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Physical activity in retired professional cricketers and strategies for promoting physical activity after retirement: A qualitative study

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3 **Physical activity in retired professional cricketers and strategies for promoting physical**
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5 **activity after retirement: A qualitative study**
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Abstract

Objectives

The physical health benefits of participation in professional sport dissipate after retirement unless a physically active lifestyle is adopted. Physical activity behaviours and reasons for adopting an active or inactive lifestyle after retirement from sport are poorly understood. We aimed to identify influences on physical activity after retirement from professional cricket and provide practical strategies for promoting physical activity after retirement.

Design

18 audio-recorded semi-structured telephone interviews were performed. An inductive thematic approach was used and coding was iterative and data-driven facilitated by NVivo software. Themes were compared between active and less active participants.

Setting

All participants formerly played professional cricket in the United Kingdom and were living in the United Kingdom or abroad at the time of interview.

Participants

Participants were male, aged a mean 57 ± 11 (range 34 to 77) years. They participated in professional cricket for a mean 12 ± 7 seasons and had been retired from professional cricket for an average 23 ± 9 years. Ten participants (56%) were classified as physically active, undertaking moderate intensity activity ≥ 150 minutes per week, or vigorous intensity activity ≥ 75 minutes per week.

Results

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3 Key physical activity influences were: time constraints; habit formation; intrinsic and
4
5 extrinsic motivation; physical activity preferences; pain and physical impairment; and cricket
6
7 coaching. Recommendations for optimising physical activity across the lifespan after cricket
8
9 retirement included: prioritise physical activity; establish a physical activity plan prior to
10
11 retirement and don't take a break from physical activity; evaluate sources of physical activity
12
13 motivation and incorporate these into a physical activity plan; find multiple, satisfying forms
14
15 of physical activity that can be adapted to accommodate fluctuations in physical capabilities
16
17 across the lifespan; coach cricket.
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20 21 **Conclusions**

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24 Physically active and inactive retired cricketers share contrasting attributes that have
25
26 informed recommendations for promoting a sustainable, physically active lifestyle after
27
28 retirement from professional cricket.
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31 32 33 **Strengths and limitations of this study**

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37 • A purposive sampling strategy was utilised to capture contrasting physical activity
38
39 behaviours and experiences, enabling comparisons between active and less active
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41 individuals.
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- 43
44 • The study may have been subjected to selection bias, individuals who desire
45
46 participation in a qualitative interview may differ from those who decline
47
48 participation.
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- 50
51 • The interviewer was a physiotherapist with knowledge of cricket and sports medicine
52
53 and experience in interviewing and building rapport with individuals. Strong rapport
54
55 enabled participants to share personal perspectives in a reflective and open manner
56
57 that enriched the findings of this study.
58
59
60

Funding

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Competing interests

Dr Arden and Mary Jones have received an unrestricted research grant from the England and Wales Cricket Board. Dr Peirce is employed as the Chief Medical Officer of the England and Wales Cricket Board. Dr Filbay and Dr Bishop have nothing to disclose.

1 Introduction

2 When an individual adopts an inactive lifestyle, maladaptive responses lead to metabolic
3 dysfunction increasing the risk of developing chronic disease.¹ Physical inactivity increases
4 the relative risk of stroke by 60%, coronary artery disease by 45%, hypertension by 30% and
5 diabetes by 50%, resulting in profound personal, societal and economic costs.² In contrast,
6 regular sport participation is associated with a wide array of psychological, social and
7 physical health benefits.^{3,4} However, the physical benefit of sports participation dissipates
8 following sport cessation; elite athletes who become inactive after retirement face the same,
9 or worse, risk of developing chronic disease as the inactive general population.⁵ If the
10 physiological and psychological benefits an athlete obtained through professional sport could
11 be maintained by adopting a physically active lifestyle after retirement, a career in
12 professional sport could pave the way for a fulfilling and active life with multiple health
13 benefits. In order to develop strategies for promoting physical activity after retirement from
14 sport, a greater understanding of reasons for physical inactivity in this population is needed.

15
16 Cricket is a popular team sport played by people of all ages across various continents. A
17 professional cricketer must dedicate a large proportion of daily life to being physically active,
18 as games are often played over entire days and can last up to five consecutive days in
19 duration. Individuals who become professional cricketers, have typically been training and
20 playing large volumes of cricket since childhood, making cricket an ideal sport to explore
21 physical activity behaviours after retirement. The vast majority of cricket-related research has
22 focused on skill acquisition, performance optimisation and cricket injury. A professional
23 cricket career predisposes players to injury⁶⁻¹¹ which also places a professional cricketer at
24 risk of developing osteoarthritis in later life.¹²⁻¹⁶ Developing osteoarthritis or chronic pain

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3 25 after retirement from cricket has potential to negatively impact physical activity levels in later
4
5 26 life, although this has not yet been explored. A better understanding of the factors that
6
7 27 influence physical activity levels in retired professional cricketers will enable the design of
8
9 28 interventions and strategies to support cricketers to adopt a sustainable physically active
10
11 29 lifestyle after cricket retirement. Such insights may also be applicable to other professional
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13 30 athletes.

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17 31 The aim of this study was to draw upon retired-cricketers' personal perspectives and
18
19 32 experiences to:

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21
22 33 i) identify key influences on physical activity behaviours after retirement from
23
24 34 professional cricket
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26
27 35 ii) provide practical strategies for promoting a physically active lifestyle after
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29 36 retirement from professional cricket.
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38 **Methods**

39 This study is reported in accordance with the consolidated criteria for reporting qualitative
40 research (COREQ) guidelines.¹³
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46 **Recruitment**

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49 43 Participants were purposively sampled from a cohort of 187 retired professional English
50
51 44 cricketers who completed a questionnaire collecting information on cricket-related factors,
52
53 45 current health, medical history and demographics. Responses from two items in this
54
55 46 questionnaire were used to allocate participants to one of two groups for purposive sampling:

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57
58 47 i) individuals who strongly agree or agree that participation in cricket has resulted in an
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3 48 increase in current physical activity level (n=46, 42%), or ii) Individuals who strongly agree
4
5 49 or agree that participation in cricket has resulted in a decrease in current physical activity
6
7 50 levels (n= 27, 25%). This sampling strategy was utilised to capture contrasting physical
8
9 51 activity behaviours and experiences to enable comparisons between active and less active
10
11 52 individuals. The age of retired cricketers was considered during recruitment to ensure the
12
13 53 sample represented men of varying ages. Only individuals from the larger cohort study who
14
15 54 indicated a willingness to participate in future sport-related research were invited into the
16
17 55 current study. Invitations and study information (including study rationale, procedure,
18
19 56 dissemination plans and the interviewer's credentials) were sent via email. 42 invitations
20
21 57 were sent to eligible participants, 19 received no response, 2 people declined to participate, 2
22
23 58 people were unavailable due to overseas travel and 1 person did not respond to further
24
25 59 correspondence despite an initial desire to participate. If no reply was received within two
26
27 60 weeks, a new individual was invited into the study.
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62 **Ethical considerations**

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37 63 This study was approved by Medical Sciences Inter-divisional Research Ethics Committee
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39 64 (IDREC), University of Oxford (reference number R45197/RE001).
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66 **Interviews**

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48 67 Informed verbal consent was obtained from each participant prior to performing 18 audio
49
50 68 recorded semi-structured telephone interviews (average 26 minutes in length (ranging from
51
52 69 18 to 37 minutes)). All interviews were performed by S.R.F, a female physiotherapist and
53
54 70 postdoctoral researcher with qualitative research experience who had not met the participants
55
56 71 prior to interview. Interviews were transcribed verbatim by a research assistant, an alias was
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3 72 allocated to each participant and transcripts were de-identified during transcription. The semi-
4
5 73 structured interview guide was pilot tested with three people with cricket experience prior to
6
7 74 ethics approval. The interview guide addressed key areas of interest while allowing the
8
9
10 75 researcher to adapt the interview guide to elicit relevant and rich information from
11
12 76 respondents through probing and prompting.¹⁷ Open-ended questions provided participants
13
14 77 with the opportunity to consider personal perspectives and experiences (Table 1). The
15
16 78 interview guide was iteratively adapted throughout the interviews to incorporate any
17
18 79 additional issues of importance to respondents (for example, by adding a question to explore
19
20 80 their relationship with cricket post-retirement). Participants had the opportunity to contribute
21
22 81 any additional information at the end of the interview.
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26 82
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29 83 Insert Table 1.
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34 85 Data saturation was achieved by the 14th interview, defined a priori as the point at which no
35
36 86 new themes were identified from four consecutive interviews (two from participants with
37
38 87 increased physical activity and two from participants with decreased physical activity). Once
39
40 88 data saturation was reached, an additional four interviews were performed to affirm data
41
42 89 saturation and expand upon ideas and themes after following the semi-structured interview
43
44 90 guide. If these final interviews resulted in the identification of new themes, additional
45
46 91 interviews were planned until data saturation was again satisfied. No new themes emerged
47
48 92 from these additional four interviews affirming data saturation. Data from all 18 interviews
49
50 93 were used for analysis.
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58 95 **Analysis procedure**

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3 96 An inductive thematic approach was used^{18 19} facilitated by NVivo version 11 software.²⁰ A
4
5 97 study journal was used to summarise each interview and reflect upon initial ideas. Transcripts
6
7 98 were read multiple times with accompanying audio to identify all information potentially
8
9 99 relevant to the research aims.²¹ This information was coded into multiple categories to be
10
11 100 later refined and analysed for themes.¹⁸ Data coding was iterative and data-driven, performed
12
13 101 without engagement with literature to avoid sensitization to themes and without reference to a
14
15 102 pre-existing coding structure.^{18 21}

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19 103 During subsequent stages of analysis, the data was further analysed for repeated patterns,
20
21 104 codes were sorted into a hierarchical structure representing themes and subthemes,
22
23 105 overlapping themes were merged, and those outside the scope of the current study were filed
24
25 106 separately. These themes and sub-themes were repeatedly reviewed and refined to confirm
26
27 107 external heterogeneity and internal homogeneity within themes and to ensure an accurate
28
29 108 representation of the entire dataset. The study journal was also revisited to check that themes
30
31 109 accurately reflected the key issues discussed by participants.^{18 22} Themes were compared
32
33 110 amongst active and less active participants to better understand factors influencing physical
34
35 111 activity behaviors.

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39 112 A selection of six transcripts representing participants with diverse physical activity patterns
40
41 113 were analysed by a second investigator (F.L.B) blinded to the coding structure developed by
42
43 114 the first author (S.R.F). A meeting was then held where key themes were discussed and a
44
45 115 high level of agreement was achieved between investigators. Key themes will be described
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47 116 with reference to participant quotes.^{18 22}

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54 118 **Physical activity classification**

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3 119 To enable comparison of physical activity behaviors and perspectives in active and less active
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5 120 counterparts, participant descriptions of current activity level (including type of activity and
6
7 121 frequency) were used to categorise participants into active and less active groups with
8
9 122 reference to the UK Physical Activity Guidelines.²³ The UK Physical Activity Guidelines
10
11 123 recommend adults undertake moderate intensity activity at least 150 minutes per week, or
12
13 124 vigorous intensity activity at least 75 minutes per week for health enhancing benefits
14
15 125 including reduced susceptibility and burden from chronic disease.²³ Physical activity type
16
17 126 was categorised into moderate or vigorous intensity with reference to previous
18
19 127 recommendations in accordance with Centers for Disease Control (CDC) and American
20
21 128 College of Sports Medicine (ACSM) guidelines.²⁴
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29 130 **Results**

31 131 **Participant characteristics**

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35 132 Participants were all male, aged a mean 57±11 (range 34 to 77) years and had been retired
36
37 133 from professional cricket for an average 23±9 (range 7 to 38) years. Ten participants were
38
39 134 physically active, meeting or exceeding the UK Physical Activity Guidelines and eight
40
41 135 participants were not active frequently enough to meet these guidelines. One in two (n=9,
42
43 136 50%) would prefer to be participating in a greater volume of physical activity. Full
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45 137 participant characteristics are presented in Table 2.
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51 139 Insert Table 2.
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3 141 **Key influences on physical activity behaviours after retirement from professional**
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5 142 **cricket**
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143

144 ***Time constraints***

145 The most common physical activity barrier identified by retired cricketers who expressed that
146 they would like to be more active, was time constraints. Many participants were working long
147 hours in sedentary professions which was a stark contrast from life as a professional cricketer
148 and resulted in difficulty finding the time to be physically active.

149 *Cam: 'work takes up too much time, office based. I don't necessarily get as much time*
150 *as I'd like either before, during or after work to, you know, do some physical activity,*
151 *other stuff has to take priority.'*

152 *Lee: 'It's time, you know, I came out of cricket, in my 30's and you try and find your*
153 *way and then you try set up a business and that sort of takes over really, so some days*
154 *you just don't, you don't get chance to go out there and do things so readily.'*

155

156 In contrast, participants who were active and satisfied with their physical activity levels
157 prioritised physical activity, and irrespective of work and family commitments, allocated time
158 to be physically active on a daily basis.

159 *Dan: 'You know time is limited and you have to vacate your time appropriately, but as*
160 *long as you can build that into your regular routine then it doesn't tend to be so much*
161 *of a problem.'*

162

163 *Leo: 'There is no excuse for people not keeping fit after playing professional cricket,*
164 *no excuse at all. If you're a married man, kids, things like that, people work long*
165 *hours these days, how do you squeeze it in? Well you squeeze it in by doing a 25*
166 *minute run whilst your kids are in the bath, you come back and take them out and dry*
167 *them and put them to bed and help mum, that type of thing.'*

168

169 ***Habit formation***

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3 170 Retired cricketers not meeting the physical activity guidelines who were dissatisfied with
4
5 171 their current physical activity level, had difficulty establishing an exercise routine and
6
7 172 integrating regular physical activity into their daily life. These individuals described adopting
8
9 173 “poor habits” early after retirement that were difficult to break when physical activity desires
10
11
12 174 changed.

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14
15 175 *Fin: ‘Part of it I think it's habit and routine to be honest. Because saying I haven't got*
16 176 *time for it is a lame excuse, because a lot of people work full time. Part of it is I've*
17 177 *just got into such a bad habit and it's just mentally getting back into that, into sort of*
18 178 *the boredom of physical activity.. ...So I enjoyed having the break, but then obviously*
19 179 *following on from that I never really turned it back around. So it was a choice to start*
20 180 *with but then but it was a bad choice because it then meant that I didn't do anything..*
21 181 *..I then found it hard to find any kind of routine where it meant I actually went to the*
22 182 *gym or did some activities.’*
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27
28 184 On the other hand, active participants had formed strong exercise habits by integrating
29
30 185 physical activity into their daily routine.

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33 186 *Joe: ‘There's not a lot more I could do really, you know, I try and do 10,000 steps a*
34 187 *day, I cycle twice a week, I go to the gym a couple of times a week.. ..I'm sort of set in*
35 188 *my routine if you will.’*
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39 40 41 190 ***Intrinsic and extrinsic motivation***

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44 191 Sources of motivation to undertake physical activity differed between retired cricketers with
45
46 192 contrasting activity levels. People meeting or exceeding the physical activity guidelines
47
48 193 described intrinsic sources of motivation and emphasised the importance of physical activity
49
50 194 in maintaining optimal mental and physical wellbeing across the lifespan.

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52
53 195 *Leo: ‘I do it because I love it. I don't do it because I have to do it, but I am not like*
54 196 *some of my friends who say, look I've got to go to walk this morning or I've got to go*
55 197 *to the gym and swim for half an hour and I've got to do my weights and all this type*
56 198 *of thing, I do it because I love it. I simply love it. If I don't exercise and do the things*
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3 199 *that I like I get quite, I can actually get quite crotchety and short tempered because I*
4 200 *feel frustrated.'*

5
6 201 Ned: *'I can only go from how I feel personally. I mean I feel a lot better doing some*
7 202 *form of exercise.. ..you know I think physically you feel better also mentally for the*
8 203 *rest of your life, whatever you're doing, you know certainly for me it's a very*
9 204 *important part of keeping myself motivated in life as much as anything I guess.'*

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15 206 In contrast, cricketers who were not meeting the physical activity guidelines despite
16
17 207 expressing dissatisfaction with current activity levels, relied on others for motivation to
18
19 208 participate in physical activity.

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22 209 Cam: *'Not really, although I have a six year old son, so it's starting to come back in*
23 210 *because I am starting to take him and, and practice with him and coach him and stuff*
24 211 *like that, so but no it hasn't really been part of my life at all for the last 10 years.'*

25
26 212

27 213 Ric: *'Well I'm ashamed to admit it but not many at the moment, as I said I need to*
28 214 *shake myself and get up and get out and do something a bit more and I think my wife*
29 215 *will galvanise me and say right we are off for a fast walk for 2 or 3 miles, 2 or 3 times*
30 216 *a week to try and sort of get back to what we were doing.'*

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36 219 Participants with the lowest activity levels were lacking internal motivation to exercise, did
37
38 220 not see physical activity as congruent with their current sense of self or identity, and
39
40 221 expressed little or no desire to become physically active.

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42
43 222 Interviewer: If you wanted to increase your physical activity levels, what do you think
44 223 would help you to do so?

45
46
47 224 Ron: *'..there isn't really anything you know, maybe my kids.. .. as long as my mind is*
48 225 *active, physical activity, you know, isn't something that, it's never really jumped out*
49 226 *at me. ..I would say quality of life is pretty good and I don't really have any desire to*
50 227 *put on a tracksuit at 52 and become a trendy middle aged man who goes for a jog*
51 228 *around the block, like I see many people doing.'*

52
53
54 229 Ken: *'Um, I don't know a 25 year-old girlfriend who wanted to go cycling. Yeah, I*
55 230 *know that sounds flippant; but it's probably true.'*

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3 232 ***Physical activity preferences***
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5 233 The most active individuals participated in some form of independent recreational activity,
6
7 234 such as cycling, running or gym-based exercise. For these individuals, participating in
8
9 235 exercise was more important than the specific type of exercise, and most were willing to
10
11 236 sacrifice some enjoyment if physical limitations led them to substitute their favourite form of
12
13 237 exercise for a less preferred form of physical activity to enable continuation of an active
14
15 238 lifestyle.
16
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19 239 Joe: *'I've always run, I've always' run.. .. but like I say now I can't, I haven't done it*
20 240 *for about two years, so I am making do with cycling now. I mean I still get a buzz out*
21 241 *of it, but it's not the same as running. I just like, you know, to do something.'*
22

23 242 Ned: *'I'd be happy to do anything I'm capable of doing, but I've kind of got you know*
24 243 *my routines now and obviously I vary the aerobic work depending on umm, you know*
25 244 *how I feel really.'*
26
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30
31 246 In contrast, individuals not meeting the physical activity guidelines commonly expressed
32
33 247 experiencing little enjoyment partaking in unaccompanied recreational exercise such as
34
35 248 cycling and gym-based activities, with a preference to be active through sport participation.
36
37 249 Some inactive individuals described having never enjoyed maintaining fitness or the
38
39 250 monotonous aspects of cricket training, but participated reluctantly in order to get out on the
40
41 251 field and play cricket which brought them great satisfaction.
42
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45 252 Fin: *'The gym side and the physical side of professional sport was the bit that I liked*
46 253 *the least.. So I was almost rebelling if you like, saying 'haha', I don't have to do this*
47 254 *anymore, so I'm not going to. But it was a dreadful decision really. Because it's*
48 255 *obviously not very good for you. ..The monotony of going to the gym and doing half*
49 256 *an hour on the treadmill for example, I can't physically do it. Actually that's wrong I*
50 257 *can physically do it, I can't mentally do that. So the type has to be sort of something I*
51 258 *enjoy and I guess that's why I do football really, because I enjoy that and it's*
52 259 *competitive. I don't find the going to the gym scenario a very appealing one.'*
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55 260

56 261 Ken: *'I enjoyed playing the sport; I will admit that I never enjoyed getting fit for it,*
57 262 *but it was something you had to do and when it's no longer your living and there is no*
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3 263 *need to get up at 6 o'clock and go running or doing other, you know fitness exercises*
4 264 *or whatever, it was a tremendous relief, shall we say.'*

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9 266 ***Pain and physical impairment***

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11 267 Despite most individuals experiencing pain and physical impairment, this did not prevent
12
13 268 participants from being physically active. Rather, for some individuals, pain and physical
14
15 269 impairment affected the type of activity they chose to take part in and imposed limitations
16
17 270 participating in higher impact activities.
18
19

20
21 271 Leo: *'I would like to be able to get out there and run for 40-50 minutes without any*
22 272 *knee problem and pain and going under the knife. But then I am thinking about*
23 273 *having one done so I can run in marathons or half marathons when I'm over 80 and*
24 274 *among that age group.'*

25
26 275 Lee: *'Yeah, yeah I mean I can get by with my knees, but like my hip, my left hip is shot*
27 276 *really, so you know if there are certain things I do, I'm hobbling around for a good*
28 277 *week afterwards and you know it just stops me sort of doing anything too extreme.'*
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31 278
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34 279 ***Cricket coaching***

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36 280 All six retired cricketers who regularly coached cricket, were able to maintain a physically
37
38 281 active lifestyle. This in part, was due to active involvement in training drills and warm-up
39
40 282 sessions. Being around a sporting environment provided motivation to maintain fitness, and
41
42 283 coaching cricket provided the time and resources needed to do so.
43
44

45 284 Ned: *'I think being in a professional environment encourages you to obviously stay*
46 285 *fit, you know, you're around professional athletes so you don't want to look fat and*
47 286 *incapable of doing your job. So I think that motivates me to keep training. ..at least*
48 287 *with this job I've got time to train, you know, I can do it in the hours that suit me as*
49 288 *opposed to having to wait until I finish work at you know 6 o'clock or whatever.'*

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51
52 289 Dom: *'I know that my physical activity, I can compensate or counter it by coaching,*
53 290 *because I can do more active sessions involving myself if I need to and set standards*
54 291 *in that, so I drive other people to do what I think they should be achieving.'*
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3 293 The positive impact of cricket coaching on physical activity levels was further demonstrated
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5 294 by Sam, who described having been active while he was coaching cricket, but was no longer
6
7 295 meeting the physical activity guidelines since he stopped coaching.
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10 296 *Sam: 'I coached there for just under 19 years, so you know I was quite active with the*
11 297 *lads there... ..I used to hit all the catches and do all the fielding drills for the cricket*
12 298 *team... it was just like part of my life, when the lads started I'd join in or some days*
13 299 *the lads wouldn't be in at all, so I would then make an effort and go to the gym and do*
14 300 *stuff and I had my own routines, so yeah, it was quite active really. But I retired.. so I*
15 301 *haven't, so I've sort of done less exercise.'*
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303 **Discussion**

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23 304 This was the first study to explore physical activity in retired professional cricketers and one
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25 305 of the first to do so in retired athletes. Using retired player's personal perspectives and
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27 306 experiences we have identified key influences on physical activity which have informed
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29 307 several recommendations for promoting physical activity across the lifespan after retirement
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31 308 from cricket.
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310 **Key influences on physical activity behaviours**

311 Several factors influencing physical activity choices were not unique to retired professional
312 cricketers. Time constraints have been identified as a barrier to physical activity in other male
313 groups including those living in rural areas²⁶, university employees,²⁷ prostate cancer
314 patients²⁸ and African-Americans.^{29 30} Additionally, intrinsic forms of motivation have been
315 shown to predict long-term exercise adherence in a variety of samples.³⁰ A strong preference
316 for competitive sport over recreational exercise was found to be a risk factor for adopting an
317 inactive lifestyle 5-20 years after ACL reconstruction in people with knee difficulties.³¹
318 Although these barriers to physical activity may be applicable to the general population, the

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3 319 characteristics of retired-cricketers are different from the general population. The journey
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5 320 from playing youth cricket to retiring from professional cricket exposes an individual to a
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7 321 high volume of physical activity and results in the refinement of physical skill and
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9 322 psychological attributes necessary to perform at an elite level. Another key difference
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11 323 between an elite athlete and the general population is that retirement from professional sport
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13 324 provides a novel opportunity where effort can be directed to optimise the likelihood that a
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15 325 retiring athlete transitions into a physically active lifestyle, and maintains it throughout later
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18 326 life.
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24 328 On the other hand, contrasts were evident regarding the relationship with joint pain and
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26 329 physical activity in our sample of retired-cricketers and previous research in this area. A
27
28 330 review of the literature confirms that individuals with osteoarthritis are less active than those
29
30 331 without³² and osteoarthritis is often perceived by those with the disease as a barrier to
31
32 332 physical activity.³³ A proportion of people living with osteoarthritis, express a misconception
33
34 333 that exercise will exacerbate osteoarthritis symptoms, and hold pain-avoidance behaviors
35
36 334 which become a barrier to being physically active.^{34 35} In contrast, retired-cricketers did not
37
38 335 express such beliefs, and osteoarthritis or joint pain did not prevent participants from being
39
40 336 physically active. It is possible that exposure to professional cricket, desensitized participants
41
42 337 to exercising through pain or discomfort. Another contributing factor may be the common
43
44 338 attributes that these retired cricketers possess, including resilience, a positive outlook, high
45
46 339 quality of life, increased body awareness and an ability to adapt activity choices in line with
47
48 340 physical capabilities which may enhance one's ability to be active in the presence of chronic
49
50 341 joint pain (Filbay et al 2017, accepted 09-05-2017 *BMJ Open*). This is in line with previous
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52 342 research that identified psychological factors as a stronger determinant of physical activity
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54 343 levels than pain severity in individuals with osteoarthritis and chronic pain.^{33 36 37} These
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3 344 findings support further research into the relationship between physical activity, joint pain
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5 345 and quality of life in retired athletes.
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10 347 **Practical strategies for promoting a physically active lifestyle after retirement**

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13 348 A number of suggestions were made by participants regarding strategies for adopting an
14
15 349 active lifestyle after retirement and other useful information arose from exploring factors
16
17 350 influencing physical activity choices. This information guided five recommendations for
18
19 351 optimising physical activity across the lifespan after retiring from professional cricket: i)
20
21 352 prioritise physical activity; ii) establish a physical activity plan prior to retirement and don't
22
23 353 take a break from physical activity; iii) evaluate sources of physical activity motivation and
24
25 354 incorporate these into a physical activity plan; iv) find multiple, satisfying forms of physical
26
27 355 activity that can be adapted to accommodate fluctuations in physical capabilities across the
28
29 356 lifespan; v) coach cricket.
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37 358 Retirement from sport may mark a pivotal point in one's life where decisions surrounding
38
39 359 physical activity have great potential to impact physical activity levels and health in later life.
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41 360 **Prioritising physical activity** may be a means to overcome the most commonly
42
43 361 acknowledged barrier to being more physically active in this sample of retired cricketers,
44
45 362 time constraints. Education may assist with forming intentions to facilitate behavior change
46
47 363 and healthy habit formation.³⁸ Retiring cricketers could benefit from being informed of the
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49 364 importance of prioritising and maintaining a physically active lifestyle after retirement from
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51 365 cricket.
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3 367 **Establishing a physical activity plan prior to retirement** and advice to **not take a break**
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5 368 **from physical activity after retirement** were suggested by participants as strategies to
6
7 369 encourage adoption of routines and habits that are conducive to living a physically active life.
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9 370 Planning can help to overcome the difficult step of translating intentions into actions, which
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11 371 can lead to habit formation.³⁹ Making physical activity behaviors habitual has several
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13 372 benefits; forming a habitual physical activity behavior may reduce the effort required to take
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15 373 part in an activity and promotes continuation of that activity even in times where motivation
16
17 374 and self-control are exhausted.^{38 40} Specific tools exist which could be used to enable
18
19 375 identification of individuals with poor exercise habits and assess the effectiveness of
20
21 376 interventions aimed at facilitating new exercise habits or changing old habits.⁴⁰ Such
22
23 377 interventions could draw upon habit-formation principles such as utilising repetition, linking
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25 378 activity to consistent cues and performing activity in a similar context to promote
26
27 379 automaticity.³⁸ Changes to an individual's environment or living circumstance (such as
28
29 380 retiring from professional cricket and transitioning to post-retirement life) provides an
30
31 381 opportune time to implement behavior change and habit formation strategies.³⁸
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383 When establishing a physical activity plan, cricketers may benefit from **evaluating sources**
384 **of physical activity motivation**. People who are externally motivated, may benefit from
385 tailoring activity choices to satisfy their external sources of motivation (for example,
386 coaching a cricket team, exercising with family or friends, or committing to an exercise group
387 or sports team).⁴¹ Additionally, retired-cricketers with a strong desire to become more
388 physically active, may benefit from interventions to foster intrinsic motivation toward
389 physical activity. Such interventions may draw upon self-determination theory (SDT) and
390 cognitive evaluation theory (CET), which emphasise the importance of satisfying an
391 individual's need for competence and autonomy in order to foster intrinsic motivation.⁴¹

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3 392 Physical activity plans should include **multiple sources of satisfying physical activity**,
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5 393 alternative sources of physical activity may be required if preferred activities become limited
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7 394 due to pain, health concerns, age or time constraints. Finally, cricketers who are concerned
8
9 395 about maintaining an active lifestyle could consider **cricket coaching**. All coaches in this
10
11 396 study were meeting the Physical Activity Guidelines, yet the positive relationship between
12
13 397 cricket coaching and physical activity may be overlooked when this option is considered
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15
16 398 prior to retiring and transitioning from professional cricket.
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20 21 22 400 **Strengths and potential limitations** 23

24
25 401 Our purposive recruitment strategy may have reduced the generalisability of results since
26
27 402 retired-cricketers reporting uncertainty regarding the impact of cricket upon their physical
28
29 403 activity level were not invited into the study. The study may have been subjected to selection
30
31 404 bias, individuals who desire participation in a qualitative interview study may share specific
32
33 405 attributes that differ from those who decline participation. Participants were not contacted
34
35 406 after the initial interview for correction or further comment, these procedures could have
36
37 407 elicited additional insights beyond those gained through the interviews. The interviewer was
38
39 408 a physiotherapist with knowledge of cricket and sports medicine and experience in
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41 409 interviewing and building rapport with individuals. Strong rapport enabled participants to
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43 410 share personal perspectives in a reflective and open manner that enriched the findings of this
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45 411 study.
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51 52 53 413 **Conclusion** 54 55 56 57 58 59 60

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3 414 This study highlights key influences on physical activity behaviours in retired professional
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5 415 cricketers and provides practical strategies to support retiring and retired cricketers to adopt
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7 416 sustainable, physically active lifestyles.
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10 417

11 12 13 418 **Acknowledgments**

14
15 419 We would like to thank the retired cricketers who took part in the interviews. We would like
16
17 420 to acknowledge Angus Porter and the Professional Cricketers' Association (PCA) for
18
19 421 assisting with recruitment and questionnaire development for the larger cross-sectional study
20
21 422 from which study participants were purposively recruited.
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25 423

26 27 28 424 **Author contributions**

29
30 425 SRF, FLB, NP, NKA conceived and designed this qualitative study. SRF, MEJ recruited
31
32 426 participants and extracted data from the cross-sectional cohort. SRF performed all interviews.
33
34 427 SRF, FLB participated in the analysis. SRF drafted the first version of the manuscript. All
35
36 428 authors contributed in revising the manuscript and gave their final approval of the submitted
37
38 429 version.
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43 44 45 431 **Data sharing**

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48 432 To view interview transcripts or additional participant quotes, please contact the
49
50 433 corresponding author.
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References

1. Booth FW, Lees SJ. Fundamental questions about genes, inactivity, and chronic diseases. *Physiological genomics* 2007;**28**(2):146-57.
2. Katzmarzyk PT, Janssen I. The economic costs associated with physical inactivity and obesity in Canada: an update. *Can J Appl Physiol* 2004;**29**(1):90-115.
3. Eime RM, Young JA, Harvey JT, et al. A systematic review of the psychological and social benefits of participation in sport for adults: informing development of a conceptual model of health through sport. *International Journal of Behavioral Nutrition and Physical Activity* 2013;**10**.
4. Eime RM, Young JA, Harvey JT, et al. A systematic review of the psychological and social benefits of participation in sport for children and adolescents: informing development of a conceptual model of health through sport. *International Journal of Behavioral Nutrition and Physical Activity* 2013;**10**.
5. Witkowski S, Spangenburg EE. Reduced physical activity and the retired athlete: a dangerous combination? *British Journal of Sports Medicine* 2008;**42**(12):952-53.
6. Ranson C, Hurley R, Rugless L, et al. International cricket injury surveillance: A report of five teams competing in the ICC Cricket World Cup 2011. *British Journal of Sports Medicine* 2013;**47**(10):637-43.
7. Stretch RA. Cricket injuries: a longitudinal study of the nature of injuries to South African cricketers. *British Journal of Sports Medicine* 2003;**37**(3):250-53.
8. Orchard J, James T, Alcott E, et al. Injuries in Australian cricket at first class level 1995/1996 to 2000/2001. *British Journal of Sports Medicine* 2002;**36**(4):270-75.
9. Ranawat VS, Dowell JK, Heywood-Waddington MB. Stress fractures of the lumbar pars interarticularis in athletes: A review based on long-term results of 18 professional cricketers. *Injury* 2003;**34**(12):915-19.
10. Russell JHB, Hughes JMF, Heskin L, et al. The pattern of hand injuries in amateur cricket. *European Journal of Plastic Surgery* 2014;**37**(5):281-86.
11. Orchard JW. Injury surveillance in cricket. *British Journal of Sports Medicine* 2013;**47**(10):605-06.
12. Roos E. Joint injury causes knee osteoarthritis in young adults. *Current Opinion in Rheumatology* 2005;**17**(2):195-200.
13. Lohmander LS, England PM, Dahl LL, et al. The long-term consequences of anterior cruciate ligament and meniscus injuries: Osteoarthritis. *American Journal of Sports Medicine* 2007;**35**(10):1756-69.
14. Spector T, Harris P, Hart DJ, et al. Risk of osteoarthritis associated with long-term weight-bearing sports. *Arthritis and rheumatism* 1996;**39**(6):988-95.
15. Thelin N, Holmberg S, Thelin A. Knee injuries account for the sports-related increased risk of knee osteoarthritis. *Scandinavian journal of medicine & science in sports* 2006;**16**(5):329-33.
16. Gelber AC, Hochberg MC, Mead LA, et al. Joint injury in young adults and risk for subsequent knee and hip osteoarthritis. *Annals of internal medicine* 2000;**133**(5):321-28.
17. Jones I, Brown L, Holloway I. *Qualitative Research in Sport and Physical Activity*: SAGE Publications, 2012.
18. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology* 2006;**3**(2):77-101.

19. Thomas DR. A General Inductive Approach for Analyzing Qualitative Evaluation Data. *American Journal of Evaluation* 2006;**27**(2):237-46.
20. Bazeley P, Jackson K. *Qualitative data analysis with NVivo*. Los Angeles: SAGE, 2013.
21. Tuckett AG. Applying thematic analysis theory to practice: A researcher's experience. *Contemporary Nurse* 2005;**19**(1-2):75-87.
22. Patton MQ. *Qualitative evaluation and research methods*, 1990.
23. Bull FatEWG. Physical Activity Guidelines in the UK: Review and recommendations School of Sport, Exercise and Health Sciences, Loughborough University, May 2010.
24. Ainsworth BE, Haskell WL, Leon AS, et al. Compendium of physical activities: classification of energy costs of human physical activities. *Med Sci Sports Exerc* 1993;**25**(1):71-80.
25. Organisation WH. Obesity: Preventing and managing the global epidemic. Report of a WHO Consultation on Obesity, Geneva,. WHO/NUT /NCD/98 1, Geneva, 1998 3-5 June 1997.
26. Morgan EH, Graham ML, Folta SC, et al. A qualitative study of factors related to cardiometabolic risk in rural men. *BMC Public Health* 2016;**16**(1).
27. George ES, Kolt GS, Rosenkranz RR, et al. Physical Activity and Sedentary Time: Male Perceptions in a University Work Environment. *American Journal of Men's Health* 2014;**8**(2):148-58.
28. Keogh JW, Patel A, Macleod RD, et al. Perceived barriers and facilitators to physical activity in men with prostate cancer: Possible influence of androgen deprivation therapy. *European Journal of Cancer Care* 2014;**23**(2):263-73.
29. Hooker SP, Wilcox S, Rheaume CE, et al. Factors related to physical activity and recommended intervention strategies as told by midlife and older African American men. *Ethnicity and Disease* 2011;**21**(3):261-67.
30. Teixeira PJ, Carraça EV, Markland D, et al. Exercise, physical activity, and self-determination theory: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity* 2012;**9**.
31. Filbay SR, Crossley KM, Ackerman IN. Activity preferences, lifestyle modifications and re-injury fears influence longer-term quality of life in people with knee symptoms following anterior cruciate ligament reconstruction: a qualitative study. *Journal of physiotherapy* 2016.
32. Hootman JM, Macera CA, Ham SA, et al. Physical activity levels among the general US adult population and in adults with and without arthritis. *Arthritis and rheumatism* 2003;**49**(1):129-35.
33. Wilcox S, Der AC, Abbott J, et al. Perceived exercise barriers, enablers, and benefits among exercising and nonexercising adults with arthritis: results from a qualitative study. *Arthritis and rheumatism* 2006;**55**(4):616-27.
34. Gyurcsik NC, Cary MA, Sessford JD, et al. Pain, anxiety, and negative outcome expectations for activity: do negative psychological profiles differ between the inactive and active? *Arthritis care & research* 2015;**67**(1):58-64.
35. Harding PA, Holland AE, Hinman RS, et al. Physical activity perceptions and beliefs following total hip and knee arthroplasty: a qualitative study. *Physiother Theory Pract* 2015;**31**(2):107-13.
36. Der Ananian C, Wilcox S, Watkins K, et al. Factors associated with exercise participation in adults with arthritis. *J Aging Phys Act* 2008;**16**(2):125-43.

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2
3 37. Gyurcsik NC, Brawley LR, Spink KS, et al. Meeting physical activity recommendations:
4 self-regulatory efficacy characterizes differential adherence during arthritis flares.
5 Rehabilitation psychology 2013;**58**(1):43-50.
6
7 38. Lally P, Gardner B. Promoting habit formation. Health Psychology Review
8 2013;**7**(sup1):S137-S58.
9
10 39. Michie S, Abraham C, Whittington C, et al. Effective techniques in healthy eating and
11 physical activity interventions: a meta-regression. Health psychology : official journal
12 of the Division of Health Psychology, American Psychological Association
13 2009;**28**(6):690-701.
14
15 40. Orbell S, Verplanken B. The strength of habit. Health Psychology Review 2015;**9**(3):311-
16 17.
17
18 41. Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation,
19 social development, and well-being. American psychologist 2000;**55**(1):68.
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Table 1. Semi-structured interview guide

1. Can you describe any physical activity, exercise or sport that you currently take part in?
2. Has that remained fairly constant since you retired from cricket or has it changed over the years?
3. Have you played cricket again since retiring? Why/why not?
4. What was your motivation for playing cricket?
5. Are you as physically active as you would like to be? If no, why not? How does this make you feel?
6. What is your motivation for taking part in physical activity/exercise/sport?
7. How important is being physically active to you? (If important, why is it important? / If not important, has it always been this way?)
8. Does the type of physical activity that you do matter to you, or would you be satisfied taking part in any form of physical activity?
(ask about specific forms of exercise that they find *dissatisfying* and why)
9. What physical activity goals are you currently trying to achieve, if any?
10. What are the barriers or challenges, if any, that impact on your ability to be physically active?
11. Do you think that retired cricketers face the same challenges with being physically active as the general population, or are they unique or different in some way?
12. Some retired cricketers become physically inactive, what advice would you give to help them maintain a physically active lifestyle after retiring from cricket?
13. If you wanted to increase your physical activity levels, what do you think would help you to do so?
14. Can you describe any positive or negative impacts that your previous participation in

1
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3 cricket has had upon your current physical activity patterns?
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6 15. If you hadn't played professional cricket, do you think that you would be more or less
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8 active, than you currently are?
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10 16. Does your current ability to participate in physical activity impact upon your quality of
11
12 life? If yes, in what ways? If no, why not?
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14 17. Overall how satisfied are you with your current quality of life?
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17 Do you think that this is related to your past career in cricket?
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19 18. Is there anything more you would like to add about your experiences with physical activity
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21 after retiring from professional cricket?
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Table 2 Participant characteristics

Alias	Age range ¹	Years post retirement ¹	UK professional seasons ¹	BMI	Joint pain	OA	TJR	Meeting physical activity guidelines	Are you as active as you would like to be?
Dan	56 to 60	26 to 30	6 to 10	Normal	Yes	Yes	No	Yes	Yes
Dom	61 to 65	26 to 30	16 to 20	Obese	No	Yes	Yes	Yes	Yes
Gus	56 to 60	11 to 15	1 to 5	Overweight	No	No	No	Yes	No
Guy	46 to 50	21 to 25	1 to 5	Obese	Yes	No	No	Yes	No
Jim	66 to 70	21 to 25	21 to 25	Overweight	Yes	Yes	Yes	Yes	Yes
Joe	61 to 65	31 to 35	16 to 20	Overweight	No	No	No	Yes	Yes
Lee	46 to 50	11 to 15	6 to 10	Overweight	Yes	No	No	Yes	No
Leo	76 to 80	36 to 40	1 to 5	Normal	Yes	Yes	Yes	Yes	Yes
Ned	56 to 60	16 to 20	16 to 20	Overweight	Yes	No	No	Yes	Yes
Tim	36 to 40	6 to 10	NR	Overweight	Yes	Yes	No	Yes	Yes
Ben	56 to 60	21 to 25	11 to 15	Overweight	Yes	Yes	Yes	No	No
Cam	51 to 55	26 to 30	1 to 5	Overweight	Yes	No	No	No	No
Fin	31 to 35	6 to 10	6 to 10	Overweight	Yes	No	No	No	No
Ken	56 to 60	26 to 30	6 to 10	Overweight	Yes	Yes	No	No	Yes
Ric	66 to 70	16 to 20	1 to 5	Obese	Yes	Yes	Yes	No	No
Ron	51 to 55	16 to 20	16 to 20	Normal	Yes	Yes	No	No	Yes
Sam	56 to 60	21 to 25	16 to 20	Overweight	Yes	Yes	No	No	No
Wes	66 to 70	26 to 30	21 to 25	Overweight	Yes	No	No	No	Yes

Note, participants above the horizontal line were meeting the UK Physical Activity

Guidelines²³ and participants below the horizontal line were not; ¹ Ranges were reported

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3 rather than absolute values to assure participants' anonymity; NR = Not reported; UK
4
5 professional seasons = number of seasons playing professional cricket in the UK; BMI (body
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7 mass index) = categorised with reference to WHO international classification guidelines
8
9 (normal weight: 18.9–24.9 kg/m², overweight: 25.0–29.9 kg/m², obese: ≥ 30.0 kg/m²)²⁵;
10
11 Joint pain = 'Do you experience pain, discomfort, or have a problem with your: hip(s) or
12
13 groin, knee(s), ankle(s), spine (back or neck), shoulder(s), elbow(s), wrist(s), finger(s) or
14
15 hand(s)'; OA (osteoarthritis) = 'Have you ever been told you have wear and tear,
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17 degeneration or osteoarthritis by a doctor?'; TJR (total joint replacement) = have you ever
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19 had joint replacement surgery?
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COREQ (CONsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
<i>Personal characteristics</i>			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	8
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	8
Occupation	3	What was their occupation at the time of the study?	8, 21
Gender	4	Was the researcher male or female?	8
Experience and training	5	What experience or training did the researcher have?	21
<i>Relationship with participants</i>			
Relationship established	6	Was a relationship established prior to study commencement?	8
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	8
Interviewer characteristics	8	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	8, 21
Domain 2: Study design			
<i>Theoretical framework</i>			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	9-10
<i>Participant selection</i>			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	7-8
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	7-8
Sample size	12	How many participants were in the study?	8
Non-participation	13	How many people refused to participate or dropped out? Reasons?	8
<i>Setting</i>			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	8
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	8
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	11
<i>Data collection</i>			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	9
Repeat interviews	18	Were repeat interviews carried out? If yes, how many?	21
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	8
Field notes	20	Were field notes made during and/or after the interview or focus group?	8-9
Duration	21	What was the duration of the interviews or focus group?	8
Data saturation	22	Was data saturation discussed?	9
Transcripts returned	23	Were transcripts returned to participants for comment and/or	21

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
<i>Data analysis</i>			
Number of data coders	24	How many data coders coded the data?	10
Description of the coding tree	25	Did authors provide a description of the coding tree?	10
Derivation of themes	26	Were themes identified in advance or derived from the data?	10
Software	27	What software, if applicable, was used to manage the data?	10
Participant checking	28	Did participants provide feedback on the findings?	21
<i>Reporting</i>			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	11-17
Data and findings consistent	30	Was there consistency between the data presented and the findings?	11-17
Clarity of major themes	31	Were major themes clearly presented in the findings?	11-17
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	14

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

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Physical activity in former elite cricketers and strategies for promoting physical activity after retirement from cricket: A qualitative study

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5 **after retirement from cricket: A qualitative study**
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Abstract

Objectives

The health benefits of professional sport dissipate after retirement unless an active lifestyle is adopted, yet reasons for adopting an active or inactive lifestyle after retirement from sport are poorly understood. Elite cricket is all-encompassing, requiring a high volume of activity and unique physical demands. We aimed to identify influences on physical activity behaviours in active and insufficiently active former-elite cricketers and provide practical strategies for promoting physical activity after cricket retirement.

Design

18 audio-recorded semi-structured telephone interviews were performed. An inductive thematic approach was used and coding was iterative and data-driven facilitated by NVivo software. Themes were compared between sufficiently active and insufficiently active participants.

Setting

All participants formerly played professional cricket in the United Kingdom.

Participants

Participants were male, mean age 57 ± 11 (range 34-77) years, participated in professional cricket for 12 ± 7 seasons and retired on average 23 ± 9 years previously. Ten participants (56%) were classified as sufficiently active according to the UK Physical Activity Guidelines (moderate intensity activity ≥ 150 minutes per week, or vigorous intensity activity ≥ 75 minutes per week). Eight participants did not meet these guidelines and were classified as insufficiently active.

Results

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3 Key physical activity influences were: time constraints; habit formation; intrinsic and
4
5 extrinsic motivation; physical activity preferences; pain/physical impairment; and cricket
6
7 coaching. Recommendations for optimising physical activity across the lifespan after cricket
8
9 retirement included: prioritise physical activity; establish a physical activity plan prior to
10
11 cricket retirement and don't take a break from physical activity; evaluate sources of physical
12
13 activity motivation and incorporate into a physical activity plan; find multiple forms of
14
15 satisfying physical activity that can be adapted to accommodate fluctuations in physical
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17 capabilities across the lifespan; coach cricket.
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20 21 **Conclusions**

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24 Physically active and less active retired cricketers shared contrasting attributes that informed
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26 recommendations for promoting a sustainable, physically active lifestyle after retirement
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28 from professional cricket.
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31 32 **Strengths and limitations of this study**

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- A purposive sampling strategy was utilised to capture contrasting physical activity behaviours and experiences, enabling comparisons between sufficiently active and insufficiently active individuals.
 - The study may have been subjected to selection bias, individuals who desire participation in a qualitative interview may differ from those who decline participation.
 - The interviewer was a physiotherapist with knowledge of cricket and sports medicine and experience in interviewing and building rapport with individuals. Strong rapport enabled participants to share personal perspectives in a reflective and open manner that enriched the findings of this study.

Funding

Dr Filbay was awarded a research fellowship from the Arthritis Research UK Centre for Sport, Exercise and Osteoarthritis to support this research. Dr Arden and Mary Jones have received an unrestricted research grant from the England and Wales Cricket Board. The parent cross-sectional study from which participants were recruited received funding from the Arthritis Research UK Centre for Sport, Exercise and Osteoarthritis, as well as the England and Wales Cricket Board.

Competing interests

Dr Arden and Mary Jones have received an unrestricted research grant from the England and Wales Cricket Board. Dr Peirce is employed as the Chief Medical Officer of the England and Wales Cricket Board. Dr Filbay and Dr Bishop have nothing to disclose.

1 Introduction

2 When an individual adopts an inactive lifestyle, maladaptive responses lead to metabolic
3 dysfunction increasing the risk of developing chronic disease.¹ Physical inactivity increases
4 the relative risk of stroke by 60%, coronary artery disease by 45%, hypertension by 30% and
5 diabetes by 50%, resulting in profound personal, societal and economic costs.² In contrast,
6 regular sport participation is associated with a wide array of psychological, social and
7 physical health benefits.^{3 4} However, the physical benefit of sports participation dissipates
8 following sport cessation; elite athletes who become inactive after retirement from sport face
9 the same, or worse, risk of developing chronic disease as the inactive general population.⁵ If
10 the physical and psychological benefits an athlete obtained through professional sport could
11 be maintained by adopting a physically active lifestyle after retirement, a career in
12 professional sport could pave the way for a fulfilling and active life with multiple health
13 benefits. In order to develop strategies for promoting physical activity after retirement from
14 sport, a greater understanding of reasons for physical inactivity in this population is needed.

15
16 Cricket is a popular team sport played by people of all ages across various continents. A
17 professional cricketer must dedicate a large proportion of daily life to being physically active,
18 as games are often played over entire days and can last up to five consecutive days in
19 duration. During the course of the seven month summer season the playing schedule is
20 relentless and many elite cricketers also play overseas during the winter period. Elite
21 cricketers train during the preseason months and in between games with a mixture of skills
22 practice, aerobic and strength based conditioning. Individuals who become professional
23 cricketers, have typically been training and playing large volumes of cricket since childhood,
24 making cricket an ideal sport to explore physical activity behaviours after retirement.

25

26 The vast majority of cricket-related research has focused on incidence, prevention, prediction
27 and treatment of cricket injuries.⁶⁻¹³ A professional cricket career predisposes players to
28 injury^{6 8 14-17} which also places a professional cricketer at risk of developing osteoarthritis in
29 later life.¹⁸⁻²² Developing symptomatic osteoarthritis after retirement from cricket has
30 potential to negatively impact physical activity levels in former cricketers, although this has
31 not yet been explored. The Professional Cricketers' Association (PCA) published an online
32 report from a past player survey of 506 former cricketers of mean age 49 (range 22 to 86)
33 years.²³ The PCA reported that 88% of former cricketers needed to find work after retiring
34 from cricket and 20% suffered health consequences from playing sport.²³ Transitioning from
35 professional sport to a sedentary profession and health consequences from playing sport have
36 potential to impact physical activity behaviours in former cricketers, although this was not
37 investigated by the PCA. A better understanding of the factors that influence physical activity
38 levels in retired professional cricketers will enable the design of interventions and strategies
39 to support cricketers to adopt a sustainable physically active lifestyle after cricket retirement.
40 Such insights may also be applicable to other professional athletes.

41 The aim of this study was to draw upon retired-cricketers' personal perspectives and
42 experiences to:

- 43 i) identify key influences on physical activity behaviours after retirement from
44 professional cricket in sufficiently active and insufficiently active individuals
- 45 ii) provide practical strategies for promoting a physically active lifestyle after
46 retirement from professional cricket.

47

48 **Methods**

49 This study is reported in accordance with the consolidated criteria for reporting qualitative
50 research (COREQ) guidelines.²⁴

52 **Recruitment**

53 Participants were purposively sampled from a cohort of 187 former elite English cricketers.
54 The cohort had been recruited from the former player membership list maintained by the
55 PCA as part of a cross-sectional retrospective questionnaire study. The questionnaire
56 collected information regarding cricket playing history, injury history, current joint health,
57 medical history and demographics.²⁵ From this larger cohort, 143 participants indicated a
58 willingness to be contacted again and formed the cohort from which participants were invited
59 to the current study. Responses from two items in this questionnaire were used to allocate
60 participants to one of two groups for purposive sampling: i) individuals who strongly agree or
61 agree that participation in cricket has resulted in an increase in current physical activity level
62 (n=46, 42%), or ii) Individuals who strongly agree or agree that participation in cricket has
63 resulted in a decrease in current physical activity levels (n= 27, 25%). This sampling strategy
64 was utilised to capture contrasting physical activity behaviours and experiences to enable
65 comparisons between sufficiently active and insufficiently active individuals. When selecting
66 former cricketers to invite into the study, potential participants were purposely selected to
67 ensure the sample represented men of varying ages. When an individual declined the
68 invitation, a former cricketer of a similar age was invited into the study. Invitations and study
69 information (including study rationale, procedure, dissemination plans and the interviewer's
70 credentials) were sent via email. 42 invitations were sent to eligible participants, 19 received
71 no response, 2 people declined to participate, 2 people were unavailable due to overseas

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3 72 travel and 1 person did not respond to further correspondence despite an initial desire to
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5 73 participate. If no reply was received within two weeks, a new individual was invited into the
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7 74 study.
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11 76 **Ethical considerations**

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15 77 This study was approved by Medical Sciences Inter-divisional Research Ethics Committee
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17 78 (IDREC), University of Oxford (reference number R45197/RE001).
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21 80 **Interviews**

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26 81 Informed verbal consent was obtained from each of the 18 participants prior to performing
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28 82 audio recorded semi-structured telephone interviews (mean duration 26 minutes (range 18 to
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30 83 37 minutes)). All interviews were performed by S.R.F, a female physiotherapist and
31
32 84 postdoctoral researcher with qualitative research experience who had not met the participants
33
34 85 prior to interview. Interviews were transcribed verbatim by a research assistant, an alias was
35
36 86 allocated to each participant and transcripts were de-identified during transcription. The semi-
37
38 87 structured interview guide was pilot tested with three people with cricket experience prior to
39
40 88 ethics approval. This resulted in the addition of three questions (Q2, Q4, Q15) and the
41
42 89 modification of one question (Q17) to assess the perceived relationship between current
43
44 90 quality of life and an individual's past cricket career (Table 1). The interview guide addressed
45
46 91 key areas of interest while allowing the researcher to adapt the interview guide to elicit
47
48 92 relevant and rich information from respondents through probing and prompting.²⁶ Open-
49
50 93 ended questions provided participants with the opportunity to consider personal perspectives
51
52 94 and experiences (Table 1). The interview guide was iteratively adapted throughout the
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54 95 interviews to incorporate any additional issues of importance to respondents (for example, by
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3 96 adding a question to explore their relationship with cricket post-retirement). Participants had
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5 97 the opportunity to contribute any additional information at the end of the interview.
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99 **Table 1.** Semi-structured interview guide

1. Can you describe any physical activity, exercise or sport that you currently take part in?

2. Has that remained fairly constant since you retired from cricket or has it changed over the years?

3. Have you played cricket again since retiring? Why/why not?

4. What was your motivation for playing cricket?

5. Are you as physically active as you would like to be? If no, why not? How does this make you feel?

6. What is your motivation for taking part in physical activity/exercise/sport?

7. How important is being physically active to you? (If important, why is it important? / If not important, has it always been this way?)

8. Does the type of physical activity that you do matter to you, or would you be satisfied taking part in any form of physical activity?
(ask about specific forms of exercise that they find *dissatisfying* and why)

9. What physical activity goals are you currently trying to achieve, if any?

10. What are the barriers or challenges, if any, that impact on your ability to be physically active?

11. Do you think that retired cricketers face the same challenges with being physically active as the general population, or are they unique or different in some way?

12. Some retired cricketers become physically inactive, what advice would you give to help them maintain a physically active lifestyle after retiring from cricket?

13. If you wanted to increase your physical activity levels, what do you think would help you to do so?

14. Can you describe any positive or negative impacts that your previous participation in cricket has had upon your current physical activity patterns?

15. If you hadn't played professional cricket, do you think that you would be more or less active, than you currently are?

16. Does your current ability to participate in physical activity impact upon your quality of life? If yes, in what ways? If no, why not?

17. Overall how satisfied are you with your current quality of life?

Do you think that this is related to your past career in cricket?

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3 18. Is there anything more you would like to add about your experiences with physical activity
4 after retiring from professional cricket?
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8 101 Data saturation was achieved by the 14th interview, defined a priori as the point at which no
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10 102 new themes were identified from four consecutive interviews (two from participants with
11
12 103 increased physical activity and two from participants with decreased physical activity). Once
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14 104 data saturation was reached, an additional four interviews were performed to expand upon
15
16 105 ideas and themes after following the semi-structured interview guide. If these final interviews
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18 106 resulted in the identification of new themes, additional interviews were planned until data
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20 107 saturation was again satisfied. No new themes emerged from these additional four interviews
21
22 108 affirming data saturation. Data from all 18 interviews were used for analysis.
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110 **Analysis procedure**

111 The analysis procedure is summarised in Figure 1. An inductive thematic approach was
112 used^{27 28} facilitated by NVivo version 11 software.²⁹ A study journal was used to summarise
113 each interview and reflect upon initial ideas. Transcripts were read multiple times with
114 accompanying audio to identify all information potentially relevant to the research aims.³⁰
115 This information was coded into multiple categories to be later refined and analysed for
116 themes.²⁷ Data coding was iterative and data-driven, performed without engagement with
117 literature to avoid sensitization to themes and without reference to a pre-existing coding
118 structure.^{27 30}

119 During subsequent stages of analysis, the data was further analysed for repeated patterns,
120 codes were sorted into a hierarchical structure representing themes and subthemes,
121 overlapping themes were merged, and those outside the scope of the current study were filed
122 separately. These themes and sub-themes were repeatedly reviewed and refined to confirm

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3 123 external heterogeneity and internal homogeneity within themes and to ensure an accurate
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5 124 representation of the entire dataset. The study journal was also revisited to check that themes
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7 125 accurately reflected the key issues discussed by participants.^{27 31} Themes were compared
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10 126 amongst sufficiently active and insufficiently active participants to better understand factors
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12 127 influencing physical activity behaviors.

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15 128 A selection of six transcripts representing participants with diverse physical activity patterns
16
17 129 were analysed by a second investigator (F.L.B) blinded to the coding structure developed by
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19 130 the first author (S.R.F). A meeting was then held between investigators and agreement was
20
21 131 achieved regarding key themes in relation to these transcripts. Although no modifications
22
23 132 were made to the coding structure following this meeting, the second investigator contributed
24
25 133 to the consolidation and interpretation of key themes. Key themes and strategies for
26
27 134 promoting physical activity will be described with reference to participant quotes^{27 31} and in
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29 135 relation to relevant participant characteristics (i.e. physical activity level,
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31 136 satisfaction/dissatisfaction with activity level and the presence/absence of joint pain).

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38 138 Insert Figure 1.

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42 43 44 140 **Physical activity classification**

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47 141 To enable comparison of physical activity behaviors and perspectives in active and less active
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49 142 counterparts, participant descriptions of current activity level over a typical week were used
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51 143 to categorise participants into ‘sufficiently active’ (meeting the UK Physical Activity
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53 144 Guidelines³²) and ‘insufficiently active’ (not meeting the UK Physical Activity Guidelines³²)
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55 145 groups. Participants were asked to describe any ‘physical activity, exercise or sport’ that they
56
57 146 currently take part in and were prompted to provide details regarding activity type, duration,
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3 147 intensity and frequency and to assure responses reflected a typical week. The UK Physical
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5 148 Activity Guidelines recommend adults undertake moderate intensity activity at least 150
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7 149 minutes per week, or vigorous intensity activity at least 75 minutes per week for health
8
9 150 enhancing benefits including reduced susceptibility and burden from chronic disease.³²
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11 151 Physical activity type was categorised into moderate or vigorous intensity with reference to
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13 152 previous recommendations in accordance with Centers for Disease Control (CDC) and
14
15 153 American College of Sports Medicine (ACSM) guidelines.³³
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21 22 155 **Participant characteristics**

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25 156 Participants were all male, aged a mean 57±11 (range 34 to 77) years and had been retired
26
27 157 from professional cricket for an average 23±9 (range 7 to 38) years. Ten participants were
28
29 158 sufficiently active, meeting or exceeding the UK Physical Activity Guidelines and eight
30
31 159 participants were insufficiently active to meet these guidelines. One in two (n=9, 50%) would
32
33 160 prefer to be participating in a greater volume of physical activity. Ten participants reported
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35 161 having received a diagnosis of osteoarthritis and 15 participants experienced joint pain (n=6
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37 162 had not been diagnosed with osteoarthritis). Full participant characteristics are presented in
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40 163 Table 2.
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165 **Table 2** Participant characteristics

Alias	Age range ¹	Years post retirement ¹	UK professional seasons ¹	BMI	Joint pain	OA	TJR	Meeting physical activity guidelines	Are you as active as you would like to be?
Dan	56 to 60	26 to 30	6 to 10	Normal	Yes	Yes	No	Yes	Yes
Dom	61 to 65	26 to 30	16 to 20	Obese	No	Yes	Yes	Yes	Yes
Gus	56 to 60	11 to 15	1 to 5	Overweight	No	No	No	Yes	No
Guy	46 to 50	21 to 25	1 to 5	Obese	Yes	No	No	Yes	No
Jim	66 to 70	21 to 25	21 to 25	Overweight	Yes	Yes	Yes	Yes	Yes
Joe	61 to 65	31 to 35	16 to 20	Overweight	No	No	No	Yes	Yes
Lee	46 to 50	11 to 15	6 to 10	Overweight	Yes	No	No	Yes	No
Leo	76 to 80	36 to 40	1 to 5	Normal	Yes	Yes	Yes	Yes	Yes
Ned	56 to 60	16 to 20	16 to 20	Overweight	Yes	No	No	Yes	Yes
Tim	36 to 40	6 to 10	NR	Overweight	Yes	Yes	No	Yes	Yes
Ben	56 to 60	21 to 25	11 to 15	Overweight	Yes	Yes	Yes	No	No
Cam	51 to 55	26 to 30	1 to 5	Overweight	Yes	No	No	No	No
Fin	31 to 35	6 to 10	6 to 10	Overweight	Yes	No	No	No	No
Ken	56 to 60	26 to 30	6 to 10	Overweight	Yes	Yes	No	No	Yes
Ric	66 to 70	16 to 20	1 to 5	Obese	Yes	Yes	Yes	No	No
Ron	51 to 55	16 to 20	16 to 20	Normal	Yes	Yes	No	No	Yes
Sam	56 to 60	21 to 25	16 to 20	Overweight	Yes	Yes	No	No	No
Wes	66 to 70	26 to 30	21 to 25	Overweight	Yes	No	No	No	Yes

166

167 Note, participants above the horizontal line were meeting the UK Physical Activity
 168 Guidelines³² and participants below the horizontal line were not; ¹ Ranges were reported
 169 rather than absolute values to assure participants' anonymity; NR = Not reported; UK
 170 professional seasons = number of seasons playing professional cricket in the UK; BMI (body
 171 mass index) = categorised with reference to WHO international classification guidelines
 172 (normal weight: 18.9–24.9 kg/m², overweight: 25.0–29.9 kg/m², obese: ≥30.0 kg/m²)³⁴;
 173 Joint pain = 'Do you experience pain, discomfort, or have a problem with your: hip(s) or
 174 groin, knee(s), ankle(s), spine (back or neck), shoulder(s), elbow(s), wrist(s), finger(s) or
 175 hand(s)'; OA (osteoarthritis) = 'Have you ever been told you have wear and tear,

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3 176 degeneration or osteoarthritis by a doctor?'; TJR (total joint replacement) = have you ever
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5 177 had joint replacement surgery?
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11 179 **Results**
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17 181 **Key influences on physical activity behaviours after retirement from professional**
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19 182 **cricket**
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25 184 ***Time constraints***
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27 185 The most common physical activity barrier identified by retired cricketers who expressed that
28
29 186 they would like to be more active, was time constraints. Many participants were working long
30
31 187 hours in sedentary professions which was a stark contrast from life as a professional cricketer
32
33 188 and resulted in difficulty finding the time to be physically active.
34

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36
37 189 *Cam: 'work takes up too much time, office based. I don't necessarily get as much time*
38 190 *as I'd like either before, during or after work to, you know, do some physical activity,*
39 191 *other stuff has to take priority.'*

40
41 192 (51-55 years old, insufficiently active, dissatisfied with activity level, current joint
42 193 pain)
43

44 194
45

46 195 *Lee: 'It's time, you know, I came out of cricket, in my 30's and you try and find your*
47 196 *way and then you try set up a business and that sort of takes over really, so some days*
48 197 *you just don't, you don't get chance to go out there and do things so readily.'*

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50 198 (46-50 years old, sufficiently active, dissatisfied with activity level, current joint pain)
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3 200 In contrast, participants who were sufficiently active and satisfied with their physical activity
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5 201 levels prioritised physical activity, and irrespective of work and family commitments,
6
7 202 allocated time to be physically active on a daily basis.
8
9

10 203 Dan: *'You know time is limited and you have to vacate your time appropriately, but as*
11 204 *long as you can build that into your regular routine then it doesn't tend to be so much*
12 205 *of a problem.'*

13
14 206 (56-60 years old, sufficiently active, satisfied with activity level, current joint pain)
15
16
17 207

18 208 Interviewer: Have you ever struggled with regards to having enough time to exercise?
19

20 209 Joe: *No, always make time.*
21

22 210 (61-65 years old, sufficiently active, satisfied with activity level, no joint pain)
23
24 211

25 26 212 **Habit formation**

27
28 213 Retired cricketers not meeting the physical activity guidelines who were dissatisfied with
29
30 214 their current physical activity level, had difficulty establishing an exercise routine and
31
32 215 integrating regular physical activity into their daily life. These individuals described adopting
33
34 216 "poor habits" early after retirement that were difficult to break when physical activity desires
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36 217 changed.
37
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40 218 Fin: *'Part of it I think it's habit and routine to be honest. Because saying I haven't got*
41 219 *time for it is a lame excuse, because a lot of people work full time. Part of it is I've*
42 220 *just got into such a bad habit and it's just mentally getting back into that, into sort of*
43 221 *the boredom of physical activity.. ...So I enjoyed having the break, but then obviously*
44 222 *following on from that I never really turned it back around. So it was a choice to start*
45 223 *with but then but it was a bad choice because it then meant that I didn't do anything..*
46 224 *..I then found it hard to find any kind of routine where it meant I actually went to the*
47 225 *gym or did some activities.'*

48
49 226 (31-35 years old, insufficiently active, dissatisfied with activity level, current joint
50 227 pain)
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3 229 On the other hand, sufficiently active participants had formed strong physical activity habits
4
5 230 by integrating physical activity into their daily routine.
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8 231 Joe: *'There's not a lot more I could do really, you know, I try and do 10,000 steps a*
9 232 *day, I cycle twice a week, I go to the gym a couple of times a week...I'm sort of set in*
10 233 *my routine if you will.'*

11
12 234 (61-65 years old, sufficiently active, satisfied with activity level, no joint pain)
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17 236 ***Intrinsic and extrinsic motivation***
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20 237 Sources of motivation to undertake physical activity differed between retired cricketers with
21
22 238 contrasting activity levels. Cricketers who were not meeting the physical activity guidelines
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24 239 despite expressing dissatisfaction with current activity levels, relied on others for motivation
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26 240 to participate in physical activity.
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30 242 Interviewer: 'Is cricket still a part of your life, today?'

31
32 243 Cam: *'Not really, although I have a six year old son, so it's starting to come back in*
33 244 *because I am starting to take him and, and practice with him and coach him and stuff*
34 245 *like that, so but no it hasn't really been part of my life at all for the last 10 years.'*

35
36
37 246 (51-55 years old, insufficiently active, dissatisfied with activity level, current joint
38 247 pain)
39

40 248
41 249 Ric: *'Well I'm ashamed to admit it but not many at the moment, as I said I need to*
42 250 *shake myself and get up and get out and do something a bit more and I think my wife*
43 251 *will galvanise me and say right we are off for a fast walk for 2 or 3 miles, 2 or 3 times*
44 252 *a week to try and sort of get back to what we were doing.'*

45
46
47 253 (66-70 years old, insufficiently active, dissatisfied with activity level, current joint
48 254 pain)
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3 256 Participants who were insufficiently active and expressed little or no desire to increase
4
5 257 activity levels did not see physical activity as congruent with their current sense of self or
6
7 258 identity and were lacking internal motivation to exercise.
8
9

10 259 Interviewer: If you wanted to increase your physical activity levels, what do you think
11
12 260 would help you to do so?

13 261 Ron: *'..there isn't really anything you know, maybe my kids.. .. as long as my mind is*
14 262 *active, physical activity, you know, isn't something that, it's never really jumped out*
15 263 *at me. ..I would say quality of life is pretty good and I don't really have any desire to*
16 264 *put on a tracksuit at 52 and become a trendy middle aged man who goes for a jog*
17 265 *around the block, like I see many people doing.'*

20 266 (51-55 years old, insufficiently active, satisfied with activity level, current joint pain)

22 267

24 268 Ken: *'Um, I don't know a 25 year-old girlfriend who wanted to go cycling. Yeah, I*
25 269 *know that sounds flippant; but it's probably true.'*

28 270 (56-60 years old, insufficiently active, satisfied with activity level, current joint pain)

30 271

31 272 In contrast, people meeting or exceeding the physical activity guidelines who were satisfied
32
33 273 with their current activity level, described intrinsic sources of motivation and emphasised the
34
35 274 importance of physical activity in maintaining optimal mental and physical wellbeing across
36
37 275 the lifespan.
38
39

41 276 Leo: *'I do it because I love it. I don't do it because I have to do it, but I am not like*
42 277 *some of my friends who say, look I've got to go to walk this morning or I've got to go*
43 278 *to the gym and swim for half an hour and I've got to do my weights and all this type*
44 279 *of thing, I do it because I love it. I simply love it. If I don't exercise and do the things*
45 280 *that I like I get quite, I can actually get quite crotchety and short tempered because I*
46 281 *feel frustrated.'*

49 282 (76-80 years old, sufficiently active, satisfied with activity level, current joint pain)

51 283

53 284 Ned: *'I can only go from how I feel personally. I mean I feel a lot better doing some*
54 285 *form of exercise.. ..you know I think physically you feel better also mentally for the*
55 286 *rest of your life, whatever you're doing, you know certainly for me it's a very*
56 287 *important part of keeping myself motivated in life as much as anything I guess.'*
57
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3 288 (56-60 years old, sufficiently active, satisfied with activity level, current joint pain)

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7
8 290 ***Physical activity preferences***

9
10 291 Individuals not meeting the physical activity guidelines commonly expressed experiencing
11
12 292 little enjoyment partaking in unaccompanied recreational exercise such as cycling and gym-
13
14 293 based activities, with a preference to be active through sport participation. Some
15
16 294 insufficiently active individuals described having never enjoyed maintaining fitness or the
17
18 295 monotonous aspects of cricket training, but participated reluctantly in order to get out on the
19
20 296 field and play cricket which brought them great satisfaction.

21
22
23
24 297 *Fin: 'The gym side and the physical side of professional sport was the bit that I liked*
25 298 *the least.. So I was almost rebelling if you like, saying 'haha', I don't have to do this*
26 299 *anymore, so I'm not going to. But it was a dreadful decision really. Because it's*
27 300 *obviously not very good for you. ..The monotony of going to the gym and doing half*
28 301 *an hour on the treadmill for example, I can't physically do it. Actually that's wrong I*
29 302 *can physically do it, I can't mentally do that. So the type has to be sort of something I*
30 303 *enjoy and I guess that's why I do football really, because I enjoy that and it's*
31 304 *competitive. I don't find the going to the gym scenario a very appealing one.'*

32
33 305 (31-35 years old, insufficiently active, dissatisfied with activity level, current joint
34 306 pain)

35 307

36 308

37
38
39 309 *Ken: 'I enjoyed playing the sport; I will admit that I never enjoyed getting fit for it,*
40 310 *but it was something you had to do and when it's no longer your living and there is no*
41 311 *need to get up at 6 o'clock and go running or doing other, you know fitness exercises*
42 312 *or whatever, it was a tremendous relief, shall we say.'*

43
44 313 (56-60 years old, insufficiently active, satisfied with activity level, current joint pain)

45 314

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51 315 In contrast, sufficiently active individuals participated in some form of independent
52
53 316 recreational activity, such as cycling, running or gym-based exercise. For these individuals,
54
55 317 participating in physical activity was more important than the specific type of exercise, and

1
2
3 318 most were willing to sacrifice some enjoyment if physical limitations led them to substitute
4
5 319 their favourite form of exercise for a less preferred form of exercise to enable continuation of
6
7 320 a physically active lifestyle.
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9

10 321 Joe: *'I've always run, I've always' run... but like I say now I can't, I haven't done it*
11 322 *for about two years, so I am making do with cycling now. I mean I still get a buzz out*
12 323 *of it, but it's not the same as running. I just like, you know, to do something.'*

14 324 (61-65 years old, sufficiently active, satisfied with activity level, no joint pain)
15
16
17 325

18 326 Ned: *'I'd be happy to do anything I'm capable of doing, but I've kind of got you know*
19 327 *my routines now and obviously I vary the aerobic work depending on umm, you know*
20 328 *how I feel really.'*

22 329 (56-60 years old, sufficiently active, satisfied with activity level, current joint pain)
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25 330
26
27

28 331 ***Pain and physical impairment***

29
30 332 Despite most individuals experiencing pain and physical impairment, this did not prevent
31
32 333 participants from being physically active. Rather, for some individuals, pain and physical
33
34 334 impairment affected the type of activity they chose to take part in and imposed limitations
35
36 335 participating in higher impact activities.
37
38

39 336 Leo: *'I would like to be able to get out there and run for 40-50 minutes without any*
40 337 *knee problem and pain and going under the knife. But then I am thinking about*
41 338 *having one done so I can run in marathons or half marathons when I'm over 80 and*
42 339 *among that age group.'*

44 340 (76-80 years old, sufficiently active, satisfied with activity level, current joint pain)
45
46
47 341

48
49 342 Lee: *'Yeah, yeah I mean I can get by with my knees, but like my hip, my left hip is shot*
50 343 *really, so you know if there are certain things I do, I'm hobbling around for a good*
51 344 *week afterwards and you know it just stops me sort of doing anything too extreme.'*

52 345 (46-50 years old, sufficiently active, dissatisfied with activity level, current joint pain)
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3 347 **Cricket coaching**
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5 348 All six retired cricketers who regularly coached cricket, were able to maintain a physically
6
7 349 active lifestyle. This in part, was due to active involvement in training drills and warm-up
8
9
10 350 sessions. Being around a sporting environment provided motivation to maintain fitness, and
11
12 351 coaching cricket provided the time and resources needed to do so.
13

14
15 352 Ned: *'I think being in a professional environment encourages you to obviously stay*
16 353 *fit, you know, you're around professional athletes so you don't want to look fat and*
17 354 *incapable of doing your job. So I think that motivates me to keep training. ..at least*
18 355 *with this job I've got time to train, you know, I can do it in the hours that suit me as*
19 356 *opposed to having to wait until I finish work at you know 6 o'clock or whatever.'*

20
21
22 357 (56-60 years old, sufficiently active, satisfied with activity level, current joint pain)
23

24 358

25
26 359 Dom: *'I know that my physical activity, I can compensate or counter it by coaching,*
27 360 *because I can do more active sessions involving myself if I need to and set standards*
28 361 *in that, so I drive other people to do what I think they should be achieving.'*

29
30 362 (61-65 years old, sufficiently active, satisfied with activity level, no joint pain)
31

32 363

33
34 364 The positive impact of cricket coaching on physical activity levels was further demonstrated
35
36 365 by Sam, who described having been active while he was coaching cricket, but was no longer
37
38 366 meeting the physical activity guidelines since he stopped coaching.
39

40
41 367 Sam: *'I coached there for just under 19 years, so you know I was quite active with the*
42 368 *lads there... ..I used to hit all the catches and do all the fielding drills for the cricket*
43 369 *team... it was just like part of my life, when the lads started I'd join in or some days*
44 370 *the lads wouldn't be in at all, so I would then make an effort and go to the gym and do*
45 371 *stuff and I had my own routines, so yeah, it was quite active really. But I retired.. so I*
46 372 *haven't, so I've sort of done less exercise.'*

47
48
49 373 (56-60 years old, insufficiently active, dissatisfied with activity level, current joint
50 374 pain)
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52 375

53
54 376 **Practical strategies for promoting a physically active lifestyle after retirement**
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3 377 A number of suggestions were made by participants regarding strategies for adopting an
4
5 378 active lifestyle after retirement from cricket and other useful information arose from
6
7 379 exploring factors influencing physical activity choices. This information guided five
8
9 380 recommendations for optimising physical activity across the lifespan after retiring from
10
11 381 professional cricket.

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17 383 ***Prioritise physical activity***

18
19 384 Retirement from sport may mark a pivotal point in one's life where decisions surrounding
20
21 385 physical activity have great potential to impact physical activity levels and health in later life.
22
23 386 Prioritising physical activity may be a means to overcome the most commonly acknowledged
24
25 387 barrier to being more physically active in this sample of retired cricketers, time constraints.

26
27
28
29 388 Leo: *'There is no excuse for people not keeping fit after playing professional cricket,*
30 389 *no excuse at all. If you're a married man, kids, things like that, people work long*
31 390 *hours these days, how do you squeeze it in? Well you squeeze it in by doing a 25*
32 391 *minute run whilst your kids are in the bath, you come back and take them out and dry*
33 392 *them and put them to bed and help mum, that type of thing.'*

34
35
36 393 (76-80 years old, sufficiently active, satisfied with activity level, current joint pain)

394

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38
39 395 ***Establish a physical activity plan prior to retirement and don't take a break from physical***
40
41 396 ***activity***

42
43
44 397 Establishing a physical activity plan prior to retirement and advice to not take a break from
45
46 398 physical activity after retirement were suggested by participants as strategies to encourage
47
48 399 adoption of routines and habits that are conducive to living a physically active life.

49
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51
52 400 Gus: *'Well, I think you have, you have two choices, you have your own choice and I*
53 401 *think it's really that choice of, of getting off your back side and having a plan. You*
54 402 *know you must have a plan for your well-being, but you know it's fitness as you get*
55 403 *older just doesn't happen, we all think we are invincible when we are 21 and you*
56 404 *know, getting on with our lives, but the reality strikes I suppose. You need a plan and*
57 405 *I think if you're that way organised, you can go and get some support as well, find a*

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3 406 *buddy and do it, that's the key.*'

4
5 407 (56-60 years old, sufficiently active, dissatisfied with activity level, no joint pain)

6
7 408

8
9 409 Fin: *'The advice I would give from my personal experience is to, to get into the habit*
10 410 *of doing something regularly straight away. That is the advice I would give.'*

11 411 (31-35 years old, insufficiently active, dissatisfied with activity level, current joint
12 412 pain)

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15 413

16
17 414 ***Evaluate sources of physical activity motivation and incorporate these into a physical***

18
19 415 ***activity plan***

20
21 416 When establishing a physical activity plan, cricketers may benefit from evaluating sources of

22
23 417 physical activity motivation. People who are externally motivated could benefit from

24
25 418 tailoring activity choices to satisfy their external sources of motivation (for example,

26
27 419 coaching a cricket team, exercising with family or friends, or committing to an exercise group

28
29 420 or sports team). Other individuals who are motivated by a desire to compete may be best

30
31 421 suited to specific activities that satisfy competitive desires without exacerbating joint pain

32
33 422 and function.

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38 423 Lee: *'I think the big thing for people is finding something that, that clicks with them,*
39 424 *that just catches their imagination when they're playing it and so for me, you know,*
40 425 *golf is something that does that, surfing is something that is a totally different thing*
41 426 *which I learnt after I played cricket... I think that's the crux of it, it's finding*
42 427 *something that just keeps you motivated to get out there and enjoy yourself really.'*

43
44 428 (46-50 years old, sufficiently active, dissatisfied with activity level, current joint pain)

45
46 429

47 430 Ben: *'What advice would I give them? Just to maintain your interest in the game if*
48 431 *you can, or some aspect of any game, just to fulfil your sort of competitive instincts if*
49 432 *they still remain.'*

50
51
52 433 (56-60 years old, insufficiently active, dissatisfied with activity level, current joint
53 434 pain)

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3 436 ***Find multiple, satisfying forms of physical activity that can be adapted to accommodate***
4
5 437 ***fluctuations in physical capabilities across the lifespan***
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8 438 Physical activity plans should include multiple sources of satisfying physical activity,
9
10 439 alternative sources of physical activity may be required if preferred activities become limited
11
12 440 due to age, joint pain or physical limitations.
13

14
15 441 *Guy: 'I think you need to try and find something that is linked to that and gives you*
16 442 *that same satisfaction and same buzz and that same adrenalin rush, but is mirrored*
17 443 *with your body and your age and your lifestyle. And I think trying to find that is not*
18 444 *easy, but that's one thing that I have certainly found with surfing, is that I want to try*
19 445 *and compete and be good at it and.. you don't have to worry about an age thing, it's*
20 446 *not necessarily a barrier to being good and competing and so that would be my*
21 447 *advice.'*
22
23

24 448 (46-50 years old, sufficiently active, dissatisfied with activity level, current joint pain)
25

26 449
27

28 450 *Jim: 'I'm going down this afternoon and I'm quite looking forward to it. I'm going to*
29 451 *have to change what I do because my ankles are a bit sore, I've been on the bike*
30 452 *perhaps too much pressure on, and I'll have to go on a rowing machine and have a*
31 453 *swim. So it's that sort of thing, if I go on the rowing machine too much my back starts*
32 454 *to ache, so I've got to go back on the bike.'*
33
34

35 455 (66-70 years old, sufficiently active, satisfied with activity level, current joint pain)
36

37 456
38
39

40 457 ***Coach cricket***

41
42 458 Cricketers who are concerned about maintaining an active lifestyle could consider cricket
43
44 459 coaching. All coaches in this study were meeting the Physical Activity Guidelines.
45
46

47 460 *Gus: 'Well everyone always gives the reason that, or gives the excuse that there are*
48 461 *not many coaching jobs. Well there is perhaps not many coaching jobs at the top end,*
49 462 *but there are coaching jobs out there and with the resources that the players have to*
50 463 *be able to get qualified as coaches during the period that they are playing, and these*
51 464 *courses are paid for, I mean that's what I did, I got myself qualified in that sense and*
52 465 *it allowed me to sort of seamlessly move into a coaching career.'*
53
54

55 466 (56-60 years old, sufficiently active, dissatisfied with activity level, no joint pain)
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3 468 **Discussion**
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6 469 Retired cricketers' personal perspectives and experiences have enabled identification of key
7
8 470 influences on physical activity behaviours. These were i) time constraints; ii) habit formation;
9
10 471 iii) intrinsic and extrinsic motivation; iv) physical activity preferences; v) pain and physical
11
12 472 impairment; and vi) cricket coaching. A number of suggestions were made by participants
13
14 473 regarding strategies for adopting an active lifestyle after retirement and other useful
15
16 474 information arose from exploring factors influencing physical activity choices. This
17
18 475 information guided five recommendations for optimising physical activity across the lifespan
19
20 476 after retiring from professional cricket: i) prioritise physical activity; ii) establish a physical
21
22 477 activity plan prior to retirement and don't take a break from physical activity; iii) evaluate
23
24 478 sources of physical activity motivation and incorporate these into a physical activity plan; iv)
25
26 479 find multiple, satisfying forms of physical activity that can be adapted to accommodate
27
28 480 fluctuations in physical capabilities across the lifespan; v) coach cricket.
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35
36 482 **Key influences on physical activity behaviours**
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39 483 Several factors influencing physical activity choices were not unique to retired professional
40
41 484 cricketers. Time constraints have been identified as a barrier to physical activity in other male
42
43 485 groups including those living in rural areas³⁵, university employees,³⁶ prostate cancer
44
45 486 patients³⁷ and African-Americans.^{38 39} Additionally, intrinsic forms of motivation have been
46
47 487 shown to predict long-term exercise adherence in a variety of samples.³⁹ A strong preference
48
49 488 for competitive sport over recreational exercise was found to be a risk factor for adopting an
50
51 489 inactive lifestyle 5-20 years after ACL reconstruction in people with knee difficulties.⁴⁰
52
53 490 Although these barriers to physical activity may be applicable to the general population, the
54
55 491 characteristics of retired-cricketers are different from the general population. The journey
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3 492 from playing youth cricket to retiring from professional cricket exposes an individual to a
4
5 493 high volume of physical activity and results in the refinement of physical skill and
6
7 494 psychological attributes necessary to perform at an elite level. Another key difference
8
9
10 495 between an elite athlete and the general population is that retirement from professional sport
11
12 496 provides a novel opportunity where effort can be directed to optimise the likelihood that a
13
14 497 retiring athlete transitions into a physically active lifestyle, and maintains it throughout later
15
16 498 life.
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22 500 On the other hand, contrasts were evident regarding the relationship with joint pain and
23
24 501 physical activity in our sample of retired-cricketers and previous research in this area. A
25
26 502 review of the literature confirms that individuals with osteoarthritis are less active than those
27
28 503 without⁴¹ and osteoarthritis is often perceived by those with the disease as a barrier to
29
30 504 physical activity.⁴² A proportion of people living with osteoarthritis, express a misconception
31
32 505 that exercise will exacerbate osteoarthritis symptoms, and hold pain-avoidance behaviors
33
34 506 which become a barrier to being physically active.^{43 44} In contrast, former elite cricketers did
35
36 507 not express such beliefs, and osteoarthritis or joint pain did not prevent participants from
37
38 508 being physically active. It is possible that exposure to professional cricket, desensitized
39
40 509 participants to exercising through pain or discomfort. Another contributing factor may be the
41
42 510 common attributes that these retired cricketers possess, including resilience, a positive
43
44 511 outlook, high quality of life, increased body awareness and an ability to adapt activity choices
45
46 512 in line with physical capabilities which may enhance one's ability to be active in the presence
47
48 513 of chronic joint pain.⁴⁵ This is in line with previous research that identified psychological
49
50 514 factors as a stronger determinant of physical activity levels than pain severity in individuals
51
52 515 with osteoarthritis and chronic pain.^{42 46 47} These findings support further research into the
53
54 516 relationship between physical activity, joint pain and quality of life in retired athletes.
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6 518**Practical strategies for promoting a physically active lifestyle after retirement**

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8
9 519 Retiring cricketers could benefit from being informed of the importance of prioritising and
10
11 520 maintaining a physically active lifestyle after retirement from cricket. Education may assist
12
13 521 with forming intentions to facilitate behavior change and healthy habit formation.⁴⁸ Planning
14
15 522 can help to overcome the difficult step of translating intentions into actions, which can lead to
16
17 523 habit formation.⁴⁹ Making physical activity behaviors habitual has several benefits; forming a
18
19 524 habitual physical activity behavior may reduce the effort required to take part in an activity
20
21 525 and promotes continuation of that activity even in times where motivation and self-control
22
23 526 are exhausted.^{48 50} Specific tools exist which could be used to enable identification of
24
25 527 individuals with poor physical activity habits and assess the effectiveness of interventions
26
27 528 aimed at facilitating new physical activity habits or changing old habits.⁵⁰ Such interventions
28
29 529 could draw upon habit-formation principles such as utilising repetition, linking activity to
30
31 530 consistent cues and performing activity in a similar context to promote automaticity.⁴⁸
32
33 531 Changes to an individual's environment or living circumstance (such as retiring from
34
35 532 professional cricket and transitioning to post-retirement life) provides an opportune time to
36
37 533 implement behavior change and habit formation strategies.⁴⁸

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45 535 Retiring and former cricketers could also benefit from evaluating what motivates them to be
46
47 536 physically active and identifying multiple sources of physical activity tailored to their unique
48
49 537 needs and motivations. For individuals largely motivated by competitive team-based
50
51 538 environments this may be of particular importance, since some individuals take many years to
52
53 539 identify alternative sources of satisfying physical activity after ceasing competitive sport.⁴⁰
54
55 540 This has potential to result in adoption of an inactive lifestyle with negative impacts on health
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2
3 541 and quality of life.⁴⁰ Retiring and former cricketers who lack intrinsic motivation to be active,
4
5 542 could benefit from interventions to foster intrinsic motivation toward physical activity. Such
6
7 543 interventions may draw upon self-determination theory (SDT) and cognitive evaluation
8
9 544 theory (CET), which emphasise the importance of satisfying an individual's need for
10
11 545 competence and autonomy in order to foster intrinsic motivation.⁵¹ Retiring and former
12
13 546 cricketers who are externally motivated may also benefit from establishing a physical activity
14
15 547 plan that incorporates external sources of motivation (such as coaching, team sport or group
16
17 548 exercise). All coaches in this study were meeting the Physical Activity Guidelines, yet the
18
19 549 positive relationship between cricket coaching and physical activity may be overlooked when
20
21 550 this option is considered prior to retiring and transitioning from professional cricket.
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551

552 **Strengths and potential limitations**

553 Our purposive recruitment strategy may have reduced the generalisability of results since
554 retired-cricketers reporting uncertainty regarding the impact of cricket upon their physical
555 activity level were not invited into the study. The study may have been subjected to selection
556 bias, individuals who desire participation in a qualitative interview study may share specific
557 attributes that differ from those who decline participation. Notably, six participants reported
558 joint pain without a diagnosis of osteoarthritis and participants spoke about pain and physical
559 impairments as opposed to osteoarthritis in relation to physical activity. For these reasons, we
560 refer to 'pain and physical impairment' rather than osteoarthritis in the results section but
561 draw upon osteoarthritis literature to aid with interpretation of findings. We also
562 acknowledge that using self-report to assess physical activity levels and categorise
563 participants into sufficiently active and insufficiently active groups has limitations.
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3 565 of information presented to the reader regarding highly active, and completely inactive
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5 566 individuals. Participants were not contacted after the initial interview for correction or further
6
7 567 comment, these procedures could have elicited additional insights beyond those gained
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9
10 568 through the interviews.

11
12 569 This was the first study to explore physical activity in former elite cricketers. The interviewer
13
14 570 was a physiotherapist with knowledge of cricket and sports medicine and experience in
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16
17 571 interviewing and building rapport with individuals. Strong rapport enabled participants to
18
19 572 share personal perspectives in a reflective and open manner that enriched the findings of this
20
21 573 study.
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24 574

25 26 27 575 **Conclusion**

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30 576 This study highlights key influences on physical activity behaviours in retired professional
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32 577 cricketers and provides practical strategies to support retiring and former cricketers to adopt
33
34 578 sustainable, physically active lifestyles.
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38 39 40 580 **Acknowledgments**

41
42 581 We would like to thank the retired cricketers who took part in the interviews. We would like
43
44 582 to acknowledge Angus Porter and the Professional Cricketers' Association (PCA) for
45
46
47 583 assisting with recruitment and questionnaire development for the larger cross-sectional study
48
49 584 from which study participants were purposively recruited.
50

51
52 585

53 54 55 586 **Author contributions**

1
2
3 587 SRF, FLB, NP, NKA conceived and designed this qualitative study. SRF, MEJ recruited
4
5 588 participants and extracted data form the cross-sectional cohort. SRF performed all interviews.
6
7 589 SRF, FLB participated in the analysis. SRF drafted the first version of the manuscript. All
8
9 590 authors contributed in revising the manuscript and gave their final approval of the submitted
10
11 591 version.
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17
18 593 **Data sharing**

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20 594 To view interview transcripts or additional participant quotes, please contact the
21
22 595 corresponding author.
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References

1. Booth FW, Lees SJ. Fundamental questions about genes, inactivity, and chronic diseases. *Physiological genomics* 2007;**28**(2):146-57.
2. Katzmarzyk PT, Janssen I. The economic costs associated with physical inactivity and obesity in Canada: an update. *Can J Appl Physiol* 2004;**29**(1):90-115.
3. Eime RM, Young JA, Harvey JT, et al. A systematic review of the psychological and social benefits of participation in sport for adults: informing development of a conceptual model of health through sport. *International Journal of Behavioral Nutrition and Physical Activity* 2013;**10**.
4. Eime RM, Young JA, Harvey JT, et al. A systematic review of the psychological and social benefits of participation in sport for children and adolescents: informing development of a conceptual model of health through sport. *International Journal of Behavioral Nutrition and Physical Activity* 2013;**10**.
5. Witkowski S, Spangenburg EE. Reduced physical activity and the retired athlete: a dangerous combination? *British Journal of Sports Medicine* 2008;**42**(12):952-53.
6. Orchard JW. Injury surveillance in cricket. *British Journal of Sports Medicine* 2013;**47**(10):605-06.
7. Frost WL, Chalmers DJ. Injury in elite New Zealand cricketers 2002-2008: Descriptive epidemiology. *British Journal of Sports Medicine* 2014;**48**(12):1002-07.
8. Ranson C, Hurley R, Rugless L, et al. International cricket injury surveillance: A report of five teams competing in the ICC Cricket World Cup 2011. *British Journal of Sports Medicine* 2013;**47**(10):637-43.
9. Finch CF, Elliott BC, McGrath AC. Measures to prevent cricket injuries. An overview. *Sports Medicine* 1999;**28**(4):263-72.
10. Morton S, Barton CJ, Rice S, et al. Risk factors and successful interventions for cricket-related low back pain: A systematic review. *British Journal of Sports Medicine* 2014;**48**(8):685-91.
11. Olivier B, Stewart AV, Olorunju SAS, et al. Static and dynamic balance ability, lumbo-pelvic movement control and injury incidence in cricket pace bowlers. *Journal of Science and Medicine in Sport* 2015;**18**(1):19-25.
12. Gray J, Aginsky KD, Derman W, et al. Symmetry, not asymmetry, of abdominal muscle morphology is associated with low back pain in cricket fast bowlers. *Journal of Science and Medicine in Sport* 2015.
13. Olivier B, Taljaard T, Burger E, et al. Which Extrinsic and Intrinsic Factors are Associated with Non-Contact Injuries in Adult Cricket Fast Bowlers? *Sports Medicine* 2016;**46**(1):79-101.
14. Stretch RA. Cricket injuries: a longitudinal study of the nature of injuries to South African cricketers. *British Journal of Sports Medicine* 2003;**37**(3):250-53.
15. Orchard J, James T, Alcott E, et al. Injuries in Australian cricket at first class level 1995/1996 to 2000/2001. *British Journal of Sports Medicine* 2002;**36**(4):270-75.
16. Ranawat VS, Dowell JK, Heywood-Waddington MB. Stress fractures of the lumbar pars interarticularis in athletes: A review based on long-term results of 18 professional cricketers. *Injury* 2003;**34**(12):915-19.
17. Russell JHB, Hughes JMF, Heskin L, et al. The pattern of hand injuries in amateur cricket. *European Journal of Plastic Surgery* 2014;**37**(5):281-86.
18. Roos E. Joint injury causes knee osteoarthritis in young adults. *Current Opinion in Rheumatology* 2005;**17**(2):195-200.
19. Lohmander LS, England PM, Dahl LL, et al. The long-term consequences of anterior cruciate ligament and meniscus injuries: Osteoarthritis. *American Journal of Sports Medicine* 2007;**35**(10):1756-69.
20. Spector T, Harris P, Hart DJ, et al. Risk of osteoarthritis associated with long-term weight-bearing sports. *Arthritis and rheumatism* 1996;**39**(6):988-95.
21. Thelin N, Holmberg S, Thelin A. Knee injuries account for the sports-related increased risk of knee osteoarthritis. *Scandinavian journal of medicine & science in sports* 2006;**16**(5):329-33.

22. Gelber AC, Hochberg MC, Mead LA, et al. Joint injury in young adults and risk for subsequent knee and hip osteoarthritis. *Annals of internal medicine* 2000;**133**(5):321-28.
23. The Professional Cricketers' Association (PCA). Past Player Survey 2013 [ONLINE]:Available at: <http://www.thepca.co.uk/assets/files/pdfs/Personal%20Development/Past%20player%20Survey%20presentation2013.pdf>. [Accessed 26 July 17].
24. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International journal for quality in health care : journal of the International Society for Quality in Health Care* 2007;**19**(6):349-57.
25. Jones ME, Davies MA, Leyland KM, et al. Risk of osteoarthritis and other long-term health outcomes in former elite english cricketers. *Osteoarthritis and Cartilage*; **25**:S195-S96.
26. Jones I, Brown L, Holloway I. *Qualitative Research in Sport and Physical Activity*: SAGE Publications, 2012.
27. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology* 2006;**3**(2):77-101.
28. Thomas DR. A General Inductive Approach for Analyzing Qualitative Evaluation Data. *American Journal of Evaluation* 2006;**27**(2):237-46.
29. Bazeley P, Jackson K. *Qualitative data analysis with NVivo*. Los Angeles: SAGE, 2013.
30. Tuckett AG. Applying thematic analysis theory to practice: A researcher's experience. *Contemporary Nurse* 2005;**19**(1-2):75-87.
31. Patton MQ. *Qualitative evaluation and research methods*, 1990.
32. Bull FatEWG. Physical Activity Guidelines in the UK: Review and recommendations School of Sport, Exercise and Health Sciences, Loughborough University, May 2010.
33. Ainsworth BE, Haskell WL, Leon AS, et al. Compendium of physical activities: classification of energy costs of human physical activities. *Med Sci Sports Exerc* 1993;**25**(1):71-80.
34. Organisation WH. Obesity: Preventing and managing the global epidemic. Report of a WHO Consultation on Obesity, Geneva,. WHO/NUT /NCD/98 1, Geneva, 1998 3-5 June 1997.
35. Morgan EH, Graham ML, Folta SC, et al. A qualitative study of factors related to cardiometabolic risk in rural men. *BMC Public Health* 2016;**16**(1).
36. George ES, Kolt GS, Rosenkranz RR, et al. Physical Activity and Sedentary Time: Male Perceptions in a University Work Environment. *American Journal of Men's Health* 2014;**8**(2):148-58.
37. Keogh JW, Patel A, Macleod RD, et al. Perceived barriers and facilitators to physical activity in men with prostate cancer: Possible influence of androgen deprivation therapy. *European Journal of Cancer Care* 2014;**23**(2):263-73.
38. Hooker SP, Wilcox S, Rheaume CE, et al. Factors related to physical activity and recommended intervention strategies as told by midlife and older African American men. *Ethnicity and Disease* 2011;**21**(3):261-67.
39. Teixeira PJ, Carraça EV, Markland D, et al. Exercise, physical activity, and self-determination theory: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity* 2012;**9**.
40. Filbay SR, Crossley KM, Ackerman IN. Activity preferences, lifestyle modifications and re-injury fears influence longer-term quality of life in people with knee symptoms following anterior cruciate ligament reconstruction: a qualitative study. *Journal of physiotherapy* 2016.
41. Hootman JM, Macera CA, Ham SA, et al. Physical activity levels among the general US adult population and in adults with and without arthritis. *Arthritis and rheumatism* 2003;**49**(1):129-35.
42. Wilcox S, Der AC, Abbott J, et al. Perceived exercise barriers, enablers, and benefits among exercising and nonexercising adults with arthritis: results from a qualitative study. *Arthritis and rheumatism* 2006;**55**(4):616-27.
43. Gyurcsik NC, Cary MA, Sessford JD, et al. Pain, anxiety, and negative outcome expectations for activity: do negative psychological profiles differ between the inactive and active? *Arthritis care & research* 2015;**67**(1):58-64.

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3 44. Harding PA, Holland AE, Hinman RS, et al. Physical activity perceptions and beliefs following total
4 hip and knee arthroplasty: a qualitative study. *Physiother Theory Pract* 2015;**31**(2):107-13.
5 45. Filbay SR, Bishop F, Peirce N, et al. Common attributes in retired professional cricketers that may
6 enhance or hinder quality of life after retirement: a qualitative study. *BMJ Open* 2017;**7**(7).
7 46. Der Ananian C, Wilcox S, Watkins K, et al. Factors associated with exercise participation in adults
8 with arthritis. *J Aging Phys Act* 2008;**16**(2):125-43.
9 47. Gyurcsik NC, Brawley LR, Spink KS, et al. Meeting physical activity recommendations: self-
10 regulatory efficacy characterizes differential adherence during arthritis flares. *Rehabilitation*
11 *psychology* 2013;**58**(1):43-50.
12 48. Lally P, Gardner B. Promoting habit formation. *Health Psychology Review* 2013;**7**(sup1):S137-S58.
13 49. Michie S, Abraham C, Whittington C, et al. Effective techniques in healthy eating and physical
14 activity interventions: a meta-regression. *Health psychology : official journal of the Division*
15 *of Health Psychology, American Psychological Association* 2009;**28**(6):690-701.
16 50. Orbell S, Verplanken B. The strength of habit. *Health Psychology Review* 2015;**9**(3):311-17.
17 51. Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social
18 development, and well-being. *American psychologist* 2000;**55**(1):68.
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Figure 1 Data analysis process

For peer review only

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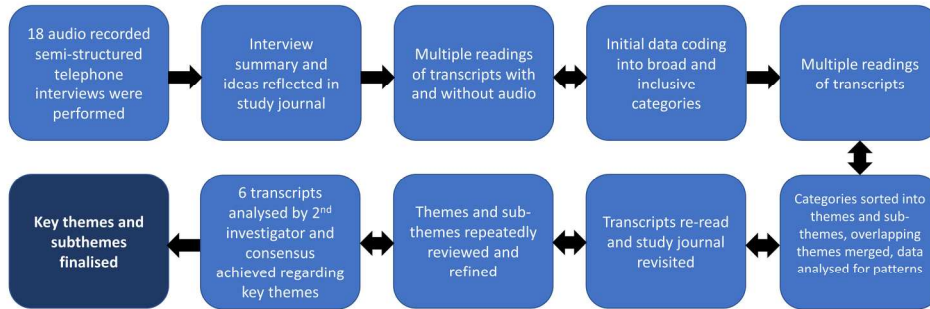


Figure 1. Data analysis process

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COREQ (CONsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
<i>Personal characteristics</i>			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	8
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	8
Occupation	3	What was their occupation at the time of the study?	8, 21
Gender	4	Was the researcher male or female?	8
Experience and training	5	What experience or training did the researcher have?	21
<i>Relationship with participants</i>			
Relationship established	6	Was a relationship established prior to study commencement?	8
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	8
Interviewer characteristics	8	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	8, 21
Domain 2: Study design			
<i>Theoretical framework</i>			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	9-10
<i>Participant selection</i>			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	7-8
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	7-8
Sample size	12	How many participants were in the study?	8
Non-participation	13	How many people refused to participate or dropped out? Reasons?	8
<i>Setting</i>			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	8
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	8
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	11
<i>Data collection</i>			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	9
Repeat interviews	18	Were repeat interviews carried out? If yes, how many?	21
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	8
Field notes	20	Were field notes made during and/or after the interview or focus group?	8-9
Duration	21	What was the duration of the interviews or focus group?	8
Data saturation	22	Was data saturation discussed?	9
Transcripts returned	23	Were transcripts returned to participants for comment and/or	21

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
<i>Data analysis</i>			
Number of data coders	24	How many data coders coded the data?	10
Description of the coding tree	25	Did authors provide a description of the coding tree?	10
Derivation of themes	26	Were themes identified in advance or derived from the data?	10
Software	27	What software, if applicable, was used to manage the data?	10
Participant checking	28	Did participants provide feedback on the findings?	21
<i>Reporting</i>			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	11-17
Data and findings consistent	30	Was there consistency between the data presented and the findings?	11-17
Clarity of major themes	31	Were major themes clearly presented in the findings?	11-17
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	14

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

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BMJ Open

Physical activity in former elite cricketers and strategies for promoting physical activity after retirement from cricket: A qualitative study

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2017-017785.R2
Article Type:	Research
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Primary Subject Heading:	Sports and exercise medicine
Secondary Subject Heading:	Qualitative research, Rheumatology
Keywords:	pain coping, exercise preferences, sport, osteoarthritis, exercise barriers, exercise motivation

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Abstract

Objectives

The health benefits of professional sport dissipate after retirement unless an active lifestyle is adopted, yet reasons for adopting an active or inactive lifestyle after retirement from sport are poorly understood. Elite cricket is all-encompassing, requiring a high volume of activity and unique physical demands. We aimed to identify influences on physical activity behaviours in active and insufficiently active former-elite cricketers and provide practical strategies for promoting physical activity after cricket retirement.

Design

18 audio-recorded semi-structured telephone interviews were performed. An inductive thematic approach was used and coding was iterative and data-driven facilitated by NVivo software. Themes were compared between sufficiently active and insufficiently active participants.

Setting

All participants formerly played professional cricket in the United Kingdom.

Participants

Participants were male, mean age 57 ± 11 (range 34-77) years, participated in professional cricket for 12 ± 7 seasons and retired on average 23 ± 9 years previously. Ten participants (56%) were classified as sufficiently active according to the UK Physical Activity Guidelines (moderate intensity activity ≥ 150 minutes per week, or vigorous intensity activity ≥ 75 minutes per week). Eight participants did not meet these guidelines and were classified as insufficiently active.

Results

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3 Key physical activity influences were: time constraints; habit formation; intrinsic and
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5 extrinsic motivation; physical activity preferences; pain/physical impairment; and cricket
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7 coaching. Recommendations for optimising physical activity across the lifespan after cricket
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9 retirement included: prioritise physical activity; establish a physical activity plan prior to
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11 cricket retirement and don't take a break from physical activity; evaluate sources of physical
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13 activity motivation and incorporate into a physical activity plan; find multiple forms of
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15 satisfying physical activity that can be adapted to accommodate fluctuations in physical
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17 capabilities across the lifespan; coach cricket.
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20 21 **Conclusions**

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24 Physically active and less active retired cricketers shared contrasting attributes that informed
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26 recommendations for promoting a sustainable, physically active lifestyle after retirement
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28 from professional cricket.
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31 32 33 **Strengths and limitations of this study**

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37 • A purposive sampling strategy was utilised to capture contrasting physical activity
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39 behaviours and experiences, enabling comparisons between sufficiently active and
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41 insufficiently active individuals.
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44 • The study may have been subjected to selection bias, individuals who desire
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46 participation in a qualitative interview may differ from those who decline
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48 participation.
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51 • The interviewer was a physiotherapist with knowledge of cricket and sports medicine
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53 and experience in interviewing and building rapport with individuals. Strong rapport
54
55 enabled participants to share personal perspectives in a reflective and open manner
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57 that enriched the findings of this study.
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Funding

Dr Filbay was awarded a research fellowship from the Arthritis Research UK Centre for Sport, Exercise and Osteoarthritis to support this research. Dr Arden and Mary Jones have received an unrestricted research grant from the England and Wales Cricket Board. The parent cross-sectional study from which participants were recruited received funding from the Arthritis Research UK Centre for Sport, Exercise and Osteoarthritis, as well as the England and Wales Cricket Board.

Competing interests

Dr Arden and Mary Jones have received an unrestricted research grant from the England and Wales Cricket Board. Dr Peirce is employed as the Chief Medical Officer of the England and Wales Cricket Board. Dr Filbay and Dr Bishop have nothing to disclose.

1 Introduction

2 When an individual adopts an inactive lifestyle, maladaptive responses lead to metabolic
3 dysfunction increasing the risk of developing chronic disease.¹ Physical inactivity increases
4 the relative risk of stroke by 60%, coronary artery disease by 45%, hypertension by 30% and
5 diabetes by 50%, resulting in profound personal, societal and economic costs.² In contrast,
6 regular sport participation is associated with a wide array of psychological, social and
7 physical health benefits.^{3 4} However, the physical benefit of sports participation dissipates
8 following sport cessation; elite athletes who become inactive after retirement from sport face
9 the same, or worse, risk of developing chronic disease as the inactive general population.⁵ If
10 the physical and psychological benefits an athlete obtained through professional sport could
11 be maintained by adopting a physically active lifestyle after retirement, a career in
12 professional sport could pave the way for a fulfilling and active life with multiple health
13 benefits. In order to develop strategies for promoting physical activity after retirement from
14 sport, a greater understanding of reasons for physical inactivity in this population is needed.

15
16 Cricket is a popular team sport played by people of all ages across various continents. A
17 professional cricketer must dedicate a large proportion of daily life to being physically active,
18 as games are often played over entire days and can last up to five consecutive days in
19 duration. During the course of the seven month summer season the playing schedule is
20 relentless and many elite cricketers also play overseas during the winter period. Elite
21 cricketers train during the preseason months and in between games with a mixture of skills
22 practice, aerobic and strength based conditioning. Individuals who become professional
23 cricketers, have typically been training and playing large volumes of cricket since childhood,
24 making cricket an ideal sport to explore physical activity behaviours after retirement.

25

26 The vast majority of cricket-related research has focused on incidence, prevention, prediction
27 and treatment of cricket injuries.⁶⁻¹³ A professional cricket career predisposes players to
28 injury^{6 8 14-17} which also places a professional cricketer at risk of developing osteoarthritis in
29 later life.¹⁸⁻²² Developing symptomatic osteoarthritis after retirement from cricket has
30 potential to negatively impact physical activity levels in former cricketers, although this has
31 not yet been explored. The Professional Cricketers' Association (PCA) published an online
32 report from a past player survey of 506 former cricketers of mean age 49 (range 22 to 86)
33 years.²³ The PCA reported that 88% of former cricketers needed to find work after retiring
34 from cricket and 20% suffered health consequences from playing sport.²³ Transitioning from
35 professional sport to a sedentary profession and health consequences from playing sport have
36 potential to impact physical activity behaviours in former cricketers, although this was not
37 investigated by the PCA. A better understanding of the factors that influence physical activity
38 levels in retired professional cricketers will enable the design of interventions and strategies
39 to support cricketers to adopt a sustainable physically active lifestyle after cricket retirement.
40 Such insights may also be applicable to other professional athletes.

41 The aim of this study was to draw upon retired-cricketers' personal perspectives and
42 experiences to:

- 43 i) identify key influences on physical activity behaviours after retirement from
44 professional cricket in sufficiently active and insufficiently active individuals
- 45 ii) provide practical strategies for promoting a physically active lifestyle after
46 retirement from professional cricket.

47

48 **Methods**

49 This study is reported in accordance with the consolidated criteria for reporting qualitative
50 research (COREQ) guidelines.²⁴

52 **Recruitment**

53 Participants were purposively sampled from a cohort of 187 former elite English cricketers.
54 The cohort had been recruited from the former player membership list maintained by the
55 PCA as part of a cross-sectional retrospective questionnaire study. The questionnaire
56 collected information regarding cricket playing history, injury history, current joint health,
57 medical history and demographics.²⁵ From this larger cohort, 143 participants indicated a
58 willingness to be contacted again and formed the cohort from which participants were invited
59 to the current study. Responses from two items in this questionnaire were used to allocate
60 participants to one of two groups for purposive sampling: i) individuals who strongly agree or
61 agree that participation in cricket has resulted in an increase in current physical activity level
62 (n=46, 42%), or ii) Individuals who strongly agree or agree that participation in cricket has
63 resulted in a decrease in current physical activity levels (n= 27, 25%). This sampling strategy
64 was utilised to capture contrasting physical activity behaviours and experiences to enable
65 comparisons between sufficiently active and insufficiently active individuals. When selecting
66 former cricketers to invite into the study, potential participants were purposely selected to
67 ensure the sample represented men of varying ages. When an individual declined the
68 invitation, a former cricketer of a similar age was invited into the study. Invitations and study
69 information (including study rationale, procedure, dissemination plans and the interviewer's
70 credentials) were sent via email. 42 invitations were sent to eligible participants, 19 received
71 no response, 2 people declined to participate, 2 people were unavailable due to overseas

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3 72 travel and 1 person did not respond to further correspondence despite an initial desire to
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5 73 participate. If no reply was received within two weeks, a new individual was invited into the
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7 74 study.
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11 76 **Ethical considerations**

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15 77 This study was approved by Medical Sciences Inter-divisional Research Ethics Committee
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17 78 (IDREC), University of Oxford (reference number R45197/RE001).
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21 80 **Interviews**

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26 81 Informed verbal consent was obtained from each of the 18 participants prior to performing
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28 82 audio recorded semi-structured telephone interviews (mean duration 26 minutes (range 18 to
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30 83 37 minutes)). All interviews were performed by S.R.F, a female physiotherapist and
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32 84 postdoctoral researcher with qualitative research experience who had not met the participants
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34 85 prior to interview. Interviews were transcribed verbatim by a research assistant, an alias was
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36 86 allocated to each participant and transcripts were de-identified during transcription. The semi-
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38 87 structured interview guide was pilot tested with three people with cricket experience prior to
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40 88 ethics approval. This resulted in the addition of three questions (Q2, Q4, Q15) and the
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42 89 modification of one question (Q17) to assess the perceived relationship between current
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44 90 quality of life and an individual's past cricket career (Table 1). The interview guide addressed
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46 91 key areas of interest while allowing the researcher to adapt the interview guide to elicit
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48 92 relevant and rich information from respondents through probing and prompting.²⁶ Open-
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50 93 ended questions provided participants with the opportunity to consider personal perspectives
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52 94 and experiences (Table 1). The interview guide was iteratively adapted throughout the
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54 95 interviews to incorporate any additional issues of importance to respondents (for example, by
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3 96 adding a question to explore their relationship with cricket post-retirement). Participants had
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5 97 the opportunity to contribute any additional information at the end of the interview.
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99 **Table 1.** Semi-structured interview guide

1. Can you describe any physical activity, exercise or sport that you currently take part in?

2. Has that remained fairly constant since you retired from cricket or has it changed over the years?

3. Have you played cricket again since retiring? Why/why not?

4. What was your motivation for playing cricket?

5. Are you as physically active as you would like to be? If no, why not? How does this make you feel?

6. What is your motivation for taking part in physical activity/exercise/sport?

7. How important is being physically active to you? (If important, why is it important? / If not important, has it always been this way?)

8. Does the type of physical activity that you do matter to you, or would you be satisfied taking part in any form of physical activity?
(ask about specific forms of exercise that they find *dissatisfying* and why)

9. What physical activity goals are you currently trying to achieve, if any?

10. What are the barriers or challenges, if any, that impact on your ability to be physically active?

11. Do you think that retired cricketers face the same challenges with being physically active as the general population, or are they unique or different in some way?

12. Some retired cricketers become physically inactive, what advice would you give to help them maintain a physically active lifestyle after retiring from cricket?

13. If you wanted to increase your physical activity levels, what do you think would help you to do so?

14. Can you describe any positive or negative impacts that your previous participation in cricket has had upon your current physical activity patterns?

15. If you hadn't played professional cricket, do you think that you would be more or less active, than you currently are?

16. Does your current ability to participate in physical activity impact upon your quality of life? If yes, in what ways? If no, why not?

17. Overall how satisfied are you with your current quality of life?

Do you think that this is related to your past career in cricket?

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3 18. Is there anything more you would like to add about your experiences with physical activity
4 after retiring from professional cricket?
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8 101 Data saturation was achieved by the 14th interview, defined a priori as the point at which no
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10 102 new themes were identified from four consecutive interviews (two from participants with
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12 103 increased physical activity and two from participants with decreased physical activity). Once
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14 104 data saturation was reached, an additional four interviews were performed to expand upon
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16 105 ideas and themes after following the semi-structured interview guide. If these final interviews
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18 106 resulted in the identification of new themes, additional interviews were planned until data
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20 107 saturation was again satisfied. No new themes emerged from these additional four interviews
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22 108 affirming data saturation. Data from all 18 interviews were used for analysis.
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110 **Analysis procedure**

111 The analysis procedure is summarised in Figure 1. An inductive thematic approach was
112 used^{27 28} facilitated by NVivo version 11 software.²⁹ A study journal was used to summarise
113 each interview and reflect upon initial ideas. Transcripts were read multiple times with
114 accompanying audio to identify all information potentially relevant to the research aims.³⁰
115 This information was coded into multiple categories to be later refined and analysed for
116 themes.²⁷ Data coding was iterative and data-driven, performed without engagement with
117 literature to avoid sensitization to themes and without reference to a pre-existing coding
118 structure.^{27 30}

119 During subsequent stages of analysis, the data was further analysed for repeated patterns,
120 codes were sorted into a hierarchical structure representing themes and subthemes,
121 overlapping themes were merged, and those outside the scope of the current study were filed
122 separately. These themes and sub-themes were repeatedly reviewed and refined to confirm

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3 123 external heterogeneity and internal homogeneity within themes and to ensure an accurate
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5 124 representation of the entire dataset. The study journal was also revisited to check that themes
6
7 125 accurately reflected the key issues discussed by participants.^{27 31} Themes were compared
8
9
10 126 amongst sufficiently active and insufficiently active participants to better understand factors
11
12 127 influencing physical activity behaviors.

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14
15 128 A selection of six transcripts representing participants with diverse physical activity patterns
16
17 129 were analysed by a second investigator (F.L.B) blinded to the coding structure developed by
18
19 130 the first author (S.R.F). A meeting was then held between investigators and agreement was
20
21 131 achieved regarding key themes in relation to these transcripts. Although no modifications
22
23 132 were made to the coding structure following this meeting, the second investigator contributed
24
25 133 to the consolidation and interpretation of key themes. Key themes and strategies for
26
27 134 promoting physical activity will be described with reference to participant quotes^{27 31} and in
28
29 135 relation to relevant participant characteristics (i.e. physical activity level,
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31 136 satisfaction/dissatisfaction with activity level and the presence/absence of joint pain).

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38 138 Insert Figure 1.

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42 43 44 140 **Physical activity classification**

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47 141 To enable comparison of physical activity behaviors and perspectives in active and less active
48
49 142 counterparts, participant descriptions of current activity level over a typical week were used
50
51 143 to categorise participants into ‘sufficiently active’ (meeting the UK Physical Activity
52
53 144 Guidelines³²) and ‘insufficiently active’ (not meeting the UK Physical Activity Guidelines³²)
54
55 145 groups. Participants were asked to describe any ‘physical activity, exercise or sport’ that they
56
57 146 currently take part in and were prompted to provide details regarding activity type, duration,
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3 147 intensity and frequency and to assure responses reflected a typical week. The UK Physical
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5 148 Activity Guidelines recommend adults undertake moderate intensity activity at least 150
6
7 149 minutes per week, or vigorous intensity activity at least 75 minutes per week for health
8
9 150 enhancing benefits including reduced susceptibility and burden from chronic disease.³²
10
11 151 Physical activity type was categorised into moderate or vigorous intensity with reference to
12
13 152 previous recommendations in accordance with Centers for Disease Control (CDC) and
14
15 153 American College of Sports Medicine (ACSM) guidelines.³³
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24 155 **Participant characteristics**

25 156 Participants were all male, aged a mean 57±11 (range 34 to 77) years and had been retired
26
27 157 from professional cricket for an average 23±9 (range 7 to 38) years. Ten participants were
28
29 158 sufficiently active, meeting or exceeding the UK Physical Activity Guidelines and eight
30
31 159 participants were insufficiently active to meet these guidelines. One in two (n=9, 50%) would
32
33 160 prefer to be participating in a greater volume of physical activity. Ten participants reported
34
35 161 having received a diagnosis of osteoarthritis and 15 participants experienced joint pain (n=6
36
37 162 had not been diagnosed with osteoarthritis). Full participant characteristics are presented in
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40 163 Table 2.
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165 **Table 2** Participant characteristics

Alias	Age range ¹	Years post retirement ¹	UK professional seasons ¹	BMI	Joint pain	OA	TJR	Meeting physical activity guidelines	Are you as active as you would like to be?
Dan	56 to 60	26 to 30	6 to 10	Normal	Yes	Yes	No	Yes	Yes
Dom	61 to 65	26 to 30	16 to 20	Obese	No	Yes	Yes	Yes	Yes
Gus	56 to 60	11 to 15	1 to 5	Overweight	No	No	No	Yes	No
Guy	46 to 50	21 to 25	1 to 5	Obese	Yes	No	No	Yes	No
Jim	66 to 70	21 to 25	21 to 25	Overweight	Yes	Yes	Yes	Yes	Yes
Joe	61 to 65	31 to 35	16 to 20	Overweight	No	No	No	Yes	Yes
Lee	46 to 50	11 to 15	6 to 10	Overweight	Yes	No	No	Yes	No
Leo	76 to 80	36 to 40	1 to 5	Normal	Yes	Yes	Yes	Yes	Yes
Ned	56 to 60	16 to 20	16 to 20	Overweight	Yes	No	No	Yes	Yes
Tim	36 to 40	6 to 10	NR	Overweight	Yes	Yes	No	Yes	Yes
Ben	56 to 60	21 to 25	11 to 15	Overweight	Yes	Yes	Yes	No	No
Cam	51 to 55	26 to 30	1 to 5	Overweight	Yes	No	No	No	No
Fin	31 to 35	6 to 10	6 to 10	Overweight	Yes	No	No	No	No
Ken	56 to 60	26 to 30	6 to 10	Overweight	Yes	Yes	No	No	Yes
Ric	66 to 70	16 to 20	1 to 5	Obese	Yes	Yes	Yes	No	No
Ron	51 to 55	16 to 20	16 to 20	Normal	Yes	Yes	No	No	Yes
Sam	56 to 60	21 to 25	16 to 20	Overweight	Yes	Yes	No	No	No
Wes	66 to 70	26 to 30	21 to 25	Overweight	Yes	No	No	No	Yes

166

167 Note, participants above the horizontal line were meeting the UK Physical Activity

168 Guidelines³² and participants below the horizontal line were not; ¹ Ranges were reported

169 rather than absolute values to assure participants' anonymity; NR = Not reported; UK

170 professional seasons = number of seasons playing professional cricket in the UK; BMI (body

171 mass index) = categorised with reference to WHO international classification guidelines

172 (normal weight: 18.9–24.9 kg/m², overweight: 25.0–29.9 kg/m², obese: ≥30.0 kg/m²)³⁴;

173 Joint pain = 'Do you experience pain, discomfort, or have a problem with your: hip(s) or

174 groin, knee(s), ankle(s), spine (back or neck), shoulder(s), elbow(s), wrist(s), finger(s) or

175 hand(s)'; OA (osteoarthritis) = 'Have you ever been told you have wear and tear,

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3 176 degeneration or osteoarthritis by a doctor?'; TJR (total joint replacement) = have you ever
4
5 177 had joint replacement surgery?
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11 179 **Results**
12

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14 180

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17 181 **Key influences on physical activity behaviours after retirement from professional**
18

19 182 **cricket**
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23

24
25 184 ***Time constraints***
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27 185 The most common physical activity barrier identified by retired cricketers who expressed that
28
29 186 they would like to be more active, was time constraints. Many participants were working long
30
31 187 hours in sedentary professions which was a stark contrast from life as a professional cricketer
32
33 188 and resulted in difficulty finding the time to be physically active.
34

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36
37 189 *Cam: 'work takes up too much time, office based. I don't necessarily get as much time*
38 190 *as I'd like either before, during or after work to, you know, do some physical activity,*
39 191 *other stuff has to take priority.'*

40
41 192 (51-55 years old, insufficiently active, dissatisfied with activity level, current joint
42 193 pain)
43

44 194
45

46 195 *Lee: 'It's time, you know, I came out of cricket, in my 30's and you try and find your*
47 196 *way and then you try set up a business and that sort of takes over really, so some days*
48 197 *you just don't, you don't get chance to go out there and do things so readily.'*

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50 198 (46-50 years old, sufficiently active, dissatisfied with activity level, current joint pain)
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3 200 In contrast, participants who were sufficiently active and satisfied with their physical activity
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5 201 levels prioritised physical activity, and irrespective of work and family commitments,
6
7 202 allocated time to be physically active on a daily basis.
8
9

10 203 Dan: *'You know time is limited and you have to vacate your time appropriately, but as*
11 204 *long as you can build that into your regular routine then it doesn't tend to be so much*
12 205 *of a problem.'*

14 206 (56-60 years old, sufficiently active, satisfied with activity level, current joint pain)
15
16
17 207

18 208 Interviewer: Have you ever struggled with regards to having enough time to exercise?
19

20 209 Joe: *No, always make time.*
21

22 210 (61-65 years old, sufficiently active, satisfied with activity level, no joint pain)
23
24
25 211

26 212 **Habit formation**

27
28 213 Retired cricketers not meeting the physical activity guidelines who were dissatisfied with
29
30 214 their current physical activity level, had difficulty establishing an exercise routine and
31
32 215 integrating regular physical activity into their daily life. These individuals described adopting
33
34 216 "poor habits" early after retirement that were difficult to break when physical activity desires
35
36
37 217 changed.
38
39

40 218 Fin: *'Part of it I think it's habit and routine to be honest. Because saying I haven't got*
41 219 *time for it is a lame excuse, because a lot of people work full time. Part of it is I've*
42 220 *just got into such a bad habit and it's just mentally getting back into that, into sort of*
43 221 *the boredom of physical activity.. ...So I enjoyed having the break, but then obviously*
44 222 *following on from that I never really turned it back around. So it was a choice to start*
45 223 *with but then but it was a bad choice because it then meant that I didn't do anything..*
46 224 *..I then found it hard to find any kind of routine where it meant I actually went to the*
47 225 *gym or did some activities.'*

48 226 (31-35 years old, insufficiently active, dissatisfied with activity level, current joint
49 227 pain)
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3 229 On the other hand, sufficiently active participants had formed strong physical activity habits
4
5 230 by integrating physical activity into their daily routine.
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8 231 Joe: *'There's not a lot more I could do really, you know, I try and do 10,000 steps a*
9 232 *day, I cycle twice a week, I go to the gym a couple of times a week...I'm sort of set in*
10 233 *my routine if you will.'*

12 234 (61-65 years old, sufficiently active, satisfied with activity level, no joint pain)

14
15 235

17 236 ***Intrinsic and extrinsic motivation***

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19
20 237 Sources of motivation to undertake physical activity differed between retired cricketers with
21
22 238 contrasting activity levels. Cricketers who were not meeting the physical activity guidelines
23
24 239 despite expressing dissatisfaction with current activity levels, relied on others for motivation
25
26
27 240 to participate in physical activity.
28

29 241

30 242 Interviewer: 'Is cricket still a part of your life, today?'

31
32 243 Cam: *'Not really, although I have a six year old son, so it's starting to come back in*
33 244 *because I am starting to take him and, and practice with him and coach him and stuff*
34 245 *like that, so but no it hasn't really been part of my life at all for the last 10 years.'*

36
37 246 (51-55 years old, insufficiently active, dissatisfied with activity level, current joint
38 247 pain)

39
40 248

41 249 Ric: *'Well I'm ashamed to admit it but not many at the moment, as I said I need to*
42 250 *shake myself and get up and get out and do something a bit more and I think my wife*
43 251 *will galvanise me and say right we are off for a fast walk for 2 or 3 miles, 2 or 3 times*
44 252 *a week to try and sort of get back to what we were doing.'*

47 253 (66-70 years old, insufficiently active, dissatisfied with activity level, current joint
48 254 pain)

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3 256 Participants who were insufficiently active and expressed little or no desire to increase
4
5 257 activity levels did not see physical activity as congruent with their current sense of self or
6
7 258 identity and were lacking internal motivation to exercise.
8
9

10 259 Interviewer: If you wanted to increase your physical activity levels, what do you think
11
12 260 would help you to do so?

13 261 Ron: *'..there isn't really anything you know, maybe my kids.. .. as long as my mind is*
14 262 *active, physical activity, you know, isn't something that, it's never really jumped out*
15 263 *at me. ..I would say quality of life is pretty good and I don't really have any desire to*
16 264 *put on a tracksuit at 52 and become a trendy middle aged man who goes for a jog*
17 265 *around the block, like I see many people doing.'*

20 266 (51-55 years old, insufficiently active, satisfied with activity level, current joint pain)

22 267

24 268 Ken: *'Um, I don't know a 25 year-old girlfriend who wanted to go cycling. Yeah, I*
25 269 *know that sounds flippant; but it's probably true.'*

28 270 (56-60 years old, insufficiently active, satisfied with activity level, current joint pain)

30 271

31 272 In contrast, people meeting or exceeding the physical activity guidelines who were satisfied
32
33 273 with their current activity level, described intrinsic sources of motivation and emphasised the
34
35 274 importance of physical activity in maintaining optimal mental and physical wellbeing across
36
37 275 the lifespan.
38
39

41 276 Leo: *'I do it because I love it. I don't do it because I have to do it, but I am not like*
42 277 *some of my friends who say, look I've got to go to walk this morning or I've got to go*
43 278 *to the gym and swim for half an hour and I've got to do my weights and all this type*
44 279 *of thing, I do it because I love it. I simply love it. If I don't exercise and do the things*
45 280 *that I like I get quite, I can actually get quite crotchety and short tempered because I*
46 281 *feel frustrated.'*

49 282 (76-80 years old, sufficiently active, satisfied with activity level, current joint pain)

51 283

53 284 Ned: *'I can only go from how I feel personally. I mean I feel a lot better doing some*
54 285 *form of exercise.. ..you know I think physically you feel better also mentally for the*
55 286 *rest of your life, whatever you're doing, you know certainly for me it's a very*
56 287 *important part of keeping myself motivated in life as much as anything I guess.'*
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3 288 (56-60 years old, sufficiently active, satisfied with activity level, current joint pain)

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8 290 ***Physical activity preferences***

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10 291 Individuals not meeting the physical activity guidelines commonly expressed experiencing
11
12 292 little enjoyment partaking in unaccompanied recreational exercise such as cycling and gym-
13
14 293 based activities, with a preference to be active through sport participation. Some
15
16 294 insufficiently active individuals described having never enjoyed maintaining fitness or the
17
18 295 monotonous aspects of cricket training, but participated reluctantly in order to get out on the
19
20 296 field and play cricket which brought them great satisfaction.

21
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24 297 *Fin: 'The gym side and the physical side of professional sport was the bit that I liked*
25 298 *the least.. So I was almost rebelling if you like, saying 'haha', I don't have to do this*
26 299 *anymore, so I'm not going to. But it was a dreadful decision really. Because it's*
27 300 *obviously not very good for you. ..The monotony of going to the gym and doing half*
28 301 *an hour on the treadmill for example, I can't physically do it. Actually that's wrong I*
29 302 *can physically do it, I can't mentally do that. So the type has to be sort of something I*
30 303 *enjoy and I guess that's why I do football really, because I enjoy that and it's*
31 304 *competitive. I don't find the going to the gym scenario a very appealing one.'*

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33
34
35 305 (31-35 years old, insufficiently active, dissatisfied with activity level, current joint
36 306 pain)

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38 307

39 308

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41 309 *Ken: 'I enjoyed playing the sport; I will admit that I never enjoyed getting fit for it,*
42 310 *but it was something you had to do and when it's no longer your living and there is no*
43 311 *need to get up at 6 o'clock and go running or doing other, you know fitness exercises*
44 312 *or whatever, it was a tremendous relief, shall we say.'*

45
46 313 (56-60 years old, insufficiently active, satisfied with activity level, current joint pain)

47
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50
51 315 In contrast, sufficiently active individuals participated in some form of independent
52
53 316 recreational activity, such as cycling, running or gym-based exercise. For these individuals,
54
55 317 participating in physical activity was more important than the specific type of exercise, and
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3 318 most were willing to sacrifice some enjoyment if physical limitations led them to substitute
4
5 319 their favourite form of exercise for a less preferred form of exercise to enable continuation of
6
7 320 a physically active lifestyle.
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9

10 321 Joe: *'I've always run, I've always' run... but like I say now I can't, I haven't done it*
11 322 *for about two years, so I am making do with cycling now. I mean I still get a buzz out*
12 323 *of it, but it's not the same as running. I just like, you know, to do something.'*

14 324 (61-65 years old, sufficiently active, satisfied with activity level, no joint pain)
15
16
17 325

18 326 Ned: *'I'd be happy to do anything I'm capable of doing, but I've kind of got you know*
19 327 *my routines now and obviously I vary the aerobic work depending on umm, you know*
20 328 *how I feel really.'*

22 329 (56-60 years old, sufficiently active, satisfied with activity level, current joint pain)
23
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25 330
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28 331 ***Pain and physical impairment***

29
30 332 Despite most individuals experiencing pain and physical impairment, this did not prevent
31
32 333 participants from being physically active. Rather, for some individuals, pain and physical
33
34 334 impairment affected the type of activity they chose to take part in and imposed limitations
35
36 335 participating in higher impact activities.
37
38

39 336 Leo: *'I would like to be able to get out there and run for 40-50 minutes without any*
40 337 *knee problem and pain and going under the knife. But then I am thinking about*
41 338 *having one done so I can run in marathons or half marathons when I'm over 80 and*
42 339 *among that age group.'*

44 340 (76-80 years old, sufficiently active, satisfied with activity level, current joint pain)
45
46
47 341

48
49 342 Lee: *'Yeah, yeah I mean I can get by with my knees, but like my hip, my left hip is shot*
50 343 *really, so you know if there are certain things I do, I'm hobbling around for a good*
51 344 *week afterwards and you know it just stops me sort of doing anything too extreme.'*

52 345 (46-50 years old, sufficiently active, dissatisfied with activity level, current joint pain)
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3 347 **Cricket coaching**
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5 348 All six retired cricketers who regularly coached cricket, were able to maintain a physically
6
7 349 active lifestyle. This in part, was due to active involvement in training drills and warm-up
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9
10 350 sessions. Being around a sporting environment provided motivation to maintain fitness, and
11
12 351 coaching cricket provided the time and resources needed to do so.
13

14
15 352 Ned: *'I think being in a professional environment encourages you to obviously stay*
16 353 *fit, you know, you're around professional athletes so you don't want to look fat and*
17 354 *incapable of doing your job. So I think that motivates me to keep training. ..at least*
18 355 *with this job I've got time to train, you know, I can do it in the hours that suit me as*
19 356 *opposed to having to wait until I finish work at you know 6 o'clock or whatever.'*

20
21
22 357 (56-60 years old, sufficiently active, satisfied with activity level, current joint pain)
23

24 358

25
26 359 Dom: *'I know that my physical activity, I can compensate or counter it by coaching,*
27 360 *because I can do more active sessions involving myself if I need to and set standards*
28 361 *in that, so I drive other people to do what I think they should be achieving.'*

29
30 362 (61-65 years old, sufficiently active, satisfied with activity level, no joint pain)
31

32 363

33
34 364 The positive impact of cricket coaching on physical activity levels was further demonstrated
35
36 365 by Sam, who described having been active while he was coaching cricket, but was no longer
37
38 366 meeting the physical activity guidelines since he stopped coaching.
39

40
41 367 Sam: *'I coached there for just under 19 years, so you know I was quite active with the*
42 368 *lads there... ..I used to hit all the catches and do all the fielding drills for the cricket*
43 369 *team... it was just like part of my life, when the lads started I'd join in or some days*
44 370 *the lads wouldn't be in at all, so I would then make an effort and go to the gym and do*
45 371 *stuff and I had my own routines, so yeah, it was quite active really. But I retired.. so I*
46 372 *haven't, so I've sort of done less exercise.'*

47
48
49 373 (56-60 years old, insufficiently active, dissatisfied with activity level, current joint
50 374 pain)
51

52 375

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54 376 **Practical strategies for promoting a physically active lifestyle after retirement**
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3 377 A number of suggestions were made by participants regarding strategies for adopting an
4
5 378 active lifestyle after retirement from cricket and other useful information arose from
6
7 379 exploring factors influencing physical activity choices. This information guided five
8
9 380 recommendations for optimising physical activity across the lifespan after retiring from
10
11 381 professional cricket.

12 382

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14
15 383 ***Prioritise physical activity***

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18
19 384 Retirement from sport may mark a pivotal point in one's life where decisions surrounding
20
21 385 physical activity have great potential to impact physical activity levels and health in later life.
22
23 386 Prioritising physical activity may be a means to overcome the most commonly acknowledged
24
25 387 barrier to being more physically active in this sample of retired cricketers, time constraints.

26
27
28
29 388 Leo: *'There is no excuse for people not keeping fit after playing professional cricket,*
30 389 *no excuse at all. If you're a married man, kids, things like that, people work long*
31 390 *hours these days, how do you squeeze it in? Well you squeeze it in by doing a 25*
32 391 *minute run whilst your kids are in the bath, you come back and take them out and dry*
33 392 *them and put them to bed and help mum, that type of thing.'*

34
35
36 393 (76-80 years old, sufficiently active, satisfied with activity level, current joint pain)

37 394

38
39 395 ***Establish a physical activity plan prior to retirement and don't take a break from physical***
40
41 396 ***activity***

42
43
44 397 Establishing a physical activity plan prior to retirement and advice to not take a break from
45
46 398 physical activity after retirement were suggested by participants as strategies to encourage
47
48 399 adoption of routines and habits that are conducive to living a physically active life.

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51
52 400 Gus: *'Well, I think you have, you have two choices, you have your own choice and I*
53 401 *think it's really that choice of, of getting off your back side and having a plan. You*
54 402 *know you must have a plan for your well-being, but you know it's fitness as you get*
55 403 *older just doesn't happen, we all think we are invincible when we are 21 and you*
56 404 *know, getting on with our lives, but the reality strikes I suppose. You need a plan and*
57 405 *I think if you're that way organised, you can go and get some support as well, find a*

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3 406 *buddy and do it, that's the key.*'

4
5 407 (56-60 years old, sufficiently active, dissatisfied with activity level, no joint pain)

6
7 408

8
9 409 Fin: *'The advice I would give from my personal experience is to, to get into the habit*
10 410 *of doing something regularly straight away. That is the advice I would give.'*

11 411 (31-35 years old, insufficiently active, dissatisfied with activity level, current joint
12 412 pain)

13
14
15 413

16
17 414 ***Evaluate sources of physical activity motivation and incorporate these into a physical***

18
19 415 ***activity plan***

20
21 416 When establishing a physical activity plan, cricketers may benefit from evaluating sources of

22
23 417 physical activity motivation. People who are externally motivated could benefit from

24
25 418 tailoring activity choices to satisfy their external sources of motivation (for example,

26
27 419 coaching a cricket team, exercising with family or friends, or committing to an exercise group

28
29 420 or sports team). Other individuals who are motivated by a desire to compete may be best

30
31 421 suited to specific activities that satisfy competitive desires without exacerbating joint pain

32
33 422 and function.

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38 423 Lee: *'I think the big thing for people is finding something that, that clicks with them,*
39 424 *that just catches their imagination when they're playing it and so for me, you know,*
40 425 *golf is something that does that, surfing is something that is a totally different thing*
41 426 *which I learnt after I played cricket... I think that's the crux of it, it's finding*
42 427 *something that just keeps you motivated to get out there and enjoy yourself really.'*

43
44 428 (46-50 years old, sufficiently active, dissatisfied with activity level, current joint pain)

45
46 429

47 430 Ben: *'What advice would I give them? Just to maintain your interest in the game if*
48 431 *you can, or some aspect of any game, just to fulfil your sort of competitive instincts if*
49 432 *they still remain.'*

50
51
52 433 (56-60 years old, insufficiently active, dissatisfied with activity level, current joint
53 434 pain)

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3 436 ***Find multiple, satisfying forms of physical activity that can be adapted to accommodate***
4
5 437 ***fluctuations in physical capabilities across the lifespan***
6
7

8 438 Physical activity plans should include multiple sources of satisfying physical activity,
9
10 439 alternative sources of physical activity may be required if preferred activities become limited
11
12 440 due to age, joint pain or physical limitations.
13

14
15 441 *Guy: 'I think you need to try and find something that is linked to that and gives you*
16 442 *that same satisfaction and same buzz and that same adrenalin rush, but is mirrored*
17 443 *with your body and your age and your lifestyle. And I think trying to find that is not*
18 444 *easy, but that's one thing that I have certainly found with surfing, is that I want to try*
19 445 *and compete and be good at it and.. you don't have to worry about an age thing, it's*
20 446 *not necessarily a barrier to being good and competing and so that would be my*
21 447 *advice.'*
22
23

24 448 (46-50 years old, sufficiently active, dissatisfied with activity level, current joint pain)
25

26 449
27

28 450 *Jim: 'I'm going down this afternoon and I'm quite looking forward to it. I'm going to*
29 451 *have to change what I do because my ankles are a bit sore, I've been on the bike*
30 452 *perhaps too much pressure on, and I'll have to go on a rowing machine and have a*
31 453 *swim. So it's that sort of thing, if I go on the rowing machine too much my back starts*
32 454 *to ache, so I've got to go back on the bike.'*
33
34

35 455 (66-70 years old, sufficiently active, satisfied with activity level, current joint pain)
36

37 456
38
39

40 457 ***Coach cricket***

41
42 458 Cricketers who are concerned about maintaining an active lifestyle could consider cricket
43
44 459 coaching. All coaches in this study were meeting the Physical Activity Guidelines.
45
46

47 460 *Gus: 'Well everyone always gives the reason that, or gives the excuse that there are*
48 461 *not many coaching jobs. Well there is perhaps not many coaching jobs at the top end,*
49 462 *but there are coaching jobs out there and with the resources that the players have to*
50 463 *be able to get qualified as coaches during the period that they are playing, and these*
51 464 *courses are paid for, I mean that's what I did, I got myself qualified in that sense and*
52 465 *it allowed me to sort of seamlessly move into a coaching career.'*
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55 466 (56-60 years old, sufficiently active, dissatisfied with activity level, no joint pain)
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3 468 **Discussion**
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6 469 Retired cricketers' personal perspectives and experiences have enabled identification of key
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8 470 influences on physical activity behaviours. These were i) time constraints; ii) habit formation;
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10 471 iii) intrinsic and extrinsic motivation; iv) physical activity preferences; v) pain and physical
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12 472 impairment; and vi) cricket coaching. A number of suggestions were made by participants
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14 473 regarding strategies for adopting an active lifestyle after retirement and other useful
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16 474 information arose from exploring factors influencing physical activity choices. This
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18 475 information guided five recommendations for optimising physical activity across the lifespan
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20 476 after retiring from professional cricket: i) prioritise physical activity; ii) establish a physical
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22 477 activity plan prior to retirement and don't take a break from physical activity; iii) evaluate
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24 478 sources of physical activity motivation and incorporate these into a physical activity plan; iv)
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26 479 find multiple, satisfying forms of physical activity that can be adapted to accommodate
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28 480 fluctuations in physical capabilities across the lifespan; v) coach cricket.
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36 482 **Key influences on physical activity behaviours**
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39 483 Several factors influencing physical activity choices were not unique to retired professional
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41 484 cricketers. Time constraints have been identified as a barrier to physical activity in other male
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43 485 groups including those living in rural areas³⁵, university employees,³⁶ prostate cancer
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45 486 patients³⁷ and African-Americans.^{38 39} Additionally, intrinsic forms of motivation have been
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47 487 shown to predict long-term exercise adherence in a variety of samples.³⁹ A strong preference
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49 488 for competitive sport over recreational exercise was found to be a risk factor for adopting an
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51 489 inactive lifestyle 5-20 years after ACL reconstruction in people with knee difficulties.⁴⁰
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54 490 Although these barriers to physical activity may be applicable to the general population, the
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56 491 characteristics of retired-cricketers are different from the general population. The journey
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3 492 from playing youth cricket to retiring from professional cricket exposes an individual to a
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5 493 high volume of physical activity and results in the refinement of physical skill and
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7 494 psychological attributes necessary to perform at an elite level. Another key difference
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10 495 between an elite athlete and the general population is that retirement from professional sport
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12 496 provides a novel opportunity where effort can be directed to optimise the likelihood that a
13
14 497 retiring athlete transitions into a physically active lifestyle, and maintains it throughout later
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16 498 life.
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22 500 On the other hand, contrasts were evident regarding the relationship with joint pain and
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24 501 physical activity in our sample of retired-cricketers and previous research in this area. A
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26 502 review of the literature confirms that individuals with osteoarthritis are less active than those
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28 503 without⁴¹ and osteoarthritis is often perceived by those with the disease as a barrier to
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30 504 physical activity.⁴² A proportion of people living with osteoarthritis, express a misconception
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32 505 that exercise will exacerbate osteoarthritis symptoms, and hold pain-avoidance behaviors
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34 506 which become a barrier to being physically active.^{43 44} In contrast, former elite cricketers did
35
36 507 not express such beliefs, and osteoarthritis or joint pain did not prevent participants from
37
38 508 being physically active. It is possible that exposure to professional cricket, desensitized
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40 509 participants to exercising through pain or discomfort. Another contributing factor may be the
41
42 510 common attributes that these retired cricketers possess, including resilience, a positive
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44 511 outlook, high quality of life, increased body awareness and an ability to adapt activity choices
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46 512 in line with physical capabilities which may enhance one's ability to be active in the presence
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48 513 of chronic joint pain.⁴⁵ This is in line with previous research that identified psychological
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50 514 factors as a stronger determinant of physical activity levels than pain severity in individuals
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52 515 with osteoarthritis and chronic pain.^{42 46 47} These findings support further research into the
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54 516 relationship between physical activity, joint pain and quality of life in retired athletes.
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6 518**Practical strategies for promoting a physically active lifestyle after retirement**

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9 519 Retiring cricketers could benefit from being informed of the importance of prioritising and
10 520 maintaining a physically active lifestyle after retirement from cricket. Education may assist
11 521 with forming intentions to facilitate behavior change and healthy habit formation.⁴⁸ Planning
12 522 can help to overcome the difficult step of translating intentions into actions, which can lead to
13 523 habit formation.⁴⁹ Making physical activity behaviors habitual has several benefits; forming a
14 524 habitual physical activity behavior may reduce the effort required to take part in an activity
15 525 and promotes continuation of that activity even in times where motivation and self-control
16 526 are exhausted.^{48 50} Specific tools exist which could be used to enable identification of
17 527 individuals with poor physical activity habits and assess the effectiveness of interventions
18 528 aimed at facilitating new physical activity habits or changing old habits.⁵⁰ Such interventions
19 529 could draw upon habit-formation principles such as utilising repetition, linking activity to
20 530 consistent cues and performing activity in a similar context to promote automaticity.⁴⁸
21 531 Changes to an individual's environment or living circumstance (such as retiring from
22 532 professional cricket and transitioning to post-retirement life) provides an opportune time to
23 533 implement behavior change and habit formation strategies.⁴⁸

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45 535 Retiring and former cricketers could also benefit from evaluating what motivates them to be
46 536 physically active and identifying multiple sources of physical activity tailored to their unique
47 537 needs and motivations. For individuals largely motivated by competitive team-based
48 538 environments this may be of particular importance, since some individuals take many years to
49 539 identify alternative sources of satisfying physical activity after ceasing competitive sport.⁴⁰
50 540 This has potential to result in adoption of an inactive lifestyle with negative impacts on health
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3 541 and quality of life.⁴⁰ Retiring and former cricketers who lack intrinsic motivation to be active,
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5 542 could benefit from interventions to foster intrinsic motivation toward physical activity. Such
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7 543 interventions may draw upon self-determination theory (SDT) and cognitive evaluation
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9 544 theory (CET), which emphasise the importance of satisfying an individual's need for
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11 545 competence and autonomy in order to foster intrinsic motivation.⁵¹ Retiring and former
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13 546 cricketers who are externally motivated may also benefit from establishing a physical activity
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15 547 plan that incorporates external sources of motivation (such as coaching, team sport or group
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17 548 exercise). All coaches in this study were meeting the Physical Activity Guidelines, yet the
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19 549 positive relationship between cricket coaching and physical activity may be overlooked when
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21 550 this option is considered prior to retiring and transitioning from professional cricket.
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552 **Strengths and potential limitations**

553 Our purposive recruitment strategy may have reduced the generalisability of results since
554 retired-cricketers reporting uncertainty regarding the impact of cricket upon their physical
555 activity level were not invited into the study. The study may have been subjected to selection
556 bias, individuals who desire participation in a qualitative interview study may share specific
557 attributes that differ from those who decline participation. Notably, six participants reported
558 joint pain without a diagnosis of osteoarthritis and participants spoke about pain and physical
559 impairments as opposed to osteoarthritis in relation to physical activity. For these reasons, we
560 refer to 'pain and physical impairment' rather than osteoarthritis in the results section but
561 draw upon osteoarthritis literature to aid with interpretation of findings. We also
562 acknowledge that using self-report to assess physical activity levels and categorise
563 participants into sufficiently active and insufficiently active groups has limitations.
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3 565 of information presented to the reader regarding highly active, and completely inactive
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5 566 individuals. Participants were not contacted after the initial interview for correction or further
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7 567 comment, these procedures could have elicited additional insights beyond those gained
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10 568 through the interviews.

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12 569 This was the first study to explore physical activity in former elite cricketers. The interviewer
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14 570 was a physiotherapist with knowledge of cricket and sports medicine and experience in
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17 571 interviewing and building rapport with individuals. Strong rapport enabled participants to
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19 572 share personal perspectives in a reflective and open manner that enriched the findings of this
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21 573 study.
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27 575 **Conclusion**

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30 576 This study highlights key influences on physical activity behaviours in retired professional
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32 577 cricketers and provides practical strategies to support retiring and former cricketers to adopt
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34 578 sustainable, physically active lifestyles.
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40 580 **Acknowledgments**

41
42 581 We would like to thank the retired cricketers who took part in the interviews. We would like
43
44 582 to acknowledge Angus Porter and the Professional Cricketers' Association (PCA) for
45
46
47 583 assisting with recruitment and questionnaire development for the larger cross-sectional study
48
49 584 from which study participants were purposively recruited.
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52 585

55 586 **Author contributions**

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3 587 SRF, FLB, NP, NKA conceived and designed this qualitative study. SRF, MEJ recruited
4
5 588 participants and extracted data form the cross-sectional cohort. SRF performed all interviews.
6
7 589 SRF, FLB participated in the analysis. SRF drafted the first version of the manuscript. All
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9 590 authors contributed in revising the manuscript and gave their final approval of the submitted
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11 591 version.
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18 593 **Data sharing**

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20 594 To view interview transcripts or additional participant quotes, please contact the
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22 595 corresponding author.
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References

1. Booth FW, Lees SJ. Fundamental questions about genes, inactivity, and chronic diseases. *Physiological genomics* 2007;**28**(2):146-57.
2. Katzmarzyk PT, Janssen I. The economic costs associated with physical inactivity and obesity in Canada: an update. *Can J Appl Physiol* 2004;**29**(1):90-115.
3. Eime RM, Young JA, Harvey JT, et al. A systematic review of the psychological and social benefits of participation in sport for adults: informing development of a conceptual model of health through sport. *International Journal of Behavioral Nutrition and Physical Activity* 2013;**10**.
4. Eime RM, Young JA, Harvey JT, et al. A systematic review of the psychological and social benefits of participation in sport for children and adolescents: informing development of a conceptual model of health through sport. *International Journal of Behavioral Nutrition and Physical Activity* 2013;**10**.
5. Witkowski S, Spangenburg EE. Reduced physical activity and the retired athlete: a dangerous combination? *British Journal of Sports Medicine* 2008;**42**(12):952-53.
6. Orchard JW. Injury surveillance in cricket. *British Journal of Sports Medicine* 2013;**47**(10):605-06.
7. Frost WL, Chalmers DJ. Injury in elite New Zealand cricketers 2002-2008: Descriptive epidemiology. *British Journal of Sports Medicine* 2014;**48**(12):1002-07.
8. Ranson C, Hurley R, Rugless L, et al. International cricket injury surveillance: A report of five teams competing in the ICC Cricket World Cup 2011. *British Journal of Sports Medicine* 2013;**47**(10):637-43.
9. Finch CF, Elliott BC, McGrath AC. Measures to prevent cricket injuries. An overview. *Sports Medicine* 1999;**28**(4):263-72.
10. Morton S, Barton CJ, Rice S, et al. Risk factors and successful interventions for cricket-related low back pain: A systematic review. *British Journal of Sports Medicine* 2014;**48**(8):685-91.
11. Olivier B, Stewart AV, Olorunju SAS, et al. Static and dynamic balance ability, lumbo-pelvic movement control and injury incidence in cricket pace bowlers. *Journal of Science and Medicine in Sport* 2015;**18**(1):19-25.
12. Gray J, Aginsky KD, Derman W, et al. Symmetry, not asymmetry, of abdominal muscle morphology is associated with low back pain in cricket fast bowlers. *Journal of Science and Medicine in Sport* 2015.
13. Olivier B, Taljaard T, Burger E, et al. Which Extrinsic and Intrinsic Factors are Associated with Non-Contact Injuries in Adult Cricket Fast Bowlers? *Sports Medicine* 2016;**46**(1):79-101.
14. Stretch RA. Cricket injuries: a longitudinal study of the nature of injuries to South African cricketers. *British Journal of Sports Medicine* 2003;**37**(3):250-53.
15. Orchard J, James T, Alcott E, et al. Injuries in Australian cricket at first class level 1995/1996 to 2000/2001. *British Journal of Sports Medicine* 2002;**36**(4):270-75.
16. Ranawat VS, Dowell JK, Heywood-Waddington MB. Stress fractures of the lumbar pars interarticularis in athletes: A review based on long-term results of 18 professional cricketers. *Injury* 2003;**34**(12):915-19.
17. Russell JHB, Hughes JMF, Heskin L, et al. The pattern of hand injuries in amateur cricket. *European Journal of Plastic Surgery* 2014;**37**(5):281-86.
18. Roos E. Joint injury causes knee osteoarthritis in young adults. *Current Opinion in Rheumatology* 2005;**17**(2):195-200.
19. Lohmander LS, England PM, Dahl LL, et al. The long-term consequences of anterior cruciate ligament and meniscus injuries: Osteoarthritis. *American Journal of Sports Medicine* 2007;**35**(10):1756-69.
20. Spector T, Harris P, Hart DJ, et al. Risk of osteoarthritis associated with long-term weight-bearing sports. *Arthritis and rheumatism* 1996;**39**(6):988-95.
21. Thelin N, Holmberg S, Thelin A. Knee injuries account for the sports-related increased risk of knee osteoarthritis. *Scandinavian journal of medicine & science in sports* 2006;**16**(5):329-33.

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2
3 22. Gelber AC, Hochberg MC, Mead LA, et al. Joint injury in young adults and risk for subsequent
4 knee and hip osteoarthritis. *Annals of internal medicine* 2000;**133**(5):321-28.
- 5 23. The Professional Cricketers' Association (PCA). Past Player Survey 2013 [ONLINE]:Available at:
6 [http://www.thepca.co.uk/assets/files/pdfs/Personal%20Development/Past%20player%20Su](http://www.thepca.co.uk/assets/files/pdfs/Personal%20Development/Past%20player%20Survey%20presentation2013.pdf)
7 [vey%20presentation2013.pdf](http://www.thepca.co.uk/assets/files/pdfs/Personal%20Development/Past%20player%20Survey%20presentation2013.pdf). [Accessed 26 July 17].
- 8 24. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a
9 32-item checklist for interviews and focus groups. *International journal for quality in health*
10 *care : journal of the International Society for Quality in Health Care* 2007;**19**(6):349-57.
- 11 25. Jones ME, Davies MA, Leyland KM, et al. Risk of osteoarthritis and other long-term health
12 outcomes in former elite english cricketers. *Osteoarthritis and Cartilage*; **25**:S195-S96.
- 13 26. Jones I, Brown L, Holloway I. *Qualitative Research in Sport and Physical Activity*: SAGE
14 Publications, 2012.
- 15 27. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology*
16 2006;**3**(2):77-101.
- 17 28. Thomas DR. A General Inductive Approach for Analyzing Qualitative Evaluation Data. *American*
18 *Journal of Evaluation* 2006;**27**(2):237-46.
- 19 29. Bazeley P, Jackson K. *Qualitative data analysis with NVivo*. Los Angeles: SAGE, 2013.
- 20 30. Tuckett AG. Applying thematic analysis theory to practice: A researcher's experience.
21 *Contemporary Nurse* 2005;**19**(1-2):75-87.
- 22 31. Patton MQ. *Qualitative evaluation and research methods*, 1990.
- 23 32. Bull FatEWG. Physical Activity Guidelines in the UK: Review and recommendations School of
24 Sport, Exercise and Health Sciences, Loughborough University, May 2010.
- 25 33. Ainsworth BE, Haskell WL, Leon AS, et al. Compendium of physical activities: classification of
26 energy costs of human physical activities. *Med Sci Sports Exerc* 1993;**25**(1):71-80.
- 27 34. Organisation WH. Obesity: Preventing and managing the global epidemic. Report of a WHO
28 Consultation on Obesity, Geneva,. WHO/NUT /NCD/98 1, Geneva, 1998 3-5 June 1997.
- 29 35. Morgan EH, Graham ML, Folta SC, et al. A qualitative study of factors related to cardiometabolic
30 risk in rural men. *BMC Public Health* 2016;**16**(1).
- 31 36. George ES, Kolt GS, Rosenkranz RR, et al. Physical Activity and Sedentary Time: Male Perceptions
32 in a University Work Environment. *American Journal of Men's Health* 2014;**8**(2):148-58.
- 33 37. Keogh JW, Patel A, Macleod RD, et al. Perceived barriers and facilitators to physical activity in
34 men with prostate cancer: Possible influence of androgen deprivation therapy. *European*
35 *Journal of Cancer Care* 2014;**23**(2):263-73.
- 36 38. Hooker SP, Wilcox S, Rheaume CE, et al. Factors related to physical activity and recommended
37 intervention strategies as told by midlife and older African American men. *Ethnicity and*
38 *Disease* 2011;**21**(3):261-67.
- 39 39. Teixeira PJ, Carraça EV, Markland D, et al. Exercise, physical activity, and self-determination
40 theory: A systematic review. *International Journal of Behavioral Nutrition and Physical*
41 *Activity* 2012;**9**.
- 42 40. Filbay SR, Crossley KM, Ackerman IN. Activity preferences, lifestyle modifications and re-injury
43 fears influence longer-term quality of life in people with knee symptoms following anterior
44 cruciate ligament reconstruction: a qualitative study. *Journal of physiotherapy* 2016.
- 45 41. Hootman JM, Macera CA, Ham SA, et al. Physical activity levels among the general US adult
46 population and in adults with and without arthritis. *Arthritis and rheumatism*
47 2003;**49**(1):129-35.
- 48 42. Wilcox S, Der AC, Abbott J, et al. Perceived exercise barriers, enablers, and benefits among
49 exercising and nonexercising adults with arthritis: results from a qualitative study. *Arthritis*
50 *and rheumatism* 2006;**55**(4):616-27.
- 51 43. Gyurcsik NC, Cary MA, Sessford JD, et al. Pain, anxiety, and negative outcome expectations for
52 activity: do negative psychological profiles differ between the inactive and active? *Arthritis*
53 *care & research* 2015;**67**(1):58-64.
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2
3 44. Harding PA, Holland AE, Hinman RS, et al. Physical activity perceptions and beliefs following total
4 hip and knee arthroplasty: a qualitative study. *Physiother Theory Pract* 2015;**31**(2):107-13.
5 45. Filbay SR, Bishop F, Peirce N, et al. Common attributes in retired professional cricketers that may
6 enhance or hinder quality of life after retirement: a qualitative study. *BMJ Open* 2017;**7**(7).
7 46. Der Ananian C, Wilcox S, Watkins K, et al. Factors associated with exercise participation in adults
8 with arthritis. *J Aging Phys Act* 2008;**16**(2):125-43.
9 47. Gyurcsik NC, Brawley LR, Spink KS, et al. Meeting physical activity recommendations: self-
10 regulatory efficacy characterizes differential adherence during arthritis flares. *Rehabilitation*
11 *psychology* 2013;**58**(1):43-50.
12 48. Lally P, Gardner B. Promoting habit formation. *Health Psychology Review* 2013;**7**(sup1):S137-S58.
13 49. Michie S, Abraham C, Whittington C, et al. Effective techniques in healthy eating and physical
14 activity interventions: a meta-regression. *Health psychology : official journal of the Division*
15 *of Health Psychology, American Psychological Association* 2009;**28**(6):690-701.
16 50. Orbell S, Verplanken B. The strength of habit. *Health Psychology Review* 2015;**9**(3):311-17.
17 51. Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social
18 development, and well-being. *American psychologist* 2000;**55**(1):68.
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3 **Figure 1** Data analysis process
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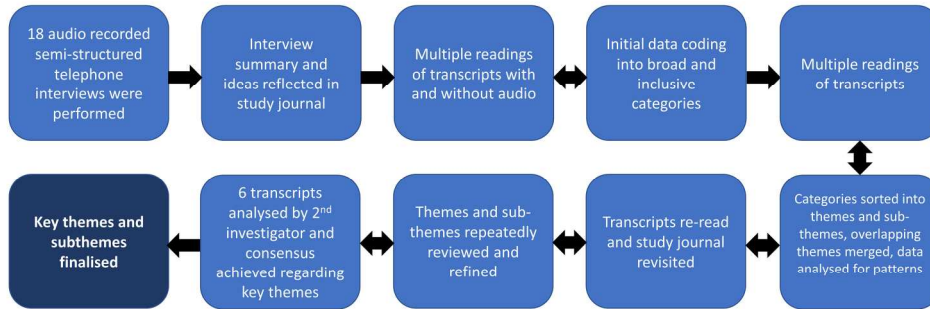


Figure 1. Data analysis process

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COREQ (CONsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
<i>Personal characteristics</i>			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	8
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	8
Occupation	3	What was their occupation at the time of the study?	8, 21
Gender	4	Was the researcher male or female?	8
Experience and training	5	What experience or training did the researcher have?	21
<i>Relationship with participants</i>			
Relationship established	6	Was a relationship established prior to study commencement?	8
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	8
Interviewer characteristics	8	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	8, 21
Domain 2: Study design			
<i>Theoretical framework</i>			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	9-10
<i>Participant selection</i>			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	7-8
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	7-8
Sample size	12	How many participants were in the study?	8
Non-participation	13	How many people refused to participate or dropped out? Reasons?	8
<i>Setting</i>			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	8
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	8
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	11
<i>Data collection</i>			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	9
Repeat interviews	18	Were repeat interviews carried out? If yes, how many?	21
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	8
Field notes	20	Were field notes made during and/or after the interview or focus group?	8-9
Duration	21	What was the duration of the interviews or focus group?	8
Data saturation	22	Was data saturation discussed?	9
Transcripts returned	23	Were transcripts returned to participants for comment and/or	21

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
<i>Data analysis</i>			
Number of data coders	24	How many data coders coded the data?	10
Description of the coding tree	25	Did authors provide a description of the coding tree?	10
Derivation of themes	26	Were themes identified in advance or derived from the data?	10
Software	27	What software, if applicable, was used to manage the data?	10
Participant checking	28	Did participants provide feedback on the findings?	21
<i>Reporting</i>			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	11-17
Data and findings consistent	30	Was there consistency between the data presented and the findings?	11-17
Clarity of major themes	31	Were major themes clearly presented in the findings?	11-17
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	14

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

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