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Exploring coach perceptions of Parkour-style training for athlete learning and development in team sports

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1   **Exploring coach perceptions of Parkour-style training for athlete learning and**

2   **development in team sports**

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Abstract

Contemporary learning and development models have identified Parkour-style training as a vehicle for athlete enrichment. However, perceptions of team sport coaches and their receptiveness to such models of athlete enrichment have not been investigated and remain unclear. To explore how Parkour-style training could be integrated into athlete development programs in team sports, we interviewed sport practitioners to explore their pre-existing knowledge of Parkour and their perceptions on its potential applications. Experienced talent development (n=10) and strength and conditioning coaches (n=10) were interviewed using an open-ended, semi-structured approach, with a two-stage thematic analysis being conducted to identify themes. Three dimensions were identified: Coaches' General Perceptions of Parkour, Potential Applications of Parkour, and Feasibility of Integrating Parkour into athlete development programs. Participant perceptions revealed that: 1) Parkour activities were viewed as supplementary activities to enrich sport-specific training routines, including use of obstacle courses and/or tag elements, 2) Parkour-style obstacle environments needed to be scalable to allow individual athletes and coaches to manipulate object orientation and tasks using soft play and traditional gym equipment, and 3), The implementation of continued professional development opportunities, athlete-centred approaches to learning designs in sport, and coach-parent forums were recommended to support the integration of Parkour-style training.

Introduction

Researchers with an interest in motor learning and development as well as skill acquisition have increasingly sought to make use of knowledge sourced from empirical research, as well as from the experiences of high-performance practitioners (termed experiential knowledge) to understand how to create the best learning and talent development environments in sport (e.g., see Burnie et al., 2018; Pocock et al., 2020; McCosker et al., 2020; Stone et al., 2020; Woods et al., 2020a; Woods et al., 2020b). This re-balancing of the relationship between experiential and empirical knowledge has emerged because the rationale for evidence-based practice in motor learning and skill acquisition has been skewed towards a limited categorisation of knowledge viewed as influencing practice (Rothwell et al., 2020). To develop a more nuanced understanding of effective learning designs in athlete development programs, recent research informed by ecological dynamics theory has transitioned towards a deeper integration of experiential and empirical knowledge (Pocock et al., 2020; Stone et al., 2020). Such integration is utilised to create a new and integrated understanding predicated on psychological science, knowledge, and practice experiences (see also; McKay & O'Connor, 2018; Browne et al., 2019). This integrative approach has contributed to the development of models such as Nonlinear Pedagogy (Chow et al., 2015) and the Athletic Skills Model, a practitioner-informed model of skill learning and development (Wormhoudt et al., 2018; Savelsbergh & Wormhoudt, 2019). Nonlinear Pedagogy provides an 'explore-discover-adapt' approach to learning via the application of five learner-centered principles (representativeness, constraints manipulation, task simplification, informational constraints, and functional variability), which emphasize how to create learning designs which support the emergence of functional goal-directed behaviours in performers at all skill levels (Renshaw & Chow, 2019). These principles of nonlinear

89   pedagogy are aligned with key ideas of skill development and learning outlined in the

90   Athletic Skills Model (Rudd et al., 2020).

91   As a concentric, skill-centred approach to athlete development, the Athletic Skills

92   Model emphasises the importance of enriching an athlete's basic movement skills (termed

93   Functional Movement Skills (Newell, 2020) (aiming; balance; climbing; jumping; kicking;

94   rolling; romping/fighting; running; swinging; throwing), promoting further gains in

95   coordinative abilities (adaptability; balance; coupling; kinetic differentiating; spatial

96   orientation; rhythmic ability) and adaptations to conditions of movement (agility; stability;

97   flexibility; power and endurance) at a foundational level (Wormhoudt et al., 2018). The

98   integration of these foundational movement skills encapsulate elements of basic motor

99   properties (coordination; speed; strength; flexibility and endurance) which enrich an athlete's

100   potential to learn specific skills needed to participate and compete in particular sports at a

101   later stage. Therefore, activities promoting the acquisition of functional movement skills are

102   considered essential for the functional development of athletes, regardless of sport

103   specialisation (Newell, 2020; Rudd et al., 2020). The Athletic Skills Model proposes the

104   benefits of experience in 'donor sports' which can "donate" elements of basic movement

105   skills that enable performers to excel in a target sport through transfer of motor skill learning

106   between sports or sport elements (Savelsbergh & Wormhoudt, 2019).

107   With origins in France, the popularity of Parkour has grown considerably since the

108   1990s and it is now practiced as a competitive sport, via different event formats, notably:

109   speed, skill, and free style (Padulo et al., 2019). Parkour requires performers (known as

110   "Traceurs") to learn how to negotiate obstacles with differing properties such as textures,

111   surfaces, inclinations, sizes and angles in the most effective and efficient way possible

112   (Greenberg & Culver 2019). The term "traceur" originated from the French verb "tracer"

113   which broadly means "going fast" and "drawing a line" (i.e., moving one point to another).

114   The Athletic Skills Model's focus on developing a foundation of functional movements

115   shares parallels with the origins of Parkour training. Early Parkour Traceurs drew motivation

116   from George Hébert's Méthode Naturelle, a training method which emphasises the value of

117   functional exercises relating to physical conditioning and development of foundational

118   movement skills (i.e., attack-defence, carrying, climbing, jumping, rising, running,

119   swimming, throwing, walking) (Terret, 2010). These foundational movement skills are

120   thought to underpin execution of more complex movement patterns, supporting a well-

121   rounded athleticism (Hébert & Till, 2017). Strafford et al. (2018) have proposed Parkour as a

122   suitable donor sport to promote learning and development. Strafford et al. (2018) emphasise

123   how creativity in movement exploration afforded by Parkour is as an antidote to early

124   specialisation methods for athlete development in sport which over-rely on rehearsing

125   technical movement patterns in traditional drill-based, repetitive practices from a very young

126   age. Parkour research to date, however, has been largely quantitative and descriptive in

127   nature, for example focused on measuring mechanical components of performance such as

128   the jumping capacities of Parkour Traceurs, evaluated in isolation of Parkour environments

129   (e.g., Grosphrêre & Lepers, 2015; Abellán-Aynés & Alacid, 2017 Padulo et al., 2019).

130   Strafford et al. (2021) addressed this concern by examining which functional movement skills

131   were correlated with Parkour-speed run performance. Consistent with insights of the Athletic

132   Skills Model, the data from Strafford et al. (2021) suggested that performance in Parkour-

133   speed-runs were underpinned by functional movement skills (jumping, running; arm

134   swinging) and condition of movement (agility), all of which encapsulate elements of basic

135   motor properties (speed; strength). These findings provided evidence that functional

136   movement skills (effectivities) are not isolated movements, but foundational skills that can be

137   enriched and integrated to support functional interactions of athletes within a Parkour speed-

138   run performance environment. It was suggested that repeated exposure to Parkour speed-run

139   environments developed specific functional movement skills which enabled the Traceurs to

140   navigate speed run environments more efficiently. Therefore, the findings from Strafford et

141   al. (2021) provide evidence that Parkour can be an effective donor sport to promote

142   specificity of learning and skill development in team sport athletes.

143   Nonlinear Pedagogy and the Athletic Skills Model consider coaches as

144   *'environmental designers',* responsible for facilitating an individualised and inclusive

145   learning environment for developing athletes. Strafford et al. (2020) explored Parkour

146   Traceurs' experiences and the skills they believed were developed through Parkour, and how

147   they developed Parkour practice landscapes to support their development of necessary

148   physical, perceptual, psychological and social skills. Parkour Traceurs explained that, for

149   athletic development, indoor Parkour environments have to promote creative and exploratory

150   movement behaviours, whilst physically and psychologically conditioning the athlete through

151   heightened opportunities for enhancing decision making and acquiring functional actions

152   (Strafford et al., 2020). Practically, Parkour Traceurs discussed how these enrichment

153   processes are achieved through the development of modular practice landscapes, where the

154   spacing, orientation and angles of the installation blocks and bar set ups are manipulated to

155   adapt task difficulty. These recommendations provided rich insights into how 'affordances'

156   (opportunities for action; Gibson (1979), offered by the Parkour environment, could be

157   designed into practice environments to facilitate their utilisation, and the development and

158   transfer of skilful behaviours. However, this suggestion has yet to be examined and research

159   on the insights of parkour and team sport coaches is needed to address the feasibility of

160   integrating Parkour performance installations into traditional team sport training programmes.

161   When integrating new approaches such as Parkour-style training in practice, the aim

162   should be to promote collaborations between sport practitioners and discussion on how to

163   adapt practice landscapes in athlete development programmes (Rothwell et al., 2020).

164   Enhancing clarity of practitioner understanding could ensure a successful longer-term

165   integration of Parkour into athlete learning and development programmes, rather than it being

166   treated as a mere "fad" which may not be sustainable. In meeting the challenge of

167   contextually integrating Parkour practice landscapes into high performance sport

168   organisations, it is important to sample the experiential knowledge and understanding of two

169   groups central to talent development in team sports: talent development specialists and

170   strength and conditioning coaches. Sampling their experiential knowledge and understanding

171   could afford practical recommendations from key stakeholders concerning the potential

172   integration of Parkour-style training into talent development and learning environments in

173   sport.

174   **Study Purpose**

175   The purpose of this study was to address how Parkour-style training could be integrated into

176   team sport athlete development programmes. To achieve this purpose, the study had three

177   aims: (1) explore talent development specialists' and strength and conditioning coaches' pre-

178   existing knowledge about Parkour-style training, (2) explore the perceptions held by talent

179   development specialists and strength and conditioning coaches on the potential applications

180   of Parkour-style training for athlete development in their sports, and (3) explore the

181   feasibility of integrating Parkour-style training into team sport practice routines, based on

182   recommendations arising from the coaches' experiential knowledge.

183   **Method**

184   **Research Design**

185   A pragmatic research paradigm was adopted to place the research aim centrally, by

186   emphasising communication, shared meaning-making, and transferability of research findings

187   to the potential practical applications of Parkour-style training in team sport settings (Creswell

188   & Creswell, 2017). In accordance with a pragmatic approach, qualitative inquiry using semi-

189   structured interviews was adopted, as the use of open-ended questions permits flexible

190   observations of participants' experiences and perceptions (Smith & Sparkes, 2016).

191   **Participant Recruitment and Demographics**

192   Twenty experienced coaches were interviewed, including ten talent development

193   specialists (Mean age: 34.8 ± 10.1 years) and ten strength and conditioning coaches (Mean

194   age: 32.7 ± 7.9 years). Participants were recruited online and in person using a combination

195   of purposive and snowball sampling (Tongco, 2007). At the time of interview, participants

196   had to be active in sport coaching and been in their working setting for a minimum of three

197   years (talent development specialists: 15.0 ± 8.2 years, strength and conditioning coaches:

198   12.3 ± 7.4 years). A summary of participant demographic information is displayed in Table 1.

199   Institutional ethical approval was granted by the university ethics committee of the lead

200   author, with all participants providing informed written consent prior to commencing the

201   interviews.

202   **Table 1.** Participants demographic information (about here)**

203   **Data Collection**

204   Development of a semi-structured interview guide ensured that each coach, regardless

205   of coaching specialism, was asked the same set of central questions, which enabled

206   participants to lead the conversation, and discuss and elaborate on their coaching philosophy,

207   perceptions of Parkour and recommendations for integrating Parkour into coaching practice.

208   All interviews were conducted by the lead author in person (n = 3) or over video call (n = 17)

209   and lasted between 24-52 minutes (Mean Duration: 31.6 ± 7.2 minutes). The interview guide

210   began with a warm-up question that was relevant to each coach, to develop rapport between

211   coach and interviewer, and to encourage each coach to talk descriptively in the presence of an

212   audio recording device (Dicicco-Bloom & Crabtree, 2006). The discussion then transitioned

213   on to specific questions about each participant's background and journey into coaching,

214   philosophy towards athlete development, perceptions on the potential applications of Parkour

215   for athletic development, and recommendations for integrating Parkour into coaching

216   practice. Probe questions were used, where deemed necessary, to encourage participants to

217   expand on responses and provide depth to articulated responses (Smith & Sparkes, 2016). All

218   interviews were recorded, with permission, in their entirety using a digital voice recorder and

219   transcribed verbatim, using desktop transcription software (Audio Notetaker, Sonocent Ltd,

220   Leeds, United Kingdom).

221   **Data Analysis**

222   To identify themes across the data set, a two-stage, reflexive thematic analysis was

223   employed (Braun & Clarke, 2019). The interview transcripts were coded in Microsoft Excel

224   (Version 18, Microsoft Cooperation, Washington, United States). During the thematic

225   analysis, the research team did not adopt an 'either or approach' (i.e., inductive approach:

226   with little pre-determined structure, theory or framework, or deductive approach: the of

227   structure, theory or a pre-determined framework). A pragmatic form of enquiry was

228   undertaken that comprised of deductive and inductive approaches (Robertson et al., 2013;

229   Braun, Clarke & Weate, 2016). The first coding stage employed deductive analysis to

230   organise the data into three dimensions (general perceptions of Parkour, potential applications

231   of Parkour, and feasibility of integrating Parkour into coaching practice). The first coding

232   stage was initially undertaken by the lead author, who read the transcripts several times

233   to identify language related to general perceptions of Parkour and feasibility of integrating

234   Parkour into coaching practice. After the first coding stage, a period of peer consultation was

235   undertaken, which involved the authors reading the transcripts independently to facilitate an

236   open discussion on the initial dimensions determined by the lead author. The authors

237   accepted that theory-free knowledge cannot be achieved, in that knowledge can be both

238   explicit (as with theoretical understanding on the subject) or implicit (as with practical skill of

239   expertise) (Dewey, 1938). Therefore, once data were organised into these three dimensions,

240   both deductive and inductive analyses were undertaken in a second coding stage (Guba &

241   Lincon, 2005). This reflexive and collaborative approach to the analytic process was

242   employed to develop a more nuanced and richer interpretation of the data, rather than seek

243   consensus on meaning (Braun & Clarke, 2019). Codes were next grouped into higher and

244   lower order themes in relation to the research questions. Codes classified in more than one of

245   the themes were assigned into the one perceived to best 'fit'. To maintain analytical rigour,

246   additional discussions of the higher and lower order themes were conducted between the

247   authorship team (Tracy, 2010). During this process members of the authorship team gave

248   voice to their interpretations of higher and lower order themes via the medium of critical

249   verbal dialogue. Where any coding differences were identified, these were resolved through

250   peer discussion and evaluation and alteration of codes as appropriate. For example, critical

251   dialogue informed the (re) wording of the higher order theme "Addressing Potential Barriers

252   to the Integration of Parkour-Style Training", where the word 'Addressing" was added to best

253   represent the recommendations outlined by coaches on how potential barriers for integration

254   of Parkour-style training could be resolved.

255   **Research Quality and Rigour**

256   Pilot interviews with two participants who had experience either as a talent

257   development specialist or strength and conditioning coach were undertaken to facilitate

258   methodological rigour. These pilot interviews acted as a consultation process which allowed

259   the authors to appraise the flexibility and suitability of the interview format in the context of

260   the population group. The interview guide was not amended following pilot interviews.

261   Concurrent with a pragmatic research paradigm, it is important to acknowledge the

262   personal biography of the authors, given that their previous work was a motivation for

263   undertaking the current study, and that their past research may have informed the

264   development of the study's methodology (Tracy, 2010). All authors were, at the time of

265   writing, academics at universities across the United Kingdom with varying experiences of

266   working in research (5-41 years). Authors' previous work is underpinned by the ecological

267   dynamics approach to motor learning. Rather than viewing such influences as potential

268   contamination of the data to be avoided, the authors engaged with retrospective (which

269   concerns the effect of the research on the researcher) and prospective (which concerns the

270   effect of the whole-person-researcher on the research) reflexivity. This process confirmed the

271   significance of their values, feelings, and knowledge that they brought to the

272   conceptualisation of the research issues and the analytical lens applied to the findings (Attia

273   & Edge, 2017; Braun & Clarke, 2019). In line with recommendations from Smith and

274   McGannon (2018), an independent critical friend was utilised during the data analysis

275   process, to discuss interpretations made throughout with the co-authors. During these

276   discussions, the role of the critical friend was to encourage reflexivity by challenging the

277   authors' "construction of knowledge" (Cowan & Taylor, 2016).

278   **Results and Discussion**

279   Thematic analysis highlighted a total of three dimensions, seven higher-order themes,

280   and 24 lower-order themes. The 3 dimensions were: (1) Coaches General Perceptions of

281   Parkour, (2) Potential Applications of Parkour, and (3), Feasibility of Integrating Parkour into

282   Coaching Practice.

283   **Coaches' General Perceptions of Parkour**

284   Within the coaches' general understanding of Parkour dimensions, two higher order

285   themes emerged, first, underlying knowledge of Parkour and, second, the resources they have

286   engaged with to acquire knowledge on Parkour (Figure 1).

287   **Figure 1.** Thematic Map: Coaches General Understanding of Parkour (about here)**

288   *Underlying Knowledge about Parkour*

289   The coaches described Parkour as an 'athlete-centred sport', which requires

290   participants to solve unstructured movement challenges to move from *point a to point b*

291   creatively:

292   Yeah I have heard of Parkour, my understanding of the activity is that it challenges

293   whoever take parts in it, will have a set out route where they might want to get from

294   say A to B, with lots of different obstacles in the way. But they can be creative in how

295   they are going to go over those obstacles to get from A to B, and they might set up

296   their own way of doing that and different movements to be able to do it. (Talent

297   Development Coach 1)

298   This coach's description of Parkour is consistent with that provided by expert Parkour

299   Traceurs in Strafford et al. (2020), who also emphasised the unstructured and creative value

300   of Parkour participation and the requirement for athletes to move from one point to another

301   creatively. By highlighting the use of obstacles, the coaches identify varied opportunities for

302   action (affordances) that they believe are innate to Parkour learning environments (Strafford

303   et al., 2018). When discussing the structural features of Parkour, some coaches drew on their

304   experiences in gymnastics for contrast:

305   So, I think it (Parkour) is a nice way of moving and, to me, it's a bit similar to

306   gymnastics but without all the rules and everything being nice and perfectly straight

307   and stuff. So, it's more you get to do some similar moves with obstacles, running,

308   jumping, turning, flipping, and everything like that. But, then move more in a freeway

309   than the strict way of competition gymnastics. (Talent Development Coach 6)

310   In gymnastics, the athlete's body has to be oriented in specific position, according to

311   set criteria, to score points evaluated by the judges. This type of structure for the sport can

312   lead athletes to become dependent on explicit coach feedback in practice, due to the need to

313   satisfy set criteria, which, in turn, may impede performance due to reduced reliance on

314   intrinsic feedback (Button et al., 2020). In contrast, the implicit nature and landscape of the

315   Parkour environment offers an array of affordances for jumping, landing, and changing direct

316   through a process of self-regulation (Rudd et al., 2020). Athletes who are repeatedly exposed

317   to Parkour environments have copious opportunities to discover, explore and exploit

318   movement solutions to navigate through the environment, and so develop or enhance their

319   functional movement skill capacities.

320   ***Resources used to gain knowledge on Parkour***

321   Concurrent with the advent of new technologies in sports coaching, the coaches'

322   understanding of Parkour was primarily founded from media sources such as social media,

323   YouTube and television shows:

324   Through my time working in academy football, I have used online videos just to get

325   ideas. So, I first came across it (Parkour) as a tool for the athletes of young ages to

326   develop different movements in football. (Talent Development Coach 4)

327   Yeah that's just kind of adapting as I see things on Twitter, if I like it, I will give it a

328   try basically. (Strength and Conditioning Coach 1)

329   It is clear how online resources on Parkour (which were beyond sport-specific

330   disciplines) have provided a platform for integration and innovation of new approaches to

331   athlete development in football-specific settings (Nicolescu, 2002). It is important to note,

332   however, that some online sources are not always appropriate and could lead to the

333   integration of unsafe or incorrect Parkour-style training. It is important to develop resources

334   on Parkour that could be provided to coaches (and published on social media platforms)

335   which are appropriately informed and relevant, not only for coaches, but also for parents,

336   athletes, and academics. These resources should be developed in consultation with Parkour

337   experts to ensure that they are representative of a safe and inclusive, yet enriching, Parkour

338   environment.

339   **Potential Applications of Parkour**

340   Within the 'Potential Applications of Parkour' dimension, coaches discussed ideas

341   surrounding application of Parkour for the psychological and physical development of

342   athletes (Figure 2).

343   **Figure 2.** Thematic Map: Potential Applications for Parkour (about here)**

344   *Parkour for Psychological Development*

345   The coaches described how exposure to Parkour-style training could develop athlete

346   self-regulation through enriching problem-solving, resilience, confidence and risk-appraisal

347   skills. Some coaches referenced how practising Parkour could be beneficial for developing

348   psychological skills in team sport athletes, in particular problem-solving and resilience

349   following physical movement challenges:

350   It (Parkour) would certainly build problem solving and resilience, because obviously

351   within the challenge they (athletes) might not fulfil it and obviously build resilience

352   from that…You know, in a way that would develop their decision-making skills to,

353   you know, in a Rugby game scenario. For, example in a penalty kick in Rugby, or

354   catching the drive, which requires you to look at the what the opposing team are doing

355   and react. (Talent Development Coach 1)

356   Parkour can develop some real good problem solving for movement challenges.

357   Ultimately this enables our athletes a sense of exploration, fun, and danger which we

358   know is going to strengthen the feedback that is given. If I think back to team

359   invasion sport athletes and what makes good movers, this is often being rhythmical or

360   being smooth or being easy on the eye. Ultimately, I think that comes down to them

361   (athletes) having a good understanding to where their limbs are in time and space and

362   how to create shapes and patterns with their body. I think Parkour is one modality that

363   can enable us to better understand where our bodies are in time and space. (Strength

364   and Conditioning Coach 8)

365   With the exception of variants of Parkour-style formats like 'world chase tag',

366   Parkour is an individual event without opponents, and unlike team sports does not require

367   ball handling skill. However, engaging in Parkour may led to the transfer of general

368   movement (e.g., dynamic balance, postural regulation, changing direction, landing, twisting

369   and turning, and using limbs in separate ways) and psychological skills between Parkour and

370   team sport domains due to a shared affordance landscape (Strafford et al., 2018). In terms of

371   developing resilience, exposure to interactions with the environment in Parkour landscapes

372   may enable team sport athletes to become more resilient in overcoming emergent movement

373   challenges in their performance environment by self-regulating and exploring their own

374   movement capabilities, relative to the positioning and orientation of their limbs in space

375   (Merrit & Tharp 2013; Aggerholm & Højbjerre Larsen, 2017). In addition to problem-solving

376   and resilience, coaches outlined how exposure to Parkour may develop athletes' capabilities

377   to manage fear and take educated (i.e., understood and evaluated) risks in team sport settings,

378   as this coach outlined:

379   I think that can help in pushing the boundaries in other sports as well. So, some things

380   in Parkour might be perceived as dangerous or, they might be afraid of some things

381   and I think in the process of learning those skills they learn like ok, I was scared at

382   first, but while practising and learning this, I did manage to do so. So, this could also

383   translate to other sports, when they face difficulties as like ok well I have had this

384   before and I know how to help by influencing this skill. (Talent Development Coach

385   6)

386   Here, the coach outlined how a willingness to take educated risks during Parkour

387   practice can transfer to willingness to explore new behaviours in the athlete's target sport

388   through heightened cognitive awareness of their own abilities. The link between Parkour and

389   cognitive appraisal has been previously examined by Taylor, Witt and Sugovic (2011) who

390   demonstrated that athletes skilled in Parkour perceived a Parkour obstacle as being shorter

391   than a novice control group. These findings from Taylor, Witt and Sugovic (2011) are

392   consistent with the notion of reciprocity between perception and action, advocated for

393   learning designs in Nonlinear Pedagogy. This reciprocal relationship was outlined originally

394   by James Gibson (1979), proposing that a performer's perception of information for

395   utilisation of affordances is scaled by their perceived abilities and capacities, described as

396   *effectivities* in ecological psychology (Fajen, Riley, & Turvey, 2008). Given that self-efficacy

397   and confidence refer to an individual's perceptions and appraisal of their capabilities, this

398   psychological function may develop with Parkour training (Baundura, 1997; Llewellyn et al.,

399   2008; Strafford et al., 2020). Indeed, many coaches in this study outlined how exposure to

400   Parkour leads to increases in athletes' confidence of their general movement abilities, which

401   is missing in other sports:

402   So, where I see the value for Parkour is, I think the confidence that can come from

403   like if you've got movement skill and coordination and all of those great things that

404   are important in any sport, you got confidence... So, when it comes to sport, say

405   transfer back into their own context, their own world, they can utilise their body in a

406   far more diverse way than they ever could prior to that form of exposure. (Strength

407   and Conditioning Coach 5)

408   It is also important to note that the coaches are outlining the integrated relationship

409   between physical and psychological development highlighted in the Athletic Skills Model

410   (Wormhoudt et al., 2018). From an ecological dynamics perspective, exposure to Parkour

411   would afford team sport athletes with opportunities to develop cognitive appraisal skills

412   relative to both the actual and perceived action capabilities of their developing movement

413   system. This enrichment process would assist risk-benefit analysis during sport performance,

414   in addition to heightening perceptual awareness of their body in relative space and decision

415   making (i.e., scaled ego-centrically) (Jacobs & Michaels, 2007; Immonen et al., 2017).

416   ***Parkour for Physical Development***

417   In addition to psychological skills, coaches also outlined physical skills that could be

418   developed through exposure to Parkour style-training. The coaches often referenced the input

419   of Parkour in building functional movement skills. Coaches described how a series of

420   functional movement skills, conditions of movement and coordinative abilities developed

421   during Parkour could be beneficial for performance in team sports:

422   Around the young ages, I am just looking for them to be able to move as well as

423   possible. I don't really mind if they go on to be a hockey player, a footballer, a

424   cricketer, a tennis player. I just know that I want them to have a large foundation of

425   movement that they can then draw upon when needed in a particular situation further

426   down the line. I think at the young age groups Parkour has got a lot of transfer.

427   (Strength and Conditioning Coach 1)

428   This emphasis on developing foundational movements at young ages aligns with the

429   Athletic Skills Model, which describes how athletes must become versatile and adaptive

430   movers before they can develop into an expert athlete (Wormhoudt et al., 2018). The above

431   quote also references the transfer of functional movement skills between Parkour and team

432   sport domains, which is consistent with the notion that Parkour can serve as a donor sport for

433   athletic development in team sports (Strafford et al., 2018; Wormhoudt et al., 2018). The

434   development of functional movement skills through Parkour may contribute to performance

435   improvement in the target sport, although the long term benefits of Parkour interventions

436   require investigation in future studies. Coaches also described how developing functional

437   movement skills will lead to gains in coordinative abilities and conditions of movement:

438   I think there is a lot of benefit in (Parkour) training, you know in that inner ear and

439   balance aspect, the proprioception aspect. For example, I was able to use some tenets

440   of Parkour with some of our soccer athletes. So, how I was able to implement that was

441   with some rolling patterns, so low level tumbling like a forward roll, a backward roll

442   then into a sprint. So, now we have the aspect of orientation so the inner ear has to

443   adjust to the new orientation of the body and figure out where they are going and what

444   the next task is. Then, you know again readjusting to the new task. (Strength and

445   Conditioning Coach 9)

446   The Athletic Skills Model proposes that functional movement skills and coordinative

447   abilities are intrinsically linked:

448   Parkour could definitely be useful for developing physical skills in rugby… for

449   example in the 5,6,7-year-olds to develop ABC skills. It is through developing

450   movement patterns and using strength through mobility that prepares them (younger

451   athletes) for what they face when do they do finally get through to the full stage of

452   ruby. But also, in the junior section when they are going through maturation, and the

453   stages of growth, it is going to be very important to allow them to access that

454   movement and develop muscle to go along with their longer limbs that they are

455   developing at the time as well. (Talent Development Coach 1)

456   Here, the coach refers to how the focus on physical conditioning during training

457   routines is relative to individual maturation. This periodised approach to training is

458   concurrent in the Athletic Skills Model, which suggests that for younger ages (up until age at

459   peak height velocity), athletic development should be more focused around developing

460   functional movement skills, while training for athlete development in older age groups (post

461   age at peak height velocity) should be more related to conditions of movement (Wormhoudt

462   et al., 2018). All elements of conditions of movement and coordinative abilities may be

463   developed through the Athletic Skills Model continuum, by not only enhancing specific

464   functional movement skills, but also engaging in technical adaptive training, as well as donor

465   sports- in the case of the present study, Parkour-style training.

466   **Feasibility of Integrating Parkour into Coaching Practice**

467   Feasibility of integrating Parkour into coaching practice emerged as a dimension from the

468   data set, with coaches outlining practical recommendations for integrating Parkour

469   environment in team sport practice (Figure 3).

470   ****Figure 3.** Thematic Map: Feasibility of Integrating Parkour into Coaching Practice **

471   ***Practical Recommendations***

472   Coaches described how the implicit nature of Parkour-style training must be

473   maintained when being integrated into team sport practice:

474   The more implicit we can make movement mastery, the better for me… I think

475   something like Parkour is a brilliant way of focusing on completing the task set, the

476   movement will happen as a solution to that. (Talent Development Coach 10)

477   It was also apparent that some coaches were already using Parkour-style activities,

478   notably tag games and obstacle courses, suggesting that these approaches could be successfully

479   integrated into other domains:

480   Yeah we are using it (Parkour) already. We have got our obstacle course and often I

481   will get the kids to try and create it so that they can be imaginative in what they want

482   to do. The kids are sort of the environmental designer so to speak. (Strength and

483   Conditioning Coach 1)

484   I love tag, I love tag games, and at *** we introduced as part of the warm up a load

485   of tag based games, which I think is about agility, it's about reacting to the opponent,

486   reacting to obstacles and so on and so forth...If I had the budget I would create a

487   performance playground (obstacle course), with crash mats, soft base blocks and so

488   on and so forth…That is the challenge in the gym, once you put a fixed gym it place,

489   it is quite fixed where I think when you have the soft area you can move things

490   around and change the environment, change the stimulus and again you can have so

491   much variety… What you have with Parkour based or gymnastics based equipment, is

492   hundreds of different exercises that you can create…. For me it makes sense, if you

493   got a small budget to focus on the things that can give you that and can increase that

494   bandwidth by giving an infinite number of different exercises. (Talent Development

495   Coach 9)

496   The interchangeability of Parkour-style equipment, in terms of manipulating the

497   position and orientation of objects affords the athlete a greater variety of potential

498   interactions with their environment. Practically, Parkour style-equipment could take the form

499   of the soft plyometric boxes that are used to train explosive jump capacity, or traditional

500   gymnastic wooden benches that are used in traditional gym-based settings, if the sport clubs

501   are constrained by budget. Theoretically, altering the orientation and position of objects in the

502   environment changes the affordance landscape (Croft & Bertram, 2017), which may invite

503   different problem-solving and re-coupling of perception and action, facilitating feelings of

504   enjoyment and creativity in movement exploration, as participants seek innovative movement

505   solutions to task goals. However, enjoyment in these tasks may also decrease if athletes

506   cannot successfully adapt and repeatably fail. Coaches should, therefore, remain of aware and

507   manipulate task difficult according to athlete experience and functional skills to

508   accommodate different levels of movement competency. For example, Tag games with soft

509   blocks positioned in a varied format could form a section of the warm up in team sport, where

510   exposure to Parkour-style training inclusive of an obstacle course (without or without a tag

511   element) could be integrated as a separate session to supplement strength and conditioning

512   work. Coaches also emphasised the importance of integrating competitive and sport-specific

513   elements into Parkour-style training:

514   I would just try and include a range of obstacles. I would still have to keep in mind

515   that they are footballers at the end of the day, no matter how young they are, it is what

516   they are doing being in a football institute. I think that would not be the emphasis at

517   every point, but just through experience at football clubs, coaches need to see

518   something football based. So, even if that included a Parkour obstacle course that had

519   a football kicking to a goal, something little but I think I would just try to include as

520   many movement patterns. So, whether that be, hurdles so they have to jump over,

521   whether that be manakins lined up so they have to sidestep, I would try and get every

522   plane of movement involved. I would also try and make it competitive, so whether

523   that be a race or be like a tag, cat and mouse, one going after the other. (Talent

524   Develop Coach 4)

525   Whilst it is not proposed that, as a donor sport, Parkour improves sport-specific skill

526   directly, the integration of sport-specific skills into these Parkour-style obstacle activities

527   could make the activity more representative of the task, environmental and organismic

528   constraint in the sport specific domain (Strafford et al., 2020). One benefit would be coach

529   and athlete "buy in" as it would be clear how football-related movements are being

530   integrated, as identified by Talent Development Coach 4. For example, Parkour-style

531   variants, such as world-chase tag with or without a football, could be integrated as the global

532   constraints governing the activity (i.e., the first person to tag their opponent wins) are

533   comparable to the offensive phases in football, where to regain possession of the ball, athletes

534   have to couple their movements relative to the constant (re)positioning of teammates,

535   opponents and the direction of the ball.

536   ***Addressing Potential Barriers to the Integration of Parkour-Style Training***

537   Coaches described potential, athlete-facing barriers when implementing Parkour

538   style-training, such as gaining athlete cooperation. As a recommendation, coaches outlined

539   that for Parkour style-training interventions to succeed there should be a culture where

540   athletes are active (i.e., co-designing) partners, fully engaged in their own performance

541   development, allowing them to create meaningful learning environments:

542   I have a good relationship with soccer coaches and athletes, but even when I brought

543   it (Parkour) to the athletes themselves, initially, they were a little bit hesitant to act

544   and participate, they thought it was joke and wasn't sure I was serious. But, as the

545   weeks went on it just became part of the culture, part of what we did and they dove

546   into it. (Strength and Conditioning Coach 9)

547   The first one you can offer is the idea that it (Parkour) is fun. So, the potential buy in

548   will be far greater by the athlete. (Strength and Conditioning Coach 2)

549   The idea of athletes and sport practitioners working together to co-design learning and

550   development environments has gained traction in recent times (e.g., Woods et al., 2020a).

551   Emphasising enjoyment, and allowing athletes to co-design their own Parkour environments,

552   may elicit the core social dimension of Parkour where interactions with coaches and peers

553   help athletes regulate resilience and self-confidence through a shared network of affordances,

554   rooted in a desire to interact with others while having fun (O'Grady, 2012). Coaches who

555   were primarily involved with youth performers outlined how an open forum with parents

556   should be arranged to challenge culturally-resistant beliefs about what support for skills

557   learning and practice should look like:

558   We have mixed groups and have invested more in having qualified coaches working

559   with parent coaches to this age group. And of course, there are challenges because

560   some have culturally resistant beliefs around the mantra 'we must select the best as

561   early as possible'…… You have to persevere, and get as may interactions as possible

562   around the microsystems of practice with people…As many as possible that you can

563   do. Which is why I don't like these places that exclude parents from training, they're

564   not good. The parents are important parts of any learning environment, very important

565   parts. (Talent Development Coach 3)

566   …I think the parents are more open to listening, that has been my experience as

567   opposed to when you are with your other coach colleagues, so I think there is

568   probably more in the way of that communication happening as opposed to parents

569   who are maybe a little bit more open to listening in many ways. I have had parents ask

570   me just straight up, what is this about and I say that I am happy to discuss if you want

571   to listen. (Talent Development Coach 2)

572   It is important to get 'as many interactions as possible' with the parents to challenge

573   culturally-resistant beliefs about the role of Parkour in athlete enrichment. Hence,

574   coordinating an open forum would allow parents to, not just ask questions about the reasons

575   for integrating Parkour-style training, but also allow them to be involved with the

576   developmental pathway of their child. Parents could also partake in 'Parkour taster sessions'

577   where they 'experience' Parkour, as this could promote meaning making and consensus on

578   the benefits of Parkour-style training for athlete enrichmentt through shared experiences.

579   Coaches also outlined how potential barriers could be negated through continued professional

580   development about Parkour:

581   So, your barriers (for integrating Parkour) are going to be, lack of knowledge, people

582   have set attitudes about it, or people not knowing anything about it at all. (Talent

583   Development Coach 8)

584   I know there are some sort of coaches that do implement this into their practice, so I

585   would try and reach out to them for CPD. Then there is the body of evidence, any

586   peer reviewed articles with practical applications at the end would be beneficial.

587   (Strength and Conditioning Coach 7)

588   I don't really understand how parkour relates to football or how could it relate to

589   football. I think it is important to know that football is played on grass, attacking one

590   goal and defending the other, with one ball…. So, where does running off a wall come

591   in?, it doesn't I can't do that in football. I just don't know the relevance to football. I

592   would have to understand parkour more. (Talent Development Coach 7)

593   Parkour is a relatively new sport and so its reach across domains is limited at present.

594   Therefore, efforts needs be made at developing an understanding of, not only what Parkour

595   *is*, but also *how* it can be specifically applied in learning and development programs in

596   different sport settings. Whilst some continued professional development courses are offered

597   by Parkour companies, researchers should look to enhance online learning materials by

598   including examples from applied practice to enhance their own learning. To achieve this aim,

599   continued professional development under the rubric of a '*Department of Methodology*'

600   could be integrated (Rothwell et al., 2020). According to Rothwell (2020), a Department of

601   Methodology is an approach where a group of practitioners work collaboratively within a

602   unified conceptual framework to: (1) coordinate activity through shared language and

603   principles, (2) communicate coherent ideas, and (3) collaboratively design practice

604   landscapes enriched in information (i.e., acoustic, haptic, proprioceptive, visual) and guide

605   emergence of multi-dimensional behaviours in athlete performance. It is anticipated that such

606   an integrated structural organisation of sport science disciplines will facilitate a working

607   environment where coaches, trainers, educators and other practitioners can adopt an

608   individualised approach to developing athletes, sharing knowledge beyond discipline

609   boundaries that will promote collaborative problem-solving (Nicolescu, 2002; Rothwell et al.,

610   2020).

611   **Conclusion**

612   In summary, coaches identified that Parkour-style activities and games could be useful for

613   enrichment of functional movement skills in helping to develop a well-rounded and adaptive

614   'mover' in team sport athletes, supporting the notion in the Athletic Skills Model of Parkour

615   as a donor sport (Strafford et al., 2018; Savelsbergh & Wormhoudt, 2019). The applications

616   arising from the experiential knowledge explored in this study are: 1) Parkour activities

617   should be viewed as supplementary to typical sport training routines and be inclusive of

618   obstacle courses with or without sport specific skills and or tag elements, 2) Parkour-style

619   obstacle environments should be scalable to allow both the developing athlete and coach to

620   manipulate tasks and object orientation using soft play and traditional gym equipment, and

621 3), The implementation of continued professional development opportunities for sport

622 practitioners, and athlete-centred approaches to learning design and opportunities for coach-

623 parent forums, are recommended to support the integration of Parkour-style enrichment

624 environments.

625   This study has provided some of the first documented insights into how Parkour-style

626 training could be integrated into team sport practice to provide opportunities for athletes to

627 learn to self-regulate and support the development of functional movement skills. However,

628 with limited research to date, these findings should be considered with caution and further

629 research is required to evaluate such approaches in practice. To address the effectiveness of

630 translating Parkour into team sport settings as a donor sport, future intervention studies

631 utilising applied experiential designs could seek to verify whether there are short term (<6

632 weeks) benefits to Parkour-style training interventions on the development of physical and

633 psycho-social skills in team sport athletes and also more longitudinal studies to the same

634 effect. An issue in the future design and development of such interventions, is to provide

635 further evidence from sports coaches on how Parkour could be effectively implemented in

636 practice. For example, employing designs such as the Delphi method to gain expert

637 consensus on a set of design principles and a framework for the integration of Parkour-style

638 training in team sport settings would help guide further intervention research designs. Such

639 studies will provide both theoretical and applied insights on athlete learning and development

640 as advocated in the Athletic Skills Model, with respect to the donor sport concept.

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800   **Table 1.** Participants' demographic information

Coach ID[a]	Sport Specialism (s)	Age (Years)	Coaching Experience (Years)	Country of Employment
Talent Development Coach 1	National Level 2 Rugby Union	45	20	United Kingdom
Talent Development Coach 2	Grass Roots Soccer	30	8	United States
Talent Development Coach 3	Division 1 Soccer	52	30	Sweden
Talent Development Coach 4	Division 1 Soccer	22	4	Netherlands
Talent Development Coach 5	Division 1 Soccer	27	8	Netherlands
Talent Development Coach 6	County Gymnastics	23	10	Netherlands
Talent Development Coach 7	International Soccer	30	14	Morocco
Talent Development Coach 8	Rugby Union	37	14	United Kingdom
Talent Development Coach 9	Academy and International Soccer	45	25	United Kingdom
Talent Development Coach 10	International Field Hockey	37	17	United Kingdom
Strength & Conditioning Coach 1	Sport Academy Boarding School	25	8	United Kingdom
Strength & Conditioning Coach 2	League 2 Soccer Academy	33	8	United Kingdom
Strength & Conditioning Coach 3	Golf and Athletics (Track and Field)	38	16	United Kingdom
Strength & Conditioning Coach 4	Ballet and Weightlifting	37	16	United Kingdom
Strength & Conditioning Coach 5	Basketball	37	15	United Kingdom
Strength & Conditioning Coach 6	Rehab and Winter Sports	49	30	United States
Strength & Conditioning Coach 7	Sport Academy Boarding School	25	7	United Kingdom
Strength & Conditioning Coach 8	Championship Football Academy	32	10	United Kingdom
Strength & Conditioning Coach 9	High School/College Sports	27	8	United States
Strength & Conditioning Coach 10	Basketball and Track and Field	24	5	United Kingdom

801   [a]The names of the coaches have been transformed using a number prefix to protect their anonymity

802 | **Lower Order Theme** | **Higher Order Theme** | **Dimension** |

803

804   Parkour is an Unstructured Activity

805

806   Parkour Involves Moving From Point A to Point
        B Creatively   Underlying Knowledge about Parkour

807   Parkour is not Gymnastics

808   Coaches General Perceptions of Parkour

809   Social Media

810   YouTube   Resources Used to Gain Knowledge on Parkour

811   Television Shows

812

813   **Figure 1.** Thematic Map: Coaches' General Perceptions of Parkour**.**

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820

| Lower Order Theme | Higher Order Theme | Dimension |

821

822   Develop Problem Solving Skills

823   Develop Resilience

824   Develop Confidence   Parkour for Psychological Development

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826   Develop Risk Appraisal Skills   Potential Applications of Parkour

827   Develop Functional Movement Skills

828   Develop Coordinative Abilities

829   Parkour for Physical Development

830   Develop Conditions of Movement

831 **Figure 2.** Thematic Map: Potential Applications of Parkour.

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Lower Order Theme	Higher Order Theme	Dimension

837 Promote Implicit Learning Through Parkour

838 Integrate Parkour as an Obstacle Course

839

840 Integrate Parkour with Tag Game Elements

Practical Recommendations

841

842 Integrate Parkour with Sport Specific Skills

843 Integrate a mixture of traditional gym based and soft play equipment

844 Practice Landscape Layout

Feasibility of Integrating Parkour into Coaching Practice

Manipulate Object Interchangeability

845

846 Manipulate Object Orientation

Emphasise Parkour and Enjoyment

847

848 Coordinate Coach CPD on Parkour

Facilitate Athlete Discussions about Parkour Through Coach-Athlete Open Forums

849 Addressing Potential Barriers to the Integration of Parkour-Style Training

850 Facilitate Parental Discussion about Parkour Through Coach-Parent Open Forums
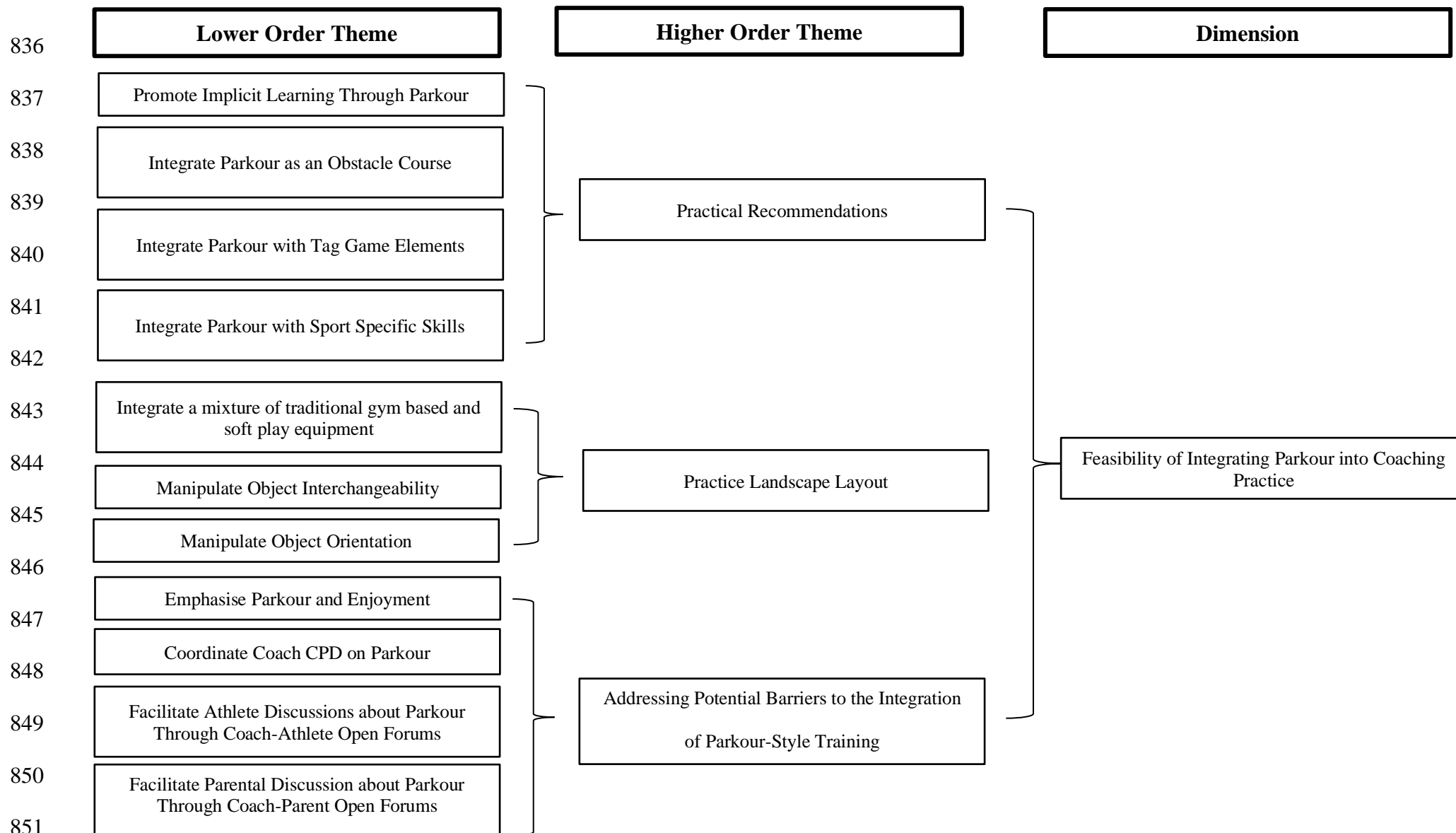
851

852 **Figure 3.** Thematic Map: Feasibility of Integrating Parkour into Coaching Practice.