

21 **The Role of Knowledge and Understanding in Fostering Physical Literacy**

22 Given physical literacy is concerned with lifelong participation in physical activity
23 (Liedl, 2013; Whitehead, 2013) and valuing and taking responsibility for engagement in
24 physical activities for life (Whitehead, 2010a), then arguably fundamental to achieving this is
25 having the required knowledge and understanding of movement and health in terms of how to
26 move, and of why, how, where, and with whom to engage in lifelong physical activity. This
27 paper therefore contributes to the literature in this regard by exploring the role of knowledge
28 and understanding in fostering physical literacy. Firstly, it highlights the place and importance
29 of knowledge and understanding in physical literacy and it then explores the type and scope of
30 knowledge and understanding deemed necessary to foster the concept. Consideration is given
31 to the health knowledge young people should acquire as they progress on their physical
32 literacy journeys through primary and secondary school in particular. The paper concludes by
33 outlining some pedagogical approaches and practical strategies for developing such
34 knowledge and understanding.

35 **Place and Importance of Knowledge and Understanding in Physical Literacy**

36 Recognition of physical literacy as a holistic concept which goes beyond physical and
37 fundamental movement skills and encompasses knowledge and understanding is now widely
38 acknowledged in the literature (Almond & Myers, 2017; Edwards, Bryant, Keegan, Morgan,
39 & Jones, 2017; Ennis, 2015; Liedl, 2013; Lundvall, 2015; Whitehead, 2010a). Knowledge
40 and understanding features explicitly within the International Physical Literacy Association's
41 (IPLA, 2017) most recent definition of physical literacy which describes the concept as "the
42 motivation, confidence, physical competence, knowledge and understanding to value and take
43 responsibility for engagement in physical activities for life." Indeed, Ennis (2015) argues that
44 "knowledge is at the heart of physical literacy" (p. 119) with it providing the foundation for
45 knowing what to do and how and when to perform. Meanwhile, Lundvall (2015) warns that

KNOWLEDGE AND UNDERSTANDING IN FOSTERING PHYSICAL LITERACY

46 without attention to embodied knowledge, “part of the literacy ambition will be lost” and
47 young people “may not master the keys to lifelong learning through movement” (p. 117).

48 Knowledge and understanding is considered to be a core element within the cognitive
49 domain as well as one of the key attributes of physical literacy (Edwards et al., 2017;
50 Whitehead, 2010a). Following a systematic review of the physical literacy literature,
51 Edwards et al. (2017) identified three core categories within the cognitive domain: (a)
52 knowledge and understanding of activities; (b) knowledge and understanding of healthy and
53 active lifestyles; and (c) the value to take responsibility for physical activity. With respect to
54 knowledge and understanding of activities, a literate sports person (or exerciser) would be
55 knowledgeable about sports/exercise rules, traditions, and values (Kirk, 2013), and in terms of
56 knowledge and understanding of healthy and active lifestyles, they would have a sound
57 awareness of the value of participating in a physically active lifestyle (Whitehead, 2013).

58 More specifically, and in terms of knowledge and understanding as an attribute,
59 “acquiring knowledge in relation to movement and health” is one of the six attributes of
60 physical literacy identified by Whitehead (2010a). She explains how individuals making
61 progress on their physical literacy journey will:

62 ... have the ability to identify and articulate the essential qualities that influence the
63 effectiveness of their own movement performance, and have an understanding of the
64 principles of embodied health with respect to basic aspects such as exercise, sleep and
65 nutrition. (p. 14)

66 The relationship between the attribute of knowledge and understanding and other
67 attributes of physical literacy is furthermore important to recognize. Indeed, knowledge and
68 understanding is arguably fundamental to achieving the other attributes and the overall
69 concept. For example, having physical competency alone, or any one attribute for that matter,
70 is clearly insufficient to ensure lifelong engagement in physical activity. Knowledge and

KNOWLEDGE AND UNDERSTANDING IN FOSTERING PHYSICAL LITERACY

71 understanding can be enriched by all aspects of participation and characteristically develops
72 as the attributes of motivation, confidence, physical competence, and fluent interactions grow
73 (Whitehead, 2010b). In turn, knowledge and understanding can positively influence these
74 other attributes in that it will support the appreciation of developing physical competence and
75 the perception of different environments (Whitehead, 2010b) and can enhance motivation and
76 confidence to participate.

77 Given the above, it is perhaps not surprising that knowledge and understanding is
78 either explicitly or implicitly embedded within the physical education curricula in most
79 countries. To illustrate this, details of the relevant requirements within the National
80 Curriculum in England are summarised later.

81 **Type and Scope of Knowledge and Understanding in Physical Literacy**

82 Just as physical literacy is a holistic concept, physical literacy knowledge and
83 understanding should equally be seen holistically. As already noted, knowledge and
84 understanding within the cognitive domain and as an attribute have different components,
85 with two constituents to the latter. The first is concerned with grasping the essential
86 principles of movement and performance and the other with health and fitness (Whitehead,
87 2010b). Whitehead argues that if lifelong involvement in physical activity is to be achieved
88 then it is clearly important for individuals to take some responsibility for both.

89 The first constituent expects individuals who are making progress on their physical
90 literacy journey to appreciate the basic components of movement and be able to evaluate their
91 own performance and that of others, using appropriate vocabulary and observing movement
92 (Whitehead, 2010b). With regards the constituent of health and fitness, Whitehead claims it is
93 essential that individuals adopt an objective view of themselves in deciding how best to
94 manage aspects of life suggesting “it would be unacceptable for the concept to omit the care,
95 attention and respect individuals should show to their embodied dimension” (p. 66).

KNOWLEDGE AND UNDERSTANDING IN FOSTERING PHYSICAL LITERACY

96 Such knowledge and understanding understandably then typically features within the
97 physical education curricula in schools. In England, for example, and with respect to
98 knowledge of movement, successive versions of the National Curriculum for Physical
99 Education include the aspects of developing knowledge and understanding of ways to
100 promote improvement through evaluation of one's own and others' performances and taking
101 steps or making suggestions for improvement. Indeed, these elements feature explicitly in the
102 current National Curriculum (Department of Education, 2013a, 2013b) for pupils from 7 years
103 of age upwards. The programmes of study state that for 7-11 year olds (key stage 2), pupils
104 "should develop an understanding of how to improve in different physical activities and sports
105 and learn how to evaluate and recognise their own success," and be taught to "compare their
106 performances with previous ones and demonstrate improvement to achieve their personal
107 best" (2013a, p. 2). For 11-14 year olds (key stage 3), pupils "should understand what makes
108 a performance effective and how to apply these principles to their own and others' work," and
109 be taught to "develop their technique and improve their performance..." as well as "analyse
110 their performances compared to previous ones and demonstrate improvement to achieve their
111 personal best" (2013b, p. 2). For 14-16 year olds (key stage 4), pupils should similarly be
112 taught to "develop their technique and improve their performance (in other sports or other
113 physical activities)," plus "evaluate their performances compared to previous ones and
114 demonstrate improvement across a range of physical activities to achieve their personal best"
115 (2013b, p. 3).

116 As noted by Whitehead (2010b), the above clearly involve firstly being able to
117 diagnose what is making a movement or movement pattern more or less effective and then
118 understanding how to improve and develop it. This should encompass experiences within a
119 wide range of activity settings and by involving participants in observation, analysis,
120 description, and evaluation (Whitehead, 2010a, 2010b).

KNOWLEDGE AND UNDERSTANDING IN FOSTERING PHYSICAL LITERACY

121 With regards to knowledge of health, and again drawing on the National Curriculum
122 in England, ensuring that all pupils “are physically active for sustained periods of time”
123 (Department of Education, 2013a, 2013b, p. 1) and “lead healthy, active lives” (p. 1) represent
124 two of the main aims of the subject across the age range. Interestingly though, and despite
125 these aims, reference to knowledge and understanding in relation to health in the programmes
126 of study is somewhat limited and more implicit. For example, pupils aged 11-14 years (key
127 stage 3) should “develop the confidence and interest to get involved in exercise, sports, and
128 activities out of school” and in later life and “understand and apply the long-term benefits of
129 physical activity” (2013b, p. 2), whilst 14-16 year olds (key stage 4) should “get involved in a
130 range of activities that develops personal fitness and promotes an active, healthy lifestyle”
131 (2013b, p. 3).

132 To achieve the above aims and notably to lead a healthy active life, a sound and broad
133 knowledge and understanding in the area is clearly required. Further, it is contended that this
134 needs to extend beyond the rather limited knowledge and understanding requirements implied
135 in the National Curriculum and the “basic aspects” of exercise, sleep, and nutrition identified
136 by Whitehead (2010a, p. 14). At the same time, it is fully accepted that physical literacy
137 knowledge and understanding does not demand a grasp of technical biomechanical and
138 medical scientific concepts (Whitehead, 2007, 2010b).

139 On this issue, Armour and Harris (2013) claim that much of the international physical
140 education community is unclear about the precise nature of appropriate health knowledge to
141 be covered in the subject. Given the different views expressed in the literature, this claim
142 would seem to be founded suggesting a need to identify the health knowledge and
143 experiences required to be able to successfully engage in physical activities for life. For this
144 reason, alongside well reported concerns over physical education teachers’ limited health
145 knowledge and their delivery of health in the curriculum generally (Alfrey, Cale, & Webb,

KNOWLEDGE AND UNDERSTANDING IN FOSTERING PHYSICAL LITERACY

146 2012; Cale & Harris, 2013; Castelli & Williams, 2007; Fardy, Azzollini, & Herman, 2004;
147 Harris, 2010; Harris & Leggett, 2015; Hastie, 2017; Keating et al., 2009; Kulinna,
148 McCaughtry, Martin, Cothran, & Faust, 2008; McKenzie, 2007; Puhse et al., 2011; Trost,
149 2006), the main focus of the discussion from hereon will centre on knowledge relating to
150 health. In 2000, and in recognition of the above, a working group comprising representatives
151 of national physical education, sport, and health organisations in England was formed in an
152 attempt to achieve consensus on health-related learning within the subject, a key output of
153 which was the publication of national guidance including health-related outcomes for
154 children aged 5 to 16 years (Harris, 2000). These outcomes are detailed fully elsewhere (see
155 Harris, 2000; Harris & Cale, 2018) and include a number of cognitive (knowledge and
156 understanding), as well as affective and behavioural outcomes. To illustrate the scope in
157 learning they are presented in four categories: safety issues, exercise effects, health benefits,
158 and activity promotion, representing the key areas of learning considered necessary to engage
159 in lifelong physical activity. In summary, for individuals to successfully engage in physical
160 activity for life, it is important that they know and understand (a) how to take part in physical
161 activity safely and effectively (safety issues), (b) the body's response to participating in
162 physical activity (exercise effects), (c) the reasons for participating in physical activity
163 (health benefits), and (d) what physical activity to take part in, where and how (activity
164 promotion).

165 In addition, and in recognition of physical literacy as a journey through which
166 individuals develop throughout their lifespan from cradle to grave (Edwards et al., 2017),
167 gradually acquiring wider and deeper knowledge and understanding (Whitehead, 2010b), the
168 learning outcomes (Harris, 2000; Harris & Cale, 2018) are presented by age group or key
169 stage (KS): 5-7 years (KS1), 7-11 years (KS2), 11-14 years (KS3), and 14-16 years (KS4).
170 These represent the middle stages of Whitehead's (2013) age-related stages which individual

KNOWLEDGE AND UNDERSTANDING IN FOSTERING PHYSICAL LITERACY

171 journeys pass through and which span from preschool through to the older adult years. Thus,
172 whilst it is acknowledged that individuals develop at different rates in light of their different
173 abilities, contexts (social cultural and geographical), and experiences, the outcomes broadly
174 illustrate how individuals' learning about health is expected to progress. Example knowledge
175 and understanding outcomes for each of the age ranges and for each category are shown
176 below. Although these were initially produced to support teachers in developing pupils'
177 knowledge and understanding, they can and should equally be reinforced by parents and
178 others, as appropriate. Learning outcomes associated with each age group are presented in
179 Table 1. Table 1 is adapted from the initial work of Harris (2000).

180 Place Table 1 Here

181 With respect to the above knowledge, research has revealed that the more instrumental
182 outcomes, for example, those relating to safety issues (e.g., safe practice and warming up and
183 cooling down) and to exercise effects (i.e., the short term effects of exercise on the body) are
184 more frequently addressed by physical education teachers than those associated with health
185 benefits and activity promotion (Harris, 2010). Yet, it is evidently the latter outcomes which
186 are mostly closely linked to valuing and engaging in physical activities for life. Alfrey and
187 Gard (2014) similarly acknowledge how the profession is depicted as clearly focussed on the
188 dualistic and instrumental understandings of health and the body, and consequently how in
189 turn this leads to many teachers focussing on and applying the same narrow instrumental
190 outcomes in their delivery. The need for a broader approach which pays more attention to
191 health and activity promoting outcomes is therefore recommended (Harris, 2000; Harris &
192 Cale, 2018) and it seems is needed if physical literacy is to be truly fostered. In addition,
193 recent calls have been made for approaches which adopt a socially-critical perspective to
194 health knowledge and information (Burrows, Wright, & McCormack, 2009; Haerens, Kirk,
195 Cardon, & De Bourdeaudhuij, 2011). Example knowledge and understanding outcomes

196 related to health benefits and activity promotion illustrating how they progress with school
197 age are shown in Table 2.

198 Place Table 2 Here

199 **Fostering Knowledge and Understanding in Physical Literacy**

200 According to Almond (2010, p. 124), “physical literacy and its associated
201 characteristics (or attributes) have no value unless they can be applied to and influence
202 common practice.” In fostering knowledge and understanding of physical literacy, the
203 content and its delivery are clearly key and need to be appropriate to ensure that all
204 individuals have the opportunity to acquire knowledge and understanding both of movement
205 and of health, and of the relationship between physical activity and health (Murdoch &
206 Whitehead, 2010).

207 In developing knowledge and understanding, there are some general principles which
208 should be subscribed to. Physical literacy is, by definition, concerned with the physical and
209 as such the concept and attributes should be developed within and through the physical, and
210 through a range of activities, with knowledge and understanding of movement and health
211 being no exception in this regard. Developing the former through the physical is common and
212 clearly common sense, but evidence suggests this is not always the case for the latter. Despite
213 it being found to be relatively ineffective (Cale & Harris, 2006), classroom-based delivery of
214 health-related theoretical concepts and information in schools is often reported (Cale, 2017;
215 Cale & Harris, 2006). A further limitation with classroom-based delivery is that it is
216 sedentary, thereby detracting from potential active time, and with the focus tending to be
217 restricted to information transmission rather than developing knowledge via a combination of
218 understanding, experiencing, decision making and evaluating (Cale, 2017; Cale & Harris,
219 2013). On the other hand, learning about health through active participation in purposeful
220 physical activity is not only consistent with the physical context of the subject and with
221 messages relating health benefits to frequent physical activity, but it helps to increase activity

KNOWLEDGE AND UNDERSTANDING IN FOSTERING PHYSICAL LITERACY

222 levels and contribute to young people’s overall physical activity (Harris, 2000; Harris & Cale,
223 2018). As highlighted later, and if taught effectively, it also potentially allows both
224 knowledge and understanding of movement and of health to be developed simultaneously,
225 whilst developing other core attributes of physical literacy as well.

226 Other principles which are fundamental to developing knowledge and understanding,
227 and arguably to all good teaching, are the inclusion and empowerment of all pupils, and their
228 subsequent shift with enhanced knowledge and understanding from dependence on the
229 teacher to independence. In considering approaches to physical literacy development,
230 Almond and Myers (2017) argue we need to consider the gradual process of emerging
231 empowerment, independence, and agency as central to how we nurture young people's
232 learning paths. The provision of positive, relevant, meaningful, and rewarding physical
233 activity learning experiences is central to facilitating this process and fostering empowered
234 and independent individuals capable of making informed lifestyle choices. On this, Elbourn
235 and James (2013) identify three key elements important to the empowerment of young people
236 with respect to healthy active lifestyles: (a) appropriate content, (b) appropriate context, and
237 (c) effective pedagogy. Appropriate content is that which is deemed to be safe, progressive,
238 relevant, well informed, inclusive, and fun, whilst appropriate context relates to the range of
239 activities through which learning can be promoted such as a variety of games, dance,
240 gymnastic, or fitness or exercise activities. Effective pedagogy is that which, amongst other
241 things, is “personalised, enabling, and collaborative, and which facilitates informed decision
242 making and uses active learning strategies” (Elbourn & James, 2013, p. 2).

243 Different organisational approaches to developing knowledge and understanding of
244 health are available which have been the subject of much debate and critique over the years
245 (Cale & Harris, 2005, 2009, 2013; Murdoch & Whitehead, 2010). Health-related learning
246 outcomes can be taught within the curriculum, within and beyond physical education. If

KNOWLEDGE AND UNDERSTANDING IN FOSTERING PHYSICAL LITERACY

247 within physical education, learning can be permeated through the core traditional activities
248 such as athletics, dance, games, gymnastics, outdoor education and swimming, taught
249 discretely in separate health-related units of work, or delivered via a combination of these
250 approaches. There are merits as well as drawbacks with each. To summarise, the strengths
251 of a permeation approach are that health knowledge and understanding can be seen as related
252 and integral to all physical education experiences and thus pupils learn that all physical
253 activities can contribute towards health, thus endorsing the close relationship between health
254 issues and participation (Harris, 2000; Murdoch & Whitehead, 2010). Via a permeated
255 approach, a skilled teacher may also be able to effectively develop both aspects of physical
256 literacy knowledge and understanding, that is, of movement and of health. However, a key
257 limitation levelled at this approach is that integrating the health-related learning through the
258 teaching of the core traditional activities may result in it becoming lost or marginalised and it
259 taking second place to other learning such as skill development or tactical understanding
260 (Cale & Harris 2005; Harris & Cale, 2018). The discrete approach avoids this issue and
261 ensures health is not overlooked, but a drawback in teaching it in isolation through separate
262 units may imply that it does not relate closely to other learning and elements of physical
263 education, physical literacy, and other curriculum subjects (Harris & Cale, 2018; Murdoch &
264 Whitehead, 2010). On balance, a combined approach is advocated in that it builds on the
265 strengths of each, helps to reinforce and ensure the consistency and coherence of learning,
266 and provides a realistic opportunity to more adequately address the required knowledge base
267 (Cale & Harris, 2009). It also allows links to be made to other physical education and
268 physical activity experiences and health behaviours and subjects (Cale & Harris, 2005, 2009).
269 For example, it is recommended that links are made with learning in related subjects such as
270 personal, social and health education science (PSHE), and food technology, plus with extra-
271 curricular and/or community activity experiences where appropriate. Furthermore,

KNOWLEDGE AND UNDERSTANDING IN FOSTERING PHYSICAL LITERACY

272 information and advice about such opportunities can be communicated to pupils as well as
273 their families in a variety of ways (e.g., via newsletters, visual displays, parent email, parent
274 consultations, assemblies, school web site; Harris & Cale, 2018). This is in fact akin to a
275 whole school approach to health which is growing in popularity and increasingly being
276 advocated within and beyond the United Kingdom (All-Party Commission on Physical
277 Activity, 2014; Blanchard, Shilton, & Bull, 2013; Cale, Harris, & Duncombe, 2016;
278 McMullen, Ní Chróinín, Tammelin, Pogorzelska, & van der Mars, 2015).

279 Concerns over the delivery of health were alluded to earlier. Indeed, alongside a lack
280 of clarity about the nature of appropriate health knowledge to cover, it is suggested teachers
281 also lack appropriate PE-for-health pedagogies (Armour & Harris, 2013; i.e., strategies for
282 delivering health). Consequently, a number of researchers have called for more and
283 alternative methods, strategies, or models to effectively teach health-related knowledge
284 (Armour & Harris, 2013; Haerens et al., 2011; Hastie, Chen, & Guarino, 2017; Hodges,
285 Kulinna, Lee, & Kwon, 2017). Indeed, critical of prevailing approaches, Armour and Harris
286 (2013) argue there has been surprisingly little new knowledge on health pedagogies that
287 could support teachers in re-contextualizing health knowledge to meet the diverse learning
288 needs of pupils and therefore call for a renewed focus on developing PE-for-health
289 pedagogies.

290 In recognition of this, there have been some recent encouraging pedagogical
291 developments which are considered to have potential, two notable ones of which are outlined
292 below and include the Health-Based Physical Education Model (HBPE; Haerens et al., 2011)
293 and the Physically Active Lifestyle (PAL) Principles (Harris, Cale, Casey, Tyne, & Samaria,
294 2016). These have typically built on and been informed by the lessons learnt from previous
295 health-related approaches originating primarily from the United States and Australia (Haerens
296 et al., 2011). In addition, other relevant developments which have shown promise recently

KNOWLEDGE AND UNDERSTANDING IN FOSTERING PHYSICAL LITERACY

297 include Knowledge in Action Lesson Segments (Hodges et al., 2017) and the Project-Based
298 Learning Model (Hastie, Chen, & Guarino, 2017).

299 The HBPE model is considered to be highly compatible with the aims of physical
300 literacy, having as its central theme “pupils valuing a physically active life, so that they learn
301 to value and practice appropriate physical activities that enhance health and wellbeing for the
302 rest of their lives” (Haerens et al., 2011, p. 321). Since 2011, the model has undergone an
303 extensive period and comprehensive process of development with teachers, teacher educators,
304 and pupils resulting in some positive outcomes for teachers and pupils (Bowler, Sammon,
305 Casey, Haerens, & Kirk, 2012; Bowler et al., 2015). The model draws on self-determination
306 theory, the social ecological model, and theories of behaviour change and identifies four
307 goals for HBPE including the characteristics of habitual, motivated, informed, and critical
308 movers. The affective domain is prominent in planning for learning emphasising the
309 importance of valuing a physically active life as a sustainable long-term process, knowledge
310 as a significant component, and of focussing beyond the individual to the wider community.
311 In this respect, and whilst intended to be used flexibly to inform learning outcomes and the
312 delivery of health knowledge and content, the model proposes that: (a) pupils’ psychological
313 needs for autonomy, competence, and relatedness should be prioritised; (b) teachers should
314 promote physical activity within and beyond lessons, maximising lesson opportunities and
315 interacting with parents and community bodies; (c) lessons should include physical activity
316 learning opportunities, such as current guidelines, age-related statistics, local opportunities,
317 and safe/effective practice; and (d) pupils should understand physical activity barriers,
318 potential strategies to overcome these and become movement activists for their peers/family
319 (Bowler et al., 2012).

320 Another pedagogical approach to promoting knowledge and understanding of health
321 is the adoption of PAL Principles (Harris et al., 2016). These principles emanated from a

KNOWLEDGE AND UNDERSTANDING IN FOSTERING PHYSICAL LITERACY

322 small-scale action-based study with teachers and trainee teachers which aimed to develop and
323 trial a principle-based approach to promoting active lifestyles which could inform policies,
324 delivery, and resources suitable for use by teachers and schools (Cale, Harris, & Hooper,
325 2017). Informed by the literature and underpinned by social cognitive theory and the social
326 ecological model, participants were involved in developing, trialling, evaluating, and
327 agreeing on a number of whole school and physical education-specific PAL principles, some
328 of which explicitly focus on the development of knowledge and understanding in this area.
329 Key considerations in the design and implementation of the principles were in ensuring their
330 flexibility, simplicity, accessibility, and sustainability. Thus, there are no rigid rules and no
331 prescriptive or structured programme for teachers to follow in incorporating them and
332 minimal training and no or few resources are needed to do so. The findings from the study
333 were encouraging revealing changes in teachers' pedagogies to increase activity levels and
334 positive responses from pupils (Cale et al., 2017).

335 Examples of whole school PAL principles which require and involve the development
336 of appropriate knowledge and understanding include (Harris et al., 2016):

- 337 • Include the physical activity for health guidelines for children in the teaching of
338 PSHE (alongside other health guidelines) as well as in physical education.
- 339 • Discuss the promotion of active lifestyles, including marketing the 'one hour a day'
340 physical activity guideline, with all staff, governors, pupils and parents/carers.
- 341 • Promote active travel to school (cycling, walking, scooting)... (p. 52)

342 Likewise, relevant examples of physical education PAL principles include (Harris et al.,
343 2016):

- 344 • Teach pupils about the broad range of benefits (physical, psychological and social) of
345 a healthy, active lifestyle, including the role of physical activity in healthy weight
346 management.

KNOWLEDGE AND UNDERSTANDING IN FOSTERING PHYSICAL LITERACY

- 347 • Include assessment of learning and progress in active ways (e.g. show me...;
348 demonstrate...; shadow...).
- 349 • Routinely inform pupils where they can be active within 3-5 miles of the school
350 radius (in every unit of work and via the school's intranet/library).
- 351 • Teach pupils how active they should be, involve them in monitoring their activity
352 levels so they become aware of how active they are, and inform them of multiple
353 ways of increasing their activity levels.
- 354 • Identify low active pupils and offer them (and their parents/carers)
355 support/guidance/information and targeted/bespoke activity sessions. (p. 52)

356 In developing knowledge and understanding, not only is identifying appropriate
357 knowledge and approaches for delivering it important, but so too is monitoring the
358 acquisition of this knowledge to establish the progress being made. Knowledge and
359 understanding of health can be assessed via written, verbal, and active responses to focussed
360 questions and tasks as well as via teacher observation (Cale & Harris, 2009). Peer- and self-
361 assessment of health-related learning are also very appropriate as they directly involve pupils
362 in making judgements and decisions about their own and others' learning (Harris & Cale,
363 2018). Furthermore, just as knowledge should be developed through the physical it is
364 recommended that, whenever possible, assessment of knowledge should be through the
365 physical for the same reasons. Active assessment methods represent one of the physical
366 education PAL principles and can involve physical responses to focussed questions and
367 practical tasks and activities which require demonstration and application of knowledge and
368 understanding. Various assessment methods, taken and/or modified from elsewhere (e.g.,
369 Cale & Harris, 2009; Harris & Cale, 2018) are presented below. Whilst these assessments
370 can be applied to different ages and abilities, it is anticipated that they be adapted, as
371 appropriate, and that the nature and depth of expected response will similarly be different.

KNOWLEDGE AND UNDERSTANDING IN FOSTERING PHYSICAL LITERACY

372 Focused questions/activities (pupil-teacher or pupils-pupil) include: (a) Show me and name
373 which muscles are working hard when you run/jump/throw; (b) Why is it important to stretch
374 muscles after you have worked them hard?; (c) How much (and what type of) activity should
375 young people do?; (d) Explain to a partner why physical activity is good for your health; and
376 (e) What are some of the main reasons why young people are not active? Practical tasks
377 include: (a) Show me a stretch for the muscles in..... the back of your leg/hamstring/calf, the
378 front of your thigh/quadriceps, chest/pectorals, etc.; (b) Perform an exercise which will
379 strengthen your.... tummy/stomach/abdominal muscles, leg/thigh muscles/quadriceps,
380 arms/triceps, etc.; (c) With a partner, plan and perform a warm up which includes mobilising
381 and pulse raising activities followed by stretches of the main muscles; (d) Observe another
382 group's cool-down for sprinting and decide how effective it is (in reducing heart and
383 breathing rates and stretching out the main muscles that were worked hard); and (e) Prepare
384 some advice for a member of your family who wishes to become more active. Identify and
385 include 10 top tips/pieces of information you think will help them to take part safely and
386 achieve their goal (of enjoying a physically active lifestyle).

387 **Conclusion**

388 Fundamental to physical literacy and to participating, valuing, and taking
389 responsibility for engaging in physical activities for life is knowledge and understanding of
390 movement and health, which is either explicitly or implicitly embedded within the physical
391 education curricula in most countries. To foster the above, and notably to lead a healthy
392 active life, a sound, broad, and holistic knowledge and understanding is clearly required.
393 With reference to health specifically, and in an attempt to achieve consensus on and illustrate
394 the scope in health-related learning, health-related outcomes for children have been published
395 covering four key categories: safety issues, exercise effects, health benefits, and activity
396 promotion. The latter outcomes relating to health and promoting activity are, however,

KNOWLEDGE AND UNDERSTANDING IN FOSTERING PHYSICAL LITERACY

397 mostly closely linked to valuing and engaging in physical activities for life, and the need to
398 pay more attention to these is therefore recommended and indeed deemed necessary if
399 physical literacy is to be truly fostered.

400 In fostering knowledge and understanding in physical literacy, the content and its
401 delivery are clearly key and there are some general principles which should be subscribed to.
402 These include: learning through the physical, and through a range of activities; the inclusion
403 and empowerment of all pupils; and the shift from dependence on the teacher to
404 independence. Different organisational approaches to developing knowledge and
405 understanding of health are also available which warrant consideration, each of which has
406 strengths and limitations. Within physical education, for example, learning can be permeated
407 through core traditional activities, taught discretely in separate health-related units of work, or
408 via a combination of these approaches. On balance, a combined approach is advocated.

409 Following concerns over the delivery of health, there have been calls for more and
410 alternative approaches to effectively teach health-related knowledge and for a renewed focus
411 on developing PE-for-health pedagogies. Encouragingly, there have been some recent
412 pedagogical developments which are considered to have potential in this regard, two notable
413 ones of which include the HBPE Model and the PAL Principles. Finally, not only is
414 identifying appropriate knowledge and approaches for delivering health important, but so too
415 is monitoring the acquisition of this knowledge to establish the progress being made. This
416 can be done in various ways and it is recommended that, where possible, assessment should
417 be through the physical (i.e., active, and via a range of practical strategies and methods).

418

419

References

420 Alfrey, L., Cale, L., & Webb, L. (2012). Physical education teachers' continuing professional
421 development in health-related exercise. *Physical Education and Sport Pedagogy*, 17,
422 477-491.

423 Alfrey, L., & Gard, M. (2014). A crack where the light gets in: a study of health and physical
424 education teachers' perspectives on fitness testing as a context for learning about
425 health. *Asia-Pacific Journal of Health, Sport and Physical Education*, 5(1), 3-18.

426 Almond, L. (2010). Physical literacy and the older adult population. In M. Whitehead (Ed.),
427 *Physical literacy: Throughout the lifecourse* (pp. 116-129). London, UK: Routledge.

428 Almond, L., & Myers, L. (2017). Physical literacy and the primacy of movement. *Physical*
429 *Education Matters*, 12(1), 19-21.

430 All-Party Commission on Physical Activity. (2014). *Tackling physical inactivity - A*
431 *coordinated approach*. Retrieved from <http://activitycommission.com/>

432 Armour K.M., & Harris, J. (2013). Making the case for developing new PE-for-health
433 pedagogies. *Quest*, 65, 201-219.

434 Blanchard C., Shilton, T., & Bull, F. (2013). Global Advocacy for Physical Activity (GAPA):
435 Global leadership towards a raised profile. *Global Health Promotion*, 20, 113-121.

436 Bowler, M., Sammon, P., Casey, A., Haerens, L., & Kirk, D. (2012, September). *Validating*
437 *the health-based physical education pedagogical model: Defining teacher and student*
438 *benchmarks*. Paper presented at the British Educational Research Association Annual
439 Conference, University of Manchester, UK.

440 Bowler, M., Sammon, P., Kirk, D., Haerens, L., Cale, L., & Casey, A. (2015, July).
441 *Developing a 'prototype' health-based physical education pedagogical model*. Paper
442 presented at the International Association for Physical Education in Higher Education
443 Annual Conference, Universidad Europea, Madrid, Spain.

KNOWLEDGE AND UNDERSTANDING IN FOSTERING PHYSICAL LITERACY

- 444 Burrows, L., Wright, J., & McCormack, J. (2009). Dosing up on food and physical activity:
445 New Zealand children's ideas about 'health.' *Health Education Journal*, 68, 157-169.
- 446 Cale, L. (2017). Teaching about Healthy Active Lifestyles. In C.D. Ennis (Ed.), *Routledge*
447 *handbook of physical education pedagogies* (pp. 399-411). Oxon, UK: Routledge.
- 448 Cale, L., & Harris, J. (Eds.). (2005). *Exercise and young people. Issues, implications and*
449 *initiatives*. Basingstoke, UK: Palgrave Macmillan.
- 450 Cale, L., & Harris, J. (2006). School based physical activity interventions – Effectiveness,
451 trends, issues, implications and recommendations for practice. *Sport, Education and*
452 *Society*, 11, 401-420.
- 453 Cale, L., & Harris, J. (2009). *Getting the buggers fit (2nd ed.)*. London, UK: Continuum.
- 454 Cale, L., & Harris, J. (2013). Physical education and health: Considerations and issues. In S.
455 Capel & M. Whitehead (Eds.), *Debates in physical education* (pp. 74-88). Oxon, UK:
456 Routledge.
- 457 Cale, L., Harris, J., & Duncombe, R. (2016). Promoting physical activity in secondary
458 schools. Growing expectations: Same old issues. *European Physical Education*
459 *Review*, 22, 526-544.
- 460 Cale, L., Harris, J., & Hooper, O. (2017, January). *The Promoting Active Lifestyles project*.
461 Paper presented at the 30th Australian Council for Health, Physical Education and
462 Recreation (ACHPER) International Conference, University of Canberra, Australia.
- 463 Castelli, D., & Williams, L. (2007). Health-related fitness and physical education teachers'
464 content knowledge. *Journal of Teaching in Physical Education*, 26, 3-19.
- 465 Department for Education. (2013a). *Programmes of study for physical education - Key stages*
466 *1 and 2*. Retrieved from [https://www.gov.uk/government/publications/national-](https://www.gov.uk/government/publications/national-curriculum-in-england-physical-education-programmes-of-study)
467 [curriculum-in-england-physical-education-programmes-of-study](https://www.gov.uk/government/publications/national-curriculum-in-england-physical-education-programmes-of-study)

KNOWLEDGE AND UNDERSTANDING IN FOSTERING PHYSICAL LITERACY

- 468 Department for Education. (2013b). *Programmes of study for physical education - Key stages*
469 *3 and 4*. Retrieved from [https://www.gov.uk/government/publications/national-](https://www.gov.uk/government/publications/national-curriculum-in-england-physical-education-programmes-of-study)
470 [curriculum-in-england-physical-education-programmes-of-study](https://www.gov.uk/government/publications/national-curriculum-in-england-physical-education-programmes-of-study)
- 471 Edwards, L.C., Bryant, A.S., Keegan, R.J., Morgan, K., & Jones, A.M. (2017). Definitions,
472 foundations and associations of physical literacy: A systematic review. *Sports*
473 *Medicine, 47*, 113-126.
- 474 Elbourn, J., & James, A. (2013). *Fitness room activities for secondary schools. A guide to*
475 *promoting effective learning about healthy active lifestyles*. Leeds, UK: Coachwise.
- 476 Ennis, C.D. (2015). Knowledge, transfer and innovation in physical literacy curricula.
477 *Journal of Sport and Health Science, 4*, 119-124.
- 478 Fardy, P.S., Azzollini, A., & Herman, A. (2004). Health-based physical education in urban
479 high schools: The PATH program. *Journal of Teaching in Physical Education, 23*,
480 359-371.
- 481 Haerens, L., Kirk, D., Cardon, G., & De Bourdeaudhuij, I. (2011). Toward the development
482 of a pedagogical model for health-based physical education. *Quest, 63*, 321-338.
- 483 Harris, J. (2000). *Health-related exercise in the national curriculum*. Leeds, UK: Human
484 Kinetics.
- 485 Harris, J. (2010). Health-related physical education. In R. Bailey (Ed.), *Physical education*
486 *for learning: A guide for secondary schools* (pp. 26-36). London, UK: Continuum.
- 487 Harris, J., & Cale, L. (2018). *Promoting active lifestyles in schools*. Leeds, UK: Human
488 Kinetics.
- 489 Harris, J., Cale, L., Casey, A., Tyne, A., & Samaria, B. (2016). Promoting active lifestyles in
490 schools. The PAL project. *Physical Education Matters, 11*(3), 52-53.

KNOWLEDGE AND UNDERSTANDING IN FOSTERING PHYSICAL LITERACY

- 491 Harris, J., & Leggett, G. (2015). Influences on the expression of health within physical
492 education curricula in secondary schools in England and Wales. *Sport Education and*
493 *Society*, 20, 908-923.
- 494 Hastie, P. (2017). Revisiting the National Physical Education Content Standards: What do we
495 really know about our achievement of the physically educated/literate person? *Journal of*
496 *Teaching in Physical Education*, 36, 3-19.
- 497 Hastie, P.A., Chen, S., & Guarino, A.J. (2017). Health-related fitness knowledge development
498 though project-based learning. *Journal of Teaching in Physical Education*, 36, 119-125.
- 499 Hodges, M., Kulinna, P.M., Lee, C., & Kwon, J.Y. (2017). Professional development and teacher
500 perceptions of experiences teaching health-related fitness knowledge. *Journal of Teaching*
501 *in Physical Education*, 36, 32-39.
- 502 International Physical Literacy Association (IPLA). (2017). Retrieved from
503 <https://www.physical-literacy.org.uk/>
- 504 Keating, X.D. Harrison, L., Chen, L., Xiang, P., Lambdin, D., Dauenhauer, . . . Pinero, J.C.
505 (2009). An analysis of research on student health-related fitness knowledge in K-16
506 physical education programs. *Journal of Teaching in Physical Education*, 28, 333-349.
- 507 Kirk, D. (2013). Educational value and models-based practice in physical education. *Educational*
508 *Philosophy Theory*, 45, 973–986.
- 509 Kulinna, P.H., McCaughtry, N., Martin, J.J., Cothran, D., & Faust, R. (2008). The influence of
510 professional development on teachers' psychosocial perceptions of teaching a health-
511 related physical education curriculum. *Journal of Teaching in Physical Education*, 27, 292-
512 307.
- 513 Liedl, R. (2013). A holistic approach to supporting physical literacy. *Physical and Health*
514 *Education Journal*, 79(2), 19.

KNOWLEDGE AND UNDERSTANDING IN FOSTERING PHYSICAL LITERACY

- 515 Lundvall, S. (2015). Physical literacy in the field of physical education – A challenge and a
516 possibility. *Journal of Sport and Health Sciences*, 4, 113-118.
- 517 McKenzie, T.L. (2007). The preparation of physical educators: A public health perspective.
518 *Quest*, 59, 346-357.
- 519 McMullen, J., Ní Chróinín, D., Tammelin, T., Pogorzelska, M., & van der Mars, H. (2015).
520 International approaches to whole-of-school physical activity promotion. *Quest*, 67,
521 384-399.
- 522 Murdoch, E., & Whitehead, M. (2010). Physical literacy, fostering the attributes and
523 curriculum planning. In M. Whitehead (Ed.), *Physical literacy: Throughout the*
524 *lifecourse* (pp. 175-188). London, UK: Routledge.
- 525 Puhse, U., Barker, D., Brettschneider, W.D., Feldmeth, A.K., Gerlach, E., McCuaig, L., . . .
526 Gerber, M. (2011). International approaches to health-oriented physical education:
527 Local health debates and differing conceptions of health. *International Journal of*
528 *Physical Education*, 3, 2-15.
- 529 Trost, S. (2006). Public health and physical education. In D. Kirk, D. Macdonald, & M.
530 O'Sullivan (Eds.), *The handbook of physical education* (pp. 63-187). London, UK:
531 Sage.
- 532 Whitehead, M. (2007). Physical literacy: Philosophical considerations in relation to
533 developing a sense of self, universality and propositional knowledge. *Sport, Ethics and*
534 *Philosophy*, 1, 281-298.
- 535 Whitehead, M. (2010a). The concept of physical literacy. In M. Whitehead (Ed.), *Physical*
536 *literacy: Throughout the lifecourse* (pp. 10-20). London, UK: Routledge.
- 537 Whitehead, M. (2010b). Physical literacy, the sense of self, relationships with others and the
538 place of knowledge and understanding in the concept. In M. Whitehead (Ed.), *Physical*
539 *literacy: Throughout the lifecourse* (pp. 56-67). London, UK: Routledge.

KNOWLEDGE AND UNDERSTANDING IN FOSTERING PHYSICAL LITERACY

- 540 Whitehead, M. (2013). The value of physical literacy. *ICSSPE Journal of Sport Science and*
541 *Physical Education*, 65, 42-43.

KNOWLEDGE AND UNDERSTANDING IN FOSTERING PHYSICAL LITERACY

542 Table 1

543 *Learning Outcomes Associated with National Curriculum Key Stages*

544

545 Pupils who are 5-7 years can:

- 546 • explain that activity starts with a gentle warm up and finishes with a calming cool
547 down (safety issues)
- 548 • recognise and describe the effects of exercise, including changes to: breathing (e.g.
549 becomes faster and deeper), heart rate (e.g. heart pumps more quickly), temperature
550 (e.g. feel hotter), appearance (e.g. look hotter), feelings (e.g. feeling good, more
551 energetic, tired) (exercise effects)
- 552 • explain that regular activity improves health by making you feel good (e.g. happy,
553 pleased, content) and helping body parts (e.g. bones and muscles) to grow, develop
554 and work well (health benefits)
- 555 • identify when, where and how they can be active at school (in and out of lessons)
556 (activity promotion).

557 Pupils who are 7-11 years can:

- 558 • explain the need for safety rules and practices (e.g. adopting good posture, changing
559 clothes and having a wash after energetic activity, wearing suitable footwear,
560 following rules, safe lifting) (safety issues)
- 561 • explain and feel the short-term effects of exercise (e.g. breathing increases in order to
562 provide more oxygen to the working muscles, the heart rate increases to pump more
563 oxygen to the working muscles, body temperature increases because working muscles
564 produce energy as heat) (exercise effects)
- 565 • explain that exercise strengthens bones and muscles (including the heart) and helps to
566 keep joints flexible (health benefits)

KNOWLEDGE AND UNDERSTANDING IN FOSTERING PHYSICAL LITERACY

- 567 • identify when, where and how they can be active in school and outside... and explain
568 that individuals have different feelings about the types and amounts of activity that
569 they choose to do (activity promotion).

570 Pupils who are 11-14 years can:

- 571 • explain the value of preparing for and recovering from activity and the possible
572 consequences of not doing so, and the purpose of each component of a warm up and
573 cool down (i.e. mobility exercises, whole body activities, static stretches) for general
574 activity and for a specific activity (safety issues)
- 575 • explain a range of short-term effects of exercise on the cardiovascular system (e.g.
576 changes in: breathing and heart rate, temperature, appearance, feelings, recovery rate)
577 and musculo-skeletal system (e.g. increases in muscular strength and endurance and
578 flexibility, improved muscle tone and posture, enhanced functional capacity) (exercise
579 effects)
- 580 • explain a range of long-term benefits of exercise on physical health (e.g. reduced risk
581 of chronic disease (e.g. heart disease), reduced risk of bone disease (e.g.
582 osteoporosis), reduced risk of some health conditions (e.g. obesity, back pain),
583 improved management of some health conditions (e.g. asthma, diabetes, arthritis)
584 (health benefits)
- 585 • know ways of incorporating exercise into their lifestyles (e.g. walking or cycling to
586 school or to meet friends, helping around the home/garden) (activity promotion).

587 Pupils who are 14-16 years can:

- 588 • recognise and manage risk and apply safe exercise principles and procedures (e.g. not
589 exercising when unwell or injured, avoiding prolonged high impact exercise,
590 administering first aid including resuscitation techniques, avoiding excessive
591 exercise) (safety issues)

KNOWLEDGE AND UNDERSTANDING IN FOSTERING PHYSICAL LITERACY

- 592 • explain that frequent and appropriate activity enhances the physical, social and
593 psychological well-being of all individuals including the young and old, able-bodied
594 and disabled, and those with health conditions (e.g. asthma, depression) and chronic
595 disease (e.g. arthritis) (health benefits)
- 596 • explain that training programmes develop both health-related components
597 (cardiovascular fitness, muscular strength and endurance, flexibility, body
598 composition, composure, decision-making) and skill-related components of physical
599 and mental fitness (agility, balance, co-ordination, power, reaction time, speed,
600 concentration, determination) (exercise effects)
- 601 • explain factors affecting participation and constraints to being active and explore how
602 to overcome the latter in order to gain access to and sustain involvement in activity
603 (activity promotion). (Taken and adapted from Harris, 2000).

604

605

606 Table 2

607 *Example Knowledge and Understanding Outcomes Related to Health Benefits and Activity*

608 *Promotion*

Learning Outcome	5-7 Year Olds	7-11 Year Olds	11-14 Year Olds	14-16 Year Olds
Health Benefits	<p>explain that regular activity improves health by:</p> <ul style="list-style-type: none"> -making you feel good (e.g. happy pleased, content) -helping body parts (e.g. bones and muscles) to grow, develop and work well 	<p>explain that activity strengthens bones and muscles (including the heart) and helps to keep joints flexible</p> <p>explain that activity can help you to feel good about yourself and can be fun and sociable</p> <p>explain that regular activity permits daily activities to be performed more easily</p> <p>explain that being active helps to maintain a</p>	<p>explain a range of long-term benefits of activity on physical health:</p> <ul style="list-style-type: none"> -reduced risk of chronic disease (e.g. heart disease) -reduced risk of bone disease (e.g. osteoporosis) -reduced risk of some health conditions (e.g. obesity, back pain) -improved management of some health conditions (e.g. asthma, diabetes, arthritis) <p>explain that activity can enhance mental health and social and psychological well-being (e.g.</p>	<p>explain that frequent and appropriate activity enhances the physical, social and psychological well-being of all individuals including the young and old, able-bodied and disabled, and those with health conditions (e.g. asthma, depression) and chronic disease (e.g. arthritis)</p> <p>explain that activity can help to manage stress and contribute to a happy, healthy and balanced lifestyle</p> <p>appreciate the risks associated with a sedentary lifestyle and with excessive behaviour (e.g. eating disorders and over-</p>

		<p>healthy body weight</p>	<p>enjoying being with friends; increased self-esteem; decreased anxiety) and that an appropriate balance between work, leisure and activity promotes good health</p> <p>explain that increasing activity levels and eating a balanced diet can help to maintain a healthy body weight (energy balance equation) but the body needs a minimum daily energy intake to function properly, and strict dieting and excessive exercising can damage one's health</p> <p>explain how each activity area (e.g. athletics, dance, games) can</p>	<p>exercising)</p> <p>identify how each activity area (e.g. gymnastics, swimming) can contribute to specific components of health-related fitness (e.g. gymnastics develops muscular strength/endurance and flexibility)</p>
--	--	----------------------------	--	--

			contribute to physical health and to social and psychological well-being (e.g. can improve stamina, assist weight management, be enjoyable)	
Activity Promotion	identify when, where and how they can be active at school (in and out of lessons)	identify when, where and how they can be active in school and outside ...explain that individuals have different feelings about the types and amounts of activity that they choose to do	...know ways of incorporating activity into their lifestyles (e.g. walking or cycling to school or to meet friends; helping around the home/garden) ...know how to go about getting involved in activities	explain and demonstrate a practical understanding of the key principles of activity programming and training, including: -progression -overload -specificity -balance, moderation and variety -maintenance -reversibility -cost benefit ratio explain factors affecting participation and constraints to being active and explore how to overcome the latter in

				order to gain access to and sustain involvement in activity
--	--	--	--	--

609

610