female, 67, pedal cyclist,
403 Oxford). Some, such as Harvey, surprised themselves with their accomplishments

404 I needed to go to Abingdon - normally a car journey. Instead, as the weather was
405 nice, I decided to cycle. I used a route via Kennington to avoid traffic. On the
406 return journey I used a lot of electric power as I was quite tired. It was good
407 exercise and I felt that I'd really accomplished something. If you'd suggested this to
408 me a year ago I'd have dismissed the possibility of cycling this distance out of
409 hand. (Male, 62, e-bike user, Oxford).

410 *Discovery*

411 Both pedal cyclists and e-bikers reported enjoying the freedom to discover new routes
412 and destinations in their local area and beyond. Sometimes exploration was part of a
413 leisure activity, for example, Alysia related how ‘I feel that the electric bike has enabled
414 us [husband and I] to make journeys that we might not otherwise have done and get out
415 enjoying the countryside.’ (Female, 51, e-bike user, Oxford) going on to explain

416 The ride I did on Sunday [from home] was perhaps the most enjoyable I've done so
417 far – very few cars and glorious clear skies and beautiful fields, hedgerows and
418 villages. I even found a previously unknown to me nature reserve!

419 Colline described how she ventured into her local area on her e-bike and 'Went
420 exploring! Trying to discover ways around Oxford avoiding main roads. Some on
421 tracks. Had to push for a short distance. Windy but enjoyable/exhilarating!' (Female,
422 65, e-bike user, Oxford). While Nikki (Female, 67, pedal cyclist, Oxford) went out on
423 her pedal bike and 'Found new routes which was fun... Made an effort to go faster and
424 enjoyed it and took long route back... with husband... energising... enjoyed exploring
425 [but] got muddy.' Ulrick's attempts to explore were stymied on occasion but led to the
426 discovery of other places: 'Seeking routes to Sunningwell and thr' Radley College but
427 thwarted by stiles, steps and gates. Changed plan and explored Abingdon.' (Male, 83, e-
428 bike user, Oxford). In his diary he noted surprising discoveries, including photographs
429 such as Figure 2.

430



432

433 Figure 2: 'Milton Manor: came across this house unexpectedly' (Participant photograph,
434 Ulrick (Male, 83, e-bike user, Oxford))

435

436 On other occasions Ulrick and his partner enjoyed more structured exploration,
437 such as using their e-bikes to access properties taking part in the annual Oxford Open
438 Doors event (see Figure 3).



439

440

Figure 3: ‘Oriel College: The Oxford Open Doors Weekend was very enjoyable.

441

Our bikes were invaluable for seeing as many venues as we could fit in.’ (Participant

442

photograph, Ulrick’s partner (Female, 78, e-bike user, Oxford))

443

444

Going further afield Fran took her pedal bike with her to the Midlands and found

445

it was ‘Good to try new roads in a different area – cycling in country meant much less

446

traffic.’ (Female, 61, pedal cyclist, Oxford). After a subsequent trip to the Brecon

447

Beacons she reflected ‘When we are away [from home, with husband] – exploring new

448

less crowded parts of the country is a joy (and escape from the family).’ Familiar,

449

functional journeys could also involve an element of exploration, Stacey described how

450

she ‘Went to post letters and extended to local exploration.’ (Female, 64, pedal cyclist,

451

Oxford).

452

The experience of freedom and discovery provided some participants with a

453

‘Strong sense of nostalgia – makes me feel young again.’ (Henry, male, 62, pedal

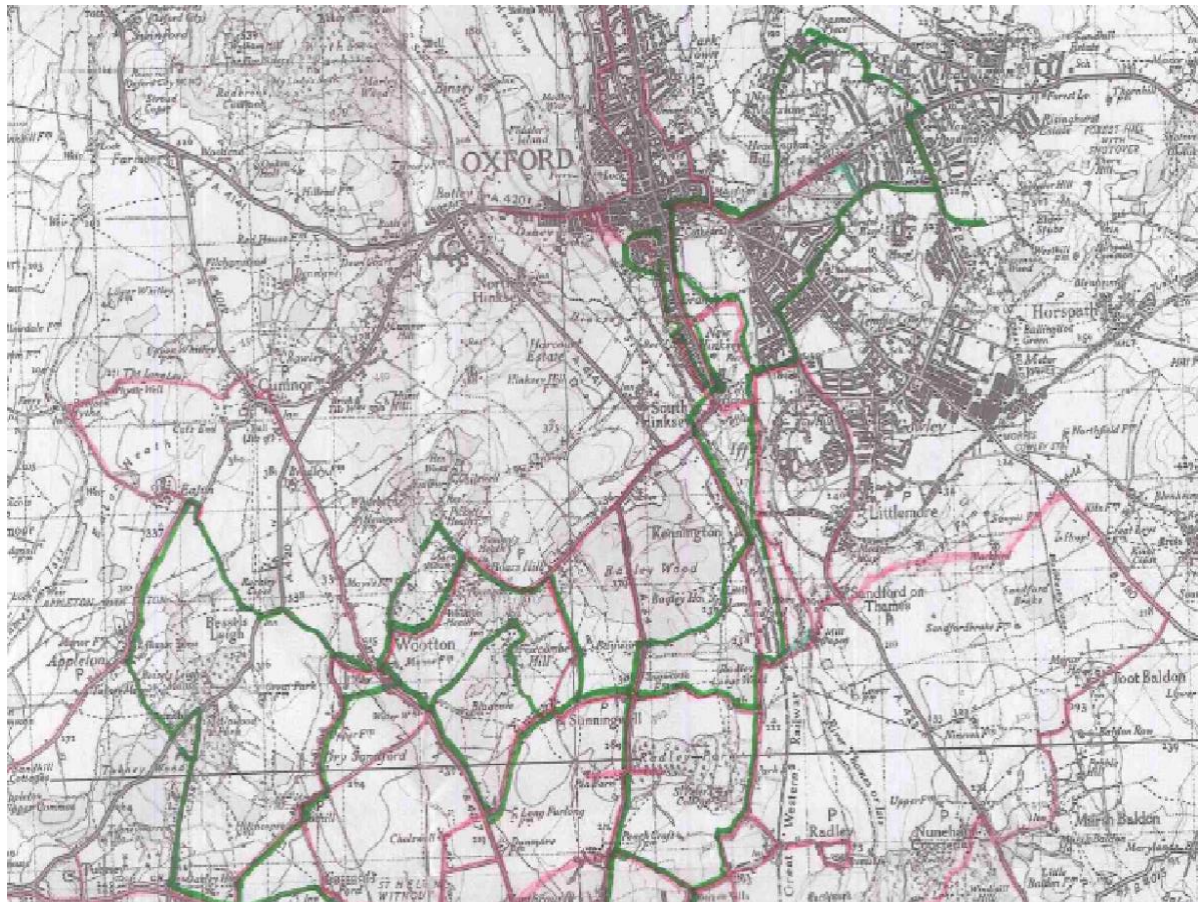
454 cyclist, Reading). This chimed with the many recollections of a sense of freedom and
455 adventure when cycling in their youth which were reported in the initial biographical
456 interviews and have been reported elsewhere (Underwood, Handy, Paterniti, & Lee,
457 2014).

458 Cycling was specifically identified by some as a better mode than walking or car
459 for exploring, Colline described how she

460 went exploring locally, where [I] had driven past side roads and wondered where it
461 went, don't do it in the car as ridiculous, don't on foot because if you can't get
462 through [you] have to turn back, perfect on a bike, go exploring all over, really
463 enjoyed that, got to know where side roads go (Female, 65, e-bike user, Oxford)

464 Many other participants also reported discovering footpaths, tow paths and other
465 routes away from the road system that were new to them.

466 In some cases, exploration was less opportunistic and more systematic. During
467 the e-bike focus group Ulricks' partner explained how she 'marked rides on a map and
468 tried to fill in gaps where I hadn't been and it is amazing the little places you can find,
469 all the tracks, minor roads, you can link through, take different routes' (Female, 78, e-
470 bike user, Oxford, see Figure 4). In contrast when on his own Ulrick would also
471 undertake an 'Abingdon mystery tour. Interesting, meandering ride seeing areas not
472 visited before' (Male, 83, e-bike user, Oxford).



473

474 Figure 4: Cycling routes recorded by hand Ulrick (Male, 83, e-bike user, Oxford)

475

476 Participants also made reconnaissance journeys by bike in preparation for
 477 undertaking anticipated journeys. For example, in advance of an appointment Val
 478 reported ‘Checking out easy route to Kidlington! First lane too muddy. Knee sore at end
 479 and started to rain but on return found the route without mud.’ (Female, 59, pedal
 480 cyclist, Oxford).

481 As already highlighted, the e-bike also allowed riders to cover more distance in
 482 less time thereby extending their range. This enabled some riders to reconnect with
 483 cherished places, Ulrick explained that ‘We had been places on pedal bikes in past,
 484 lovely to be able to go again, do the distances... [we] would have struggled on ordinary
 485 bikes’ (Male, 83, e-bike user, Oxford).

486 E-bikes also gave participants confidence that they could return home from
487 longer journeys without running out of energy. Ulrick went on to describe how the e-
488 bikes used by him and his partner

489 Enabled us to venture out further, much further and easier than, you know, we
490 would have done otherwise [we] knew when went to Wallingford [we had] a bit of
491 assistance to help coming back, don't think, 'oh I've got 12 miles of slog to get
492 back home', always [provides a] back-up with us. (Male, 83, e-bike user,
493 Oxford).

494 Participants also appreciated the ability to engage more directly with the
495 landscape. 'I enjoy cycling and experiencing the sounds and smells of being outdoors.
496 Luckily we have had a very mild autumn so far which has made being outside very
497 pleasant.' (Alysia, female, 51, e-bike user, Oxford). Often participants would pick out
498 particular aspects of nature that they discovered, 'Nice to be back on the bike again
499 mostly away from traffic...pleasant to ride, rabbits and daffodils on way!' (Sophey,
500 female, 59, e-bike user, Oxford). 'Nice ride to Northleigh. Lots of trees so lots of leaves
501 blowing down as I passed, beginning to seem a bit more like autumn.' (Val, female, 59,
502 pedal cyclist, Oxford), 'Saw a Muntjac deer!' (Veronica, female, 62, pedal cyclist,
503 Oxford). For some their explorations involved a combination of social and natural
504 encounters which they appreciated, Alisha described how she

505 explore[d] part of the towpath I had not been on before. All the cyclists I saw said
506 'hello' or acknowledged me with a nod – made me feel good – as did dog
507 walkers... Saw lots of wildlife, including swans landing on the river, which always
508 makes me smile. Lots of blossom, lots of spring flowers at the lock garden.
509 (Female, 53, pedal cyclist, Reading)

510 *Benefits*

511 The cycling experience reported by both pedal and e-bike participants during the trial

512 was positive overall⁴. The two groups of pedal and e-bike participants that completed
513 the 8-week trial differed slightly in terms of the time spent cycling with e-bikers riding
514 for an average of 2.4 hours a week and pedal cyclists 2.1 hours. Both e-bikers and pedal
515 cyclists reported getting healthy exercise outdoors and a feeling that (e)cycling was
516 contributing to personal health and wellbeing. This included weight loss, increased
517 fitness, improved leg strength and endurance, better sleep and improved self-esteem.
518 Some were explicit about the wellbeing benefits that this type of experience provided,
519 ‘On Sunday I took the bike out for the afternoon to cheer myself up. Gloomy day but
520 the countryside around is lovely so felt better when I came back!’ (Alysia, female, 51,
521 e-bike user, Oxford).

522 Overall participants were very positive about the physical benefits of cycling,
523 Marti (Female, 53, pedal cyclist, Oxford) was typical in commenting on the effects of
524 cycling on her body, ‘Could feel previous cycling in my legs and felt good for
525 exercising... Feel definitely fitter for cycling - feels easier than at the start.’ Participants
526 also contrasted the experience of being outdoors with indoor exercise ‘it's not difficult
527 to find a pleasant 30-minute route and it certainly beats 30 minutes on the cross-trainer!’
528 Darren (Male, 66, pedal cyclist, Oxford) and ‘Think that cycling at the gym is helping
529 with stamina a bit - but it's not so much fun.’ (Venita, female, 60, pedal cyclist, Oxford).

530 Some were concerned about over-stressing their systems, Byran explains in
531 week five that ‘I am not particularly motivated to push my physical limit more than I
532 already do – I take identification with me in case of heart attack or stroke – strangely I
533 am unconcerned about any other accident.’ (Male, 69, pedal cyclist, Reading).

⁴ Twelve videos of participants, summarising and reflecting on their experience of using e-bikes and pedal cycles during the trial are available at <https://www.cycleboom.org/video/>.

534 Having engaged in the study, there was a sense of achievement and satisfaction
535 in written narratives from both the pedal and e-bike groups. Participants reported that by
536 maintaining their activity over the eight weeks they had gained confidence and skills.
537 For example, Binky felt ‘Brilliant & thrilled!’ because she never imagined she could
538 ride as far as she did. She explained ‘When [the cycle trainer] initiated me on the bike
539 he said, ‘You could go to Henley and I fell about – ‘dream on!’ So today I decided to go
540 and try it! Hooray, did it all no problem’ (Female, 65, e-bike user, Reading). During the
541 eight weeks Fran ‘Extended the ride to almost 45 minutes – great sense of
542 achievement.’ (Female, 61, pedal cyclist, Oxford).

543 Many enjoyed the company of others but some preferred cycling alone. For
544 example, Vassily explained that ‘I always cycle alone. Depending on the conditions I
545 try to travel at 14-15 mph.’ (Male, 68, pedal cyclist, Oxford) and Fran, stated that ‘All
546 my rides were done on my own but for me that added to pleasure - time to ponder and
547 reflect as I went along and no pressure to 'keep up' with anyone.’ (Female, 61, pedal
548 cyclist, Oxford). Whereas Venita enjoyed the social experience and motivation of
549 cycling with her peers

550

551 On Sunday I went on a lovely bike ride with friends from Church Hanborough, this is
552 the third we have done in about the last 6 months. It's my second outing on my new
553 bike which I am really enjoying... actually the hill was much shorter than in my
554 memory and having companions made it much easier.’ (Female, 60, pedal cyclist,
555 Oxford).

556

557 Others enjoyed both, including intergenerational cycling, Nikki explained that
558 she enjoyed the ‘Variety of cycling both on my own and with family (grandson and

559 husband) ... Beautiful and good fun ... I like both but prefer company.' (Female, 67,
560 pedal cyclist, Oxford).

561 The e-bike was seen as particularly beneficial in providing opportunities to ride
562 with a more agile partner or friend. For example, Ulrick and his partner had been
563 struggling to enjoy shared walks due to variations in their relative speed whereas they
564 could cycle together at a similar pace.

565 Participants reflected on the different experiences they had of cycling in contrast
566 to walking. In addition to the earlier comments on the particular suitability of bikes for
567 exploring, triallists such as Stacey (Female, 64, pedal cyclist, Reading) emphasised the
568 'opportunity to cycle around and cover ground more quickly with breeze in hair!' and
569 Henry (Male, 62, pedal cyclist, Reading) found himself 'Surprised at how quickly I
570 arrived compared to walking.' Along with the benefit of being able to transport loads
571 easily 'Carried 10kg of ride in backpack on way back!' A couple of weeks into his e-
572 bike trial Ulrick, who had a knee problem, reported 'Didn't enjoy walk; longed for
573 bike.' The following week 'Do not enjoy walking at present. But feel I must do some.
574 Hope to improve by doing more but so slow compared to cycling' (Male, 83, e-bike
575 user, Oxford). Whereas Veronica found cycling less meditative

576 I have always found walking a great aid to problem solving/creative thinking. It
577 can be anything – what to cook and how to adapt a recipe; a problem with a
578 painting e.g. composition, final touches; how to write a tricky email. Cycling on
579 the other hand doesn't serve the same function – perhaps there's too much to
580 concentrate on! (Female, 62, pedal cyclist, Oxford).

581
582 Bikes were seen as preferable to using vehicles in some circumstances 'One ride
583 I did to my piano lesson was particularly nice as it went through countryside and was in
584 fact quicker than driving (and much pleasanter)' (Alysia, female, 51, e-bike user,

585 Oxford). Alisha noted that ‘it's much easier to see the Victorian Architectural details on
586 the houses by bike. You miss so much by being enclosed in a box on wheels.’ (Female,
587 53, pedal cyclist, Reading).

588 **Discussion**

589 The CWT provided the opportunity for participants to engage in a series of
590 cycling experiences of their own choosing. While a small number exited the trial or
591 struggled to endure it despite problems with health, time availability and technical
592 issues the majority embraced the chance to cycle and to take part in shaping their own
593 microadventures. The previous section has provided an overview of the cycling
594 experiences of participants in the CWT structured using Swarbrooke et al.’s (2012)
595 stages of the process of adventure. This has proved to be a useful framework to
596 understand participants’ entire experience. Participants built up skills and confidence
597 throughout the eight weeks. They particularly appreciated the preparation provided by
598 the initial assessment and training but then continued to expand their cycling in terms of
599 distances travelled, environments encountered and physical challenges. In some cases,
600 preparation involved the use of advice and/or mapping to anticipate and negotiate
601 unwelcome challenges.

602 Cycling was reported by the participants to be a mode uniquely placed to
603 facilitate exploration – providing greater flexibility than motorised vehicles in terms of
604 size, manoeuvrability and access to narrow or restricted rights of way but less of a
605 physical and time commitment than walking. This supports and extends the
606 identification of freedom of interactions with the spatial and social environment when
607 cycling (Brömmelstroet, Nikolaeva, Glaser, Nicolaisen, & Chan, 2017) whereby
608 cyclists tend to build up an extensive and detailed image of their locality. This can be
609 enhanced by an ‘upright’ cycling style, such as required by the loaned e-bikes which

610 provide the ‘highest sensory potential’ for cycling (ibid. p. 8). Furthermore, cycles also
611 provided a means of overcoming physical ailments such as knee and hip problems. In
612 many cases e-bikes allow microadventures by bike to be extended and prolonged
613 offering the advantages of reliability, range, comfort and carrying capacity.

614 Cycling was also a means of connecting and reconnecting with places through
615 providing access to destinations but also experiencing them on a bike (Spinney, 2007).
616 Participants delighted in their contact with nature in the form of landscape, plants and
617 animals and the richness of sensory experience. The self-selection of green/blue
618 environments for cycling by our trial participants follows the conclusion of Boyes that
619 ‘Relatively benign natural places are ideal for exploration and exercise by older people
620 where the individual can freely choose the activity, the duration, the intensity and the
621 companions’ (Boyes, 2016, p. 374). In our study this was due to a combination of the
622 positive attraction of nature and the avoidance of vehicles. However, even these more
623 benign environments provided unwelcome challenges in terms of quality of surfaces,
624 wayfinding and legibility. This made the cycling experience considerably less enjoyable
625 and needs to be addressed. While good quality connections to green space/blue
626 corridors are vital in urban settings improved infrastructure is also needed so that biking
627 becomes an everyday cherished microadventure rather than a series of ‘micro-stresses’
628 that act as a deterrent to activity.

629 A social component was not necessary for all participants. While some
630 appreciated the support and companionship of friends or family members many also
631 relished the sense of independence (Hickman et al., 2017). Age was not a factor with
632 participants throughout the range, from 50-83 years, reporting adventurous activities.
633 Similarly, both men and women undertook microadventures, including personal
634 challenges and enjoying exploration.

635 But we must also recognise the potential for more functional cycling to meet
636 other needs of everyday life, such as, shopping, education, social and care visits etc.
637 These are often in urban areas where the impact of fear of traffic is very significant and
638 the risk of a potential journey goes beyond the thrill of adventuring. So, there is also the
639 need to extend positive cycling environments by ‘recreationalising’ urban areas such
640 that functional destinations can be accessed in a safe and enjoyable manner with the
641 added potential of urban adventuring by cycle. More people should be encouraged and
642 enabled to have journeys that move from ‘post letters’ to ‘extended to local exploration’
643 as in the case of Stacey (Female, 64, pedal cyclist, Oxford).

644 Levels of acceptable risk and tolerance varied between participants and at
645 different moments during the trial. As one participant explained ‘It was a mixture of
646 exhilaration interspersed with brief periods of sheer terror!’ (Anonymous response to
647 the Exit Survey). The experience of terror went beyond the adventuring expectations of
648 that individual.

649 Many of the participants had positive associations between their recent cycling
650 microadventures and more extensive adventures on cycles in their youth. This positive
651 association may be a generational effect that predisposes the current cohort of older
652 people to cycling and to cycling microadventures and can therefore be capitalised on to
653 encourage cycling outdoors.

654 **Conclusion**

655 The cycle BOOM wellbeing trial has demonstrated how cycle training, together
656 with an 8-week structured programme of cycling can have a positive effect on wellbeing
657 and perceived physical health for older people keen to re-engage with cycling. This may
658 not be simply to do with increased physical exercise but also the opportunity that
659 cycling provides for older people to engage directly with the outdoor physical and social

660 environment.

661 The experience of cycle BOOM participants in the CWT has shown that
662 microadventures by (e-)bike offer the potential for local, outdoor, relatively accessible
663 and environmentally sustainable adventures (Rawles, 2013; Roberts, 2018) for older
664 people. They can provide ‘the more classical elements of adventure (risk taking,
665 uncertainty, discomfort etc.)’ (Roberts, 2018, p. 28) and help people connect and re-
666 connect to place and other people as they age, for example, through cycling with peers,
667 sharing an activity with a partner who otherwise moves at a different speed and
668 intergenerational cycling. In addition, cyclists can devise and undertake their own
669 challenges and seize opportunities to explore and ‘to go “off-script” *even among the*
670 *everyday*’ (Roberts, 2018, p. 28 Author’s emphasis). While using cycles provides an
671 inspiring and apt means of undertaking microadventures, these can be further extended
672 by electrical assistance.

673 As Ulrick’s partner summarised at the end of her eight-week diary ‘There!
674 Instead of “closing down” at our ages [83 and 78] we’re thinking of exciting and
675 challenging things to do... we have seen lots of lovely places on our e-bikes – some we
676 have never seen before, others we have not seen for some years and also those we see
677 often but always enjoy.’ (Female, 78, e-bike user, Oxford)

678

679 [Word count 7384]

680

681 **References**

682

683 Abraham, A., Sommerhalder, K., & Abel, T. (2010). Landscape and well-being: a
684 scoping study on the health-promoting impact of outdoor environments.

685 *International Journal of Public Health*, 55(1), 59–69.

686 <https://doi.org/10.1007/s00038-009-0069-z>

687 Boyes, M. (2016). Age and the outdoors. In P. Humberstone, B. H. & Henderson, K.A.
688 (Eds.), *Routledge International Handbook of Outdoor Studies* (pp. 369–377).

689 Abingdon, UK: Routledge.

690 Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative*
691 *Research in Psychology*, 3(2), 77–101.

692 <https://doi.org/10.1191/1478088706qp063oa>

693 Brömmelstroet, M. te, Nikolaeva, A., Glaser, M., Nicolaisen, M. S., & Chan, C. (2017).
694 Travelling together alone and alone together: mobility and potential exposure to

695 diversity. *Applied Mobilities*. Retrieved from

696 <https://www.tandfonline.com/doi/abs/10.1080/23800127.2017.1283122>

697 Chatterjee, K., Sherwin, H., & Jain, J. (2013). Triggers for changes in cycling: the role
698 of life events and modifications to the external environment. *Journal of*

699 *Transport Geography*, 30(Supplement C), 183–193.

700 <https://doi.org/10.1016/j.jtrangeo.2013.02.007>

701 Colcombe, S., & Kramer, A. F. (2003). Fitness effects on the cognitive function of older
702 adults: a meta-analytic study. *Psychological Science*, 14(2), 125–130.

703 <https://doi.org/10.1111/1467-9280.t01-1-01430>

704 Cutler-Riddick, C. (2016). The importance of physical activity and recreation to ageing
705 well: Unveiling research findings and take away ideas. In B. Humberstone & M.

706 Konstantaki (Eds.), *Ageing, physical activity, recreation and wellbeing* (pp. 1–
707 21). Newcastle upon Tyne: Cambridge Scholars Publishing.

708 Fincham, B. (2007). Bicycle messengers: image, identity and community. *Cycling and*
709 *Society*, 179–196.

710 Harper, S., Banks, J., Boyle, P., Kirkwood, T., Knapp, M., Myerson, J., ... Wells, O.
711 (2016). *Future of an ageing population*. Retrieved from
712 <https://www.gov.uk/government/publications/future-of-an-ageing-population>

713 Harrison, R. L., Veeck, A., & Gentry, J. W. (2011). A life course perspective of family
714 meals via the life grid method. *Journal of Historical Research in Marketing*,
715 3(2), 214–233. <https://doi.org/10.1108/17557501111132154>

716 Hickman, M., Stokes, P., Beard, C., & Inkster, A. (2017). Doing the plastic fantastic:
717 ‘artificial’ adventure and older adult climbers. *Journal of Adventure Education*
718 *and Outdoor Learning*, 1–11. <https://doi.org/10.1080/14729679.2017.1308874>

719 Hopkins, D., & Putnam, R. (1994). *Personal Growth Through Adventure*. Routledge.

720 Humphreys, A. (2014). *Microadventures*. HarperCollins.

721 Humphreys, A. (2018). Microadventures [Microadventures]. Retrieved 19 March 2018,
722 from <http://www.alastairhumphreys.com/microadventures/>

723 Jacelon, C. S., & Imperio, K. (2005). Participant diaries as a source of data in research
724 with older adults. *Qualitative Health Research*, 15(7), 991–997.
725 <https://doi.org/10.1177/1049732305278603>

726 Jones, P. (2012). Sensory indiscipline and affect: a study of commuter cycling. *Social &*
727 *Cultural Geography*, 13(6), 645–658.
728 <https://doi.org/10.1080/14649365.2012.713505>

729 Jones, T., Chatterjee, K., Spinney, J., Street, E., Van Reekum, C., Spencer, B., ... Beale,
730 N. (2016). *cycle BOOM. Design for Lifelong Health and Wellbeing. Summary of*

731 *Key Findings and Recommendations*. Oxford, UK: Oxford Brookes University.
732 Retrieved from <http://cycleboom.org/summary-report/>

733 Jones, T., Harms, L., & Heinen, E. (2016). Motives, perceptions and experiences of
734 electric bicycle owners and implications for health, wellbeing and mobility.
735 *Journal of Transport Geography*, 53, 41–49.
736 <https://doi.org/10.1016/j.jtrangeo.2016.04.006>

737 Lanzendorf, M. (2010). Key Events and Their Effect on Mobility Biographies: The
738 Case of Childbirth. *International Journal of Sustainable Transportation*, 4(5),
739 272–292. <https://doi.org/10.1080/15568310903145188>

740 Larsen, J. (2014). (Auto)Ethnography and cycling. *International Journal of Social*
741 *Research Methodology*, 17(1), 59–71.
742 <https://doi.org/10.1080/13645579.2014.854015>

743 Leyland, L., Spencer, B., Beale, N., Jones, T., & Van Reekum, C. (2018). The effect of
744 cycling on cognitive function and well-being in older adults. *PLOS One*.

745 LifeCycle. (2010). Bringing Cycling to Life: The LifeCycle Best Practice Handbook.
746 *FGM-AMOR*.

747 McKenzie, M. (2003). Beyond “The Outward Bound Process:” Rethinking Student
748 Learning. *Journal of Experiential Education*, 26(1), 8–23.
749 <https://doi.org/10.1177/105382590302600104>

750 Milligan, C., Bingley, A., & Gatrell, A. (2005). Digging deep: using diary techniques to
751 explore the place of health and well-being amongst older people. *Social Science*
752 *& Medicine (1982)*, 61(9), 1882–1892.
753 <https://doi.org/10.1016/j.socscimed.2005.04.002>

754 Musselwhite, C. (2017). *Transport, Travel and Later Life*. Emerald Publishing Limited.

755 Nordbakke, S., & Schwanen, T. (2014). Well-being and Mobility: A Theoretical
756 Framework and Literature Review Focusing on Older People. *Mobilities*, 9(1),
757 104–129. <https://doi.org/10.1080/17450101.2013.784542>

758 Office for National Statistics. (2017). Overview of the UK population - Office for
759 National Statistics. Retrieved 4 December 2017, from
760 [https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration](https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/articles/overviewoftheukpopulation/july2017)
761 [n/populationestimates/articles/overviewoftheukpopulation/july2017](https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/articles/overviewoftheukpopulation/july2017)

762 Ormerod, M., Newton, R., Phillips, J., Musselwhite, C., McGee, S., & Russell, R.
763 (2015). How can transport provision and associated built environment
764 infrastructure be enhanced and developed to support the mobility needs of
765 individuals as they age? Government Office for Science.

766 Østergaard, L., Jensen, M. K., Overvad, K., Tjønneland, A., & Grøntved, A. (2018).
767 Associations Between Changes in Cycling and All-Cause Mortality Risk.
768 *American Journal of Preventive Medicine*, 55(5), 615–623.
769 <https://doi.org/10.1016/j.amepre.2018.06.009>

770 Oxford City Council. (2017). Oxford Cycle City. Retrieved 8 December 2017, from
771 https://www.oxford.gov.uk/info/20077/cycling/854/oxford_cycle_city

772 Pike, E. C. J., & Beames, S. (Eds.). (2013). *Outdoor adventure and social theory*.
773 London: Routledge.

774 Pooley, C. G. (2013). *Promoting walking and cycling*. Policy Press.

775 Pucher, J., & Buehler, R. (2012). *City Cycling*. MIT Press.

776 Rawles, K. (2013). Outdoor adventure in a carbon-light era. In E. C. J. Pike & S.
777 Beames, *Outdoor Adventure and Social Theory*. Abingdon, UK: Routledge.

778 Roberts, J. W. (2018). Re-Placing Outdoor Education: Diversity, Inclusion, and the
779 Microadventures of the Everyday. *Journal of Outdoor Recreation, Education,*

780 *and Leadershi*, 10, 20–32. <http://dx.doi.org/10.18666/JOREL-2018-V10-I1->
781 8152

782 Saelens, B. E., Sallis, J. F., & Frank, L. D. (2003). Environmental correlates of walking
783 and cycling: Findings from the transportation, urban design, and planning
784 literatures. *Annals of Behavioral Medicine*, 25(2), 80–91.
785 https://doi.org/10.1207/S15324796ABM2502_03

786 Spinney, J. (2007). Cycling the city: non-place and the sensory construction of meaning
787 in a mobile practice. *Cycling and Society*, 2545.

788 Spinney, J. E. L., Scott, D. M., & Newbold, K. B. (2009). Transport mobility benefits
789 and quality of life: A time-use perspective of elderly Canadians. *Transport*
790 *Policy*, 16(1), 1–11. <https://doi.org/10.1016/j.tranpol.2009.01.002>

791 Sugerman, D. (2003). Motivation of older adults to participate in outdoor adventure
792 programs. *The Journal of Experiential Education*, 25(3), 346.

793 Sugiyama, T., & Thompson, C. W. (2007). Outdoor Environments, Activity and the
794 Well-Being of Older People: Conceptualising Environmental Support.
795 *Environment and Planning A*, 39(8), 1943–1960. <https://doi.org/10.1068/a38226>

796 Sustrans. (2017). National Cycle Network. Retrieved 8 December 2017, from
797 <https://www.sustrans.org.uk/ncn/map/national-cycle-network>

798 Swarbrooke, J., Beard, C., Leckie, S., & Pomfret, G. (2012). *Adventure Tourism*.
799 Routledge.

800 Underwood, S. K., Handy, S. L., Paterniti, D. A., & Lee, A. E. (2014). Why do teens
801 abandon bicycling? A retrospective look at attitudes and behaviors. *Journal of*
802 *Transport & Health*, 1(1), 17–24. <https://doi.org/10.1016/j.jth.2013.12.002>

803 Walsh, V., & Golins, G. (1976). The exploration of the Outward Bound process.
804 Colorado Outward Bound School. Denver.

805 World Health Organization. (2002). *A Physically Active Life through Everyday*
806 *Transport* (with a special focus on children and older people and examples and
807 approaches from across Europe) Copenhagen: WHO Regional Office for
808 Europe. WHO Regional Office for Europe.

809 World Health Organization. (2015). *WHO World report on ageing and health*.
810 Retrieved from <http://www.who.int/ageing/events/world-report-2015-launch/en/>

811 Ziegler, F., & Schwanen, T. (2011). 'I like to go out to be energised by different
812 people': an exploratory analysis of mobility and wellbeing in later life. *Ageing &*
813 *Society*, 31(5), 758–781. <https://doi.org/10.1017/S0144686X10000498>

814

815 **Figures**

816 Figure 1: Example of completed cycling and wellbeing trial Diary of Cycling
817 Experience (DoCE)

818 Figure 2: ‘Milton Manor: came across this house unexpectedly’ (Participant photograph,
819 Ulrick (Male, 83, e-bike user, Oxford))

820 Figure 3: ‘Oriel College: The Oxford Open Doors Weekend was very enjoyable. Our
821 bikes were invaluable for seeing as many venues as we could fit in.’ (Participant
822 photograph, Ulrick’s partner (Female, 78, e-bike user, Oxford))

823 Figure 4: Cycling routes recorded by hand (Male, 83, e-bike user, Oxford)
824

825 **Tables**

826 Table 1: Summary of participants taking part in the cycling and wellbeing trial
827
828