Article

EPER

European Physical Education Review
1–21

DOI: 10.1177/1356336X251388628
journals.sagepub.com/home/epe


Feasibility, acceptability and preliminary effectiveness of a gamified physical education intervention on motor competence and emotional intelligence

Jenna Rice[1], Lawrence Foweather[1], Ceriann Magill[1], Jonathan Foulkes[1], An De Meester[2], Matthieu Lenoir[3], David Stodden[2], and Katie Fitton Davies[1]

Abstract

This study evaluated (a) the feasibility and acceptability of a gamified physical education (PE) intervention among 9- to 10-year-old children and (b) intervention effectiveness on emotional intelligence (EI), motor competence (MC), basic psychological needs (BPNs) and motivational regulations. A mixed-method, single-group, pre-post trial was conducted in three primary schools in North West England. Classroom teachers taught a 10-week gamified PE unit (one 60-minute lesson per week). Researcher logs recorded recruitment, retention, adherence and attrition; feasibility and acceptability were assessed via semi-structured teacher interviews ($n = 3$) and three focus groups with children ($n = 18$). Children completed questionnaires assessing EI, BPNs and motivational regulations. MC was measured with the Körperkoordinationtest für Kinder and the Motor Competence Assessment. Three teachers and 63 children were recruited. Adherence was good (26/30 lessons taught), and participant retention was excellent (0% attrition). Qualitative findings indicated the intervention was feasible and acceptable: lessons were easy to follow, well-structured, inclusive, fun, and promoted teamwork. Challenges were mainly logistical (set-up time and equipment). Improvements were observed from pre- to post-test in EI ($F = 38.02$, $p < .001$), MC ($p < .05$), intrinsic motivation in PE ($F = 10.08$, $p = .002$), and identified ($F = 11.84$, $p < .001$) and external regulation ($F = 4.15$, $p = .046$) for physical activity. However, EI outcome measurement posed challenges (child comprehension/scale structure), highlighting the need for child-appropriate tools.

[1]Liverpool John Moores University, UK
[2]University of South Carolina, USA
[3]Ghent University, Belgium

Corresponding author:
Katie Fitton Davies, Research Institute of Sports and Exercise Sciences, Liverpool John Moores University, Liverpool, UK.
Email: K.FittonDavies@ljmu.ac.uk

Overall, findings support trial feasibility and intervention acceptability, with promising effects, warranting a larger controlled trial.

Keywords
Gamification, physical education, primary, schools, intervention, feasibility

Introduction

Emotional intelligence (EI) is a set of skills that enable the recognition and regulation of emotions and support adaptive behaviour (Petrides et al., 2016). Acquiring EI skills such as social and self-awareness in childhood – particularly preadolescence (ages 9–12) – is crucial for holistic development and psychological well-being (Lea et al., 2019). High EI correlates positively with physical activity (PA) (Amado-Alonso et al., 2019), motivation in physical education (PE; Rico-González, 2023) and motor competence (MC; Mohammadi Orangi et al., 2023). Thus, cross-sectional evidence underscores EI's importance for holistic development, but experimental studies are needed to establish causality and mechanisms.

PE is considered a key learning environment for developing EI (Castillo-Viera et al., 2020; Rico-González, 2023). Lessons expose children to stressful situations that help them learn intrapersonal competencies, including self-control and emotional expression (Castillo-Viera et al., 2020). PE also develops interpersonal competencies – such as social skills and prosocial behaviours – through communication, co-operation, and problem-solving with peers (Opstoel et al., 2020).

PE is also a primary context for developing MC, defined as an individual's proficiency in executing a broad range of movement skills (Utesch and Bardid, 2019). MC is positively associated with PA participation (den Uil et al., 2023) and is hypothesised to promote lifelong PA (Stodden et al., 2008). Furthermore, MC is positively associated with mental health (Hill et al., 2024) and negatively associated with unfavourable psychosocial outcomes, including poor social skills, depression and anxiety (Mancini et al., 2016).

Few studies have explored the association between MC and EI. Mohammadi Orangi et al. (2023) found a strong positive association across three age groups (5–11 years old, 12–17 years old, and 18–21 years old). These findings suggest that, even from a young age, children with low MC may have lower EI than peers with higher MC. The relationship between MC and EI can be elucidated by the Elaborated Environmental Stress Hypothesis (EESH; Cairney et al., 2013). The EESH posits that low MC is a primary stressor that exposes children to secondary stressors such as limited social interaction and peer conflict (Cairney et al., 2013). These experiences can harm self-esteem, well-being, and participation in PE. EI acts as a protective resource against stress, helping to prevent internalising issues (Davis et al., 2019). Improving MC increases success across activities, which is linked to stronger self-perceptions and confidence and, in turn, sustained participation in PA (Niemistö et al., 2023). Greater participation affords children opportunities to develop EI through experiences of winning and losing, helping them manage emotions and behaviours in social contexts (Rico-Gonzalez, 2023).

Gamification, defined as the use of game-like elements in non-gaming contexts (Deterding et al., 2011), is a viable pedagogical approach in PE (Fernández-Rio et al., 2020). Gamification incorporates strategies such as narratives, relationships, challenges, levels, rules, feedback and points (Werbach and Hunter, 2015). Unlike traditional teacher-centred approaches, gamification is student-centred and seeks to boost motivation, engagement and problem-solving (Kapp, 2012). In PE, sustaining children's motivation and engagement is essential for MC development (Saiz-González et al., 2024). According to

Self-Determination Theory (SDT), intrinsic motivation, which is positively linked to persistence and performance in PE (Vasconcellos et al., 2020), occurs when children's basic psychological needs (BPNs) for autonomy (control of one's actions), relatedness (connection to others), and competence (mastery in one's actions) are met (Ryan and Deci, 2020). Evidence shows that gamified PE interventions improve BPNs and intrinsic motivation among primary school-aged children (Fernandez-Rio et al., 2020; Sotos-Martinez et al., 2024). Blain et al.'s (2022) theoretical framework illustrates how gamification strategies support BPNs. For example, *levels* afford decision-making (autonomy), *teamwork* fosters peer connection (relatedness), and progressively more difficult *challenges* promote skill development (competence).

Gamified interventions in PE (Fernández-Vázquez et al., 2024) and home settings (Davies et al., 2024) have positively impacted MC. These improvements may reflect the incorporation of strategies – progressive difficulty, structured challenges, and feedback – proposed to support motor learning (Guadagnoli and Lee, 2004). While no gamified PE interventions have directly targeted EI in children, a 14-week gamified teaching programme improved psychological well-being, including EI, in university students (Navarro-Mateos et al., 2024). Gamified PE programmes also increase moderate-to-vigorous and total PA in primary school children (Guijarro-Romero et al., 2024). Based on the EESH (Cairney et al., 2013), which links PA opportunities and MC development to EI, gamification may offer a viable approach to improving EI via MC. However, evidence in primary PE is limited; further research should evaluate the effects of gamification on both MC and EI.

Co-developing interventions with school stakeholders can enhance the feasibility, acceptability, sustainability, and relevance through their direct involvement (Reed et al., 2021). In our previous study, 91 children and four classroom teachers from three primary schools in North West England took part in co-development workshops to create context-specific gamified PE interventions to increase MC and, in turn, EI (Rice et al., 2025). The present study examined whether the co-developed intervention and the trial procedures were feasible and acceptable for children aged 9–10 years old. Feasibility testing indicates whether processes such as recruitment and data collection can be replicated in a larger, definitive trial (Thabane and Lancaster, 2018). Assessing feasibility from both teacher and child perspectives is critical to ensure the intervention is practical, relevant, and implementable in schools (Leahy et al., 2021). Accordingly, the primary aim was to evaluate feasibility and acceptability; the secondary aim was to explore preliminary effects on EI, MC, BPNs and motivational regulations.

Methods

Study design

This study employed a single-group pre-post design (Pearson et al., 2020). The gamified PE lessons were taught between April and June 2023. Headteachers provided gatekeeper consent to integrate the lessons into the PE curriculum; thus, all children participated in lessons, while only consenting children completed assessments. Measures were collected at baseline (T0: March 2023) and post-intervention (T1: July 2023), though some MC assessments were collected only at T1 due to equipment delays. Feasibility and acceptability data were gathered from consenting children and teachers after T1. The intervention programme was reported per Hastie and Casey's (2014) guidelines. Institutional ethical approval was obtained (23/SPS/008), and reporting followed Consolidated Standards of Reporting Trials (CONSORT) guidelines (Schulz et al., 2010).

Sample size

Feasibility studies generally do not require a formal power calculation (Eldridge et al., 2016), as analyses are preliminary. Recommended sample sizes range from 30 to 50 participants (Beets et al., 2021). Accordingly, the study aimed to recruit 60 children to allow for attrition.

Recruitment and participants

A convenience sample of three schools and three teachers were recruited for the study. Schools were recruited as part of the co-development study, following headteacher consent (Rice et al., 2025). All schools were in areas of low socio-economic status, indicated by the index of multiple deprivation (Noble et al., 2019), with 33%–63% of children eligible for free school meals. Children were eligible for the study if they were in Year 5 (aged 9–10 years old); teachers were eligible if they taught PE. Informed consent was obtained from teachers and parents; children provided assent. All three teachers were female, White British, non-specialist PE teachers ($M_{age} = 42$ years), with 5–20 years' teaching experience; two were PE leads.

Intervention programme

Prior to delivery, teachers attended a two-hour Continuing Professional Development (CPD) workshop to re-familiarise themselves with the lesson plans (Goodyear, 2017) created as part of phase one of the wider research programme (Rice et al., 2025). The lessons were designed to be taught once a week for 60 minutes, over a 10-week period. Lessons focused on different themes each week (e.g. Week 1: throwing and catching) and integrated a minimum of four gamification strategies (Rice et al., 2025). Each school used a distinct narrative: School A – *A quest through time* (a teleportation journey from Ancient Greece, with activities in each lesson bringing them closer to the present day); School B – *The American Dream* (a route from New York across US states with activities linked to each state's geography); School C – *Treasure Island* (tasks to earn crystals to save the island). Two example weeks are provided in Supplemental File A.

Primary outcomes

Trial feasibility. Table 1 presents the traffic light criteria (Avery et al., 2017), informed by previous work (Fairclough et al., 2024), used to assess feasibility (green = acceptable, proceed; amber = discuss and modify; red = do not proceed, re-design). Recruitment (returned parental consent and child assent), adherence (lesson dose), and retention (completion of pre-post assessments) were evaluated using researcher and teacher logs and qualitative interviews.

Implementation acceptability. Implementation of the gamified PE lessons was explored through semi-structured interviews with each teacher ($n = 3$) and focus groups with a subsample of six children per school (three boys, three girls; total $n = 18$), randomly selected by the lead author. Topic guides were informed by Bowen et al.'s (2009) framework (see Table 2), and all data collection was conducted by the lead author (see Supplemental Files B and C for full interview schedules). Teacher interviews were held on Microsoft Teams, lasting 39–53 minutes. Child focus groups followed published protocols (Adler et al., 2019), took place in a quiet classroom during curriculum hours, and lasted 15–35 minutes.

Table 1. Feasibility traffic light progression criterion.

Progression criteria	Methods used	Green: acceptable	Amber: discuss and modify	Red: stop
1. Recruitment: child participants	Researcher logs	≥75% of eligible children consented	35%–74% of eligible children consented	<35% of eligible children consented
2. Adherence: intervention dose	Semi-structured interviews Focus groups	≥80% of scheduled lessons delivered	40%–74% of scheduled lessons delivered	<40% of scheduled lessons delivered
3. Baseline (T0) child-completed quantitative measures	Researcher logs	≥75% of data collected from children	50%–74% of data collected from children	<50% of data collected from children
4. Follow up (T1) child-completed quantitative measures	Researcher logs	<20% data attrition	21%–30% data attrition	>30% data attrition

Secondary outcomes

Emotional intelligence. EI was assessed using the Schutte Self-Report EI Test (SSEIT; Schutte et al., 1998), a 33-item scale rated from 1 ('strongly disagree') to 5 ('strongly agree'). The SSEIT has been used with children (e.g. Mohammadi Orangi et al., 2023; Williams et al., 2009), but its structural validity has been questioned (e.g. Petrides and Furnham, 2000). The SSEIT includes four subdomains (optimism and mood regulation, appraisal of emotions, utilisation of emotions, social skills), but alternative factorial structures have been proposed (e.g. Gignac et al., 2005; Lane et al., 2009; Ng et al., 2010). In line with the feasibility aims of this study, we trialled the SSEIT to explore its reliability and sensitivity to change in primary school-aged children, using both original and alternative structures.

Motor competence. The Körperkoordinationtest für Kinder (KTK3+; Coppens et al., 2021) comprises four test items: jumping sideways, moving sideways, eye–hand coordination and balancing backwards. For the first three items, two trials are summed for the item score. Balancing backwards includes three trials on each beam (6.0 cm × 4.5 cm × 3.0 cm); the final score is the total number of steps counted (maximum 72 steps; 8 per trial). The KTK3+ is valid and reliable in children aged 6–19 years old (Coppens et al., 2021).

The Motor Competence Assessment (MCA; Luz et al., 2016) comprises six subscales: shifting platforms and jumping sideways for stability; 4 × 10 m shuttle run and standing long jump for locomotor; and ball throwing velocity and ball kicking velocity for object control. Participants completed two trials for shifting platforms, jumping sideways, and the shuttle run, and three trials for the standing long jump, ball throwing velocity, and ball kicking velocity; the best trial provided the item score. The MCA is valid and reliable in children aged 7–10 years old (Luz et al., 2016).

Needs satisfaction. The BPN Satisfaction and Frustration Scale was used (Van der Kaap-Deeder et al., 2020). Following prior PE applications (e.g. Vlachopoulos et al., 2011), the stem was adapted from 'how you feel in general' to 'how you feel in PE'. The scale comprises 24 items on a 5-point Likert scale (1 = 'completely not true' to 5 = 'completely true'), assessing BPN satisfaction and frustration. The scale is valid and reliable in children aged 7–11 years old (Vlachopoulos et al., 2011).

Table 2. Feasibility and acceptability codes and brief descriptions of evidence based on Bowen et al.'s (2009) framework.

Focus area	Code	Description
Feasibility codes		
Implementation	Dosage and duration	Lessons were implemented as intended (i.e. dosage and duration).
	Implementation degree	How the lessons were implemented (i.e. ease of implementation and gamification strategies, and the barriers and challenges to implementation).
Adaptations	Adaptations	Adaptations made during the intervention.
	Adaptations for other populations	Suggested adaptations for other populations.
Integration	Suitability for other participants	Suitability of the lessons for other schools and wider use.
Acceptability codes		
Acceptability	Appropriateness	Elements (i.e. activities, narrative, national curriculum, lesson content, structure, and design) of the lessons were suitable for the purpose, situation and participants (i.e. school setting and children).
	Satisfaction	Teacher and child satisfaction (i.e. liking, disliking, gamification strategies, and usefulness to promote social and movement skills).
	Intention for future use of the gamified PE lessons	Intent to use the lessons post-intervention, including participants' reasons.

Motivational regulations in PA. The Behavioural Regulation in Exercise Questionnaire (BREQ; Mullan et al., 1997), adapted for PA (Sebire et al., 2013), was used to measure students' motivation for PA. The scale comprises 12 items on a 5-point Likert scale (1 = 'not true for me' to 5 = 'very true for me') covering intrinsic, identified, introjected and external regulation. The questionnaire has been shown to be valid and reliable with children aged 7–11 years old (Sebire et al., 2013).

Motivational regulations in PE. The BREQ (Mullan et al., 1997), adapted for PE, was used to assess students' motivation for PE. The scale comprises 12 items on a 5-point Likert scale (1 = 'not true for me' to 5 = 'very true for me') covering intrinsic, identified, introjected and external regulation. The questionnaire has been shown to be valid and reliable with children aged 7–11 years old (Sebire et al., 2013).

Analysis

Quantitative analysis. Analyses were conducted in IBM SPSS Statistics (Version 29). Internal consistency was assessed with Cronbach's α, interpreted as: unacceptable <.50, poor .50–.59, questionable .60–.69, acceptable .70–.79, good .80–.89, and excellent ≥.90 (Tavakol and Dennick, 2011). Two-way mixed analysis of variance (ANOVA) tests examined intervention effects on child-level outcomes, with time (pre, post) serving as the within-subject factor and gender (girls, boys) as the between-subject factor. Effect sizes are reported as partial eta-squared (η_p^2; Miles and Shevlin, 2001). All statistical assumptions were met (Judd et al., 2017). The scores were normally distributed (Shapiro–Wilk test, $p > .05$), and inspection of Q–Q plots revealed no deviations. No outliers were detected ($SD \pm 3$), and there was homogeneity of variances (Levene's test, $p > .05$) and covariances ($p > .001$). Statistical significance was set at $p < .05$ (Di Leo and Sardanelli, 2020). For brevity, results for gender differences and Gender × Time interactions are provided in Supplemental File D.

Qualitative analysis. This study took a relative ontological view, acknowledging that reality is not fixed but instead subjectively experienced (Guba and Lincoln, 2005). Semi-structured interviews and focus groups were audio recorded and then transcribed verbatim. The transcripts were uploaded to NVivo for analysis. The lead author deductively coded the transcripts using key concepts from the definitions of Bowen et al.'s (2009) feasibility and acceptability framework. Table 2 presents a list and description of the feasibility and acceptability codes used. Sections of the transcripts were then allocated to the codes and then analysed to identify subthemes. The process aligned with the six-phase reflexive thematic analysis approach (Braun and Clarke, 2019). Letters and numbers were assigned to participants to maintain confidentiality and differentiate the teachers and children from the three schools. For example, a teacher from school A and a child from school A were coded as Teacher A and Child A, respectively.

Results

Quantitative findings are presented first to evaluate trial feasibility and implementation dose and duration against the predefined progression criteria (Table 1). This is followed by the qualitative findings, which are organised deductively using Bowen et al.'s (2009) framework: implementation, adaptations, integration, and acceptability.

Quantitative findings

Trial feasibility. Figure 1 presents a CONSORT flow diagram for participants through the study. Of 91 children invited to participate, 69.3% ($n = 63$; $M_{age} = 9.43 \pm 0.05$ years; 28 males) of children provided informed consent (progression criterion 1 = amber). Consent rates were: 54% (School A), 55% (School B) and 100% (School C). At T0, 100% ($n = 63$) of children completed the child-level measures (progression criterion 5 = green), except for the MCA, which was only administered at post-test due to equipment delivery delays. Attrition at T1 was 0% across all child-level measures, indicating high retention. For the KTK3+ and the MCA, test duration was between 20–30 and 30–50 minutes, respectively, depending on the group size ($n = 5$–8). For the EI, BPNs and motivational regulation questionnaires, test duration was 10 minutes per questionnaire, with a class of 30 children. Minor comprehension issues were observed with some items on the EI measure.

Qualitative findings

Implementation

Dosage and duration. Classroom teachers taught 26/30 scheduled gamified PE lessons (86.7%; progression criterion 3 = green). Schools A and B taught 8/10 lessons each (80%), and School C taught 10/10 lessons (100%). Missed lessons ($n = 4$) were due to a school inspection ($n = 1$; School B) and school commitments (e.g. school trips; $n = 3$ across Schools A and B). Children reported that 20/30 lessons had been taught (66.7%; progression criterion 4 = amber): School A = 2/10 (20%), School B = 8/10 (80%) and School C = 10/10 (100%). Child-reported reasons for missed lessons included non-teacher delivery (School A), school trips, and a sports day (School B).

Implementation degree

Ease of implementation. Teachers reported the lessons were easy to implement, and subthemes related to resources and lesson structure: 'the teaching resources were easy to follow' (Teacher B), 'the diagrams made it easier, and were helpful for setting up and showing the children' (Teacher C); and 'the structure of the lessons were clear, so I knew what I needed to teach' (Teacher A). Furthermore, teachers emphasised the importance of the CPD workshops for re-familiarisation with the lessons: 'we went over the lessons and it made it easier to then deliver them' (Teacher C) and implementation of the gamification strategies: 'the workshops beforehand helped me to understand what the strategies were, and how we could implement them' (Teacher A).

Challenges to implementation. Subthemes concerned the clarity of lesson diagrams: '…I think Miss [teacher] was a bit unsure on the set-up sometimes' (Child C) and behavioural issues: 'some people have ADHD, and some people mess around making it hard for Miss [teacher]' (Child B). Teachers did not report major challenges or barriers but noted set-up time and equipment demands as occasional issues, which they felt were manageable with organisation. One teacher also cited limited indoor space: 'our hall is tiny, when we had to come inside because of the weather, there isn't much space' (Teacher A).

Adaptations

The most commonly reported subthemes for adaptation during implementation were related to special educational needs (SEN): 'I adapted the height of the hurdles [jumping and landing lesson] for the children with SEN, as I could see them struggling' (Teacher A), and child competence: 'we stayed on specific parts [levels] for longer if they were struggling and would bypass levels they

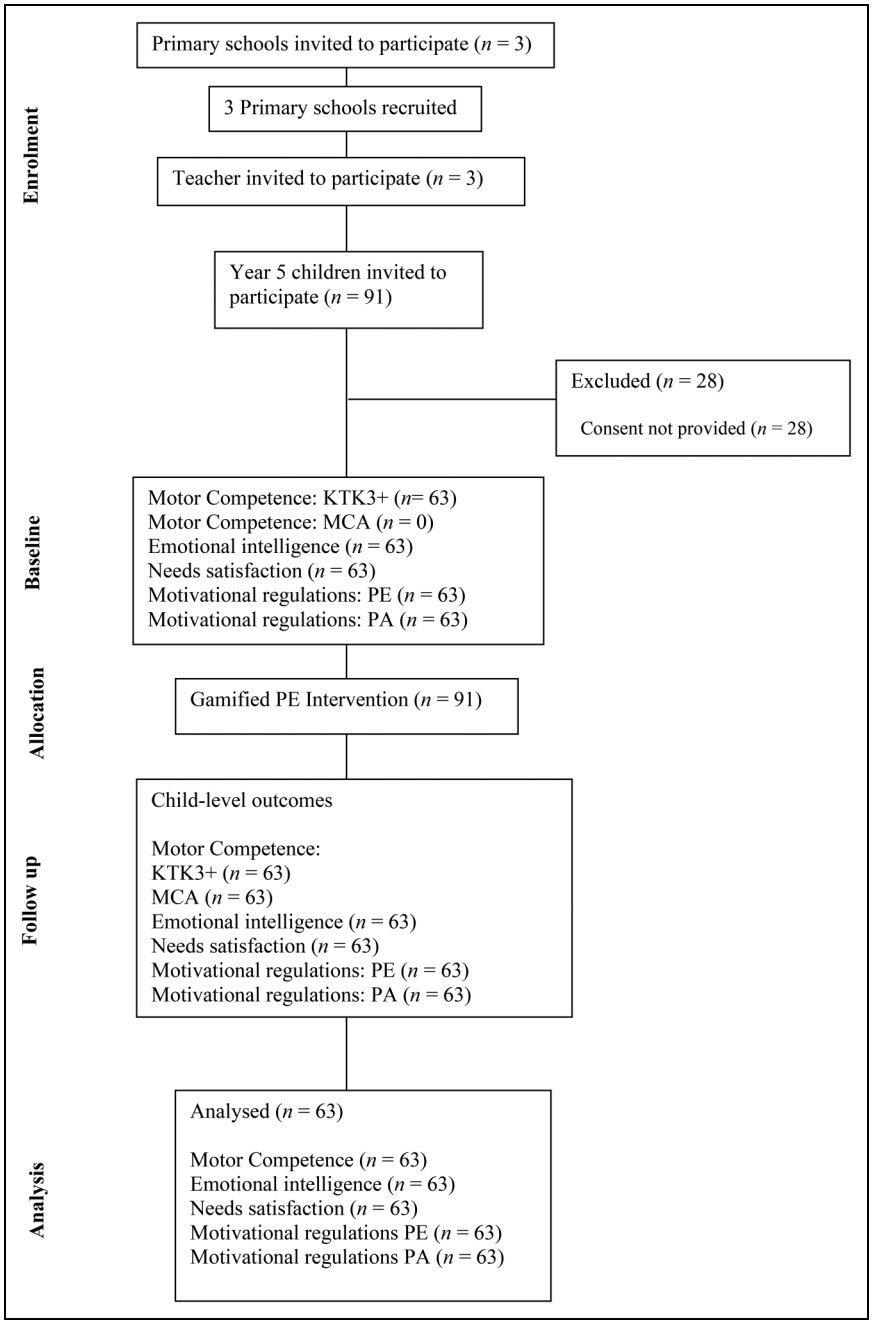

Figure 1. CONSORT flow diagram of participants throughout the study.

found easier' (Teacher B). Teachers stressed that knowing pupils' needs made adaptation easier. They judged the lessons transferable to other schools, recommending early discussion of class needs, equipment availability, and practical PE space.

Integration

Suitability of the lessons for wider use. Subthemes most frequently reported by teachers were inclusivity: 'they [the gamified PE lessons] appeal to a range of students and teachers and are really inclusive' (Teacher C); the novelty of gamification: 'it is a novel concept, and something both teachers and children will enjoy' (Teacher B); and increased participation as factors that would make the lessons suitable for other schools. Participation was also commonly reported by children: 'for people who do not like PE it is fun, and [child's name] joined in, and never normally does' (Child B). Other subthemes frequently reported by the children were the enjoyability of the lessons: 'they will enjoy them' (Child C) and the gamification strategies: '…like you can do States [intervention theme] in the classroom but we did them in PE with the levels and challenges' (Child C).

Acceptability

Appropriateness of the lesson content. Common subthemes were the variety of activities: 'the variety worked well, there were lots of activities' (Teacher A), volume of content: 'it was good to have a lot planned, sometimes I was unsure on how the children would react' (Teacher C) and the range of skills: 'the children got to develop different skills' (Teacher B). Other subthemes noted by both children and teachers included that the intervention was easy to follow, well structured and planned. Children particularly emphasised the importance of the narrative: 'the PE lessons had a storyline you followed, and you completed activities to move on to the next' (Child C). A few children felt that some lessons were either too easy or too difficult.

Appropriateness of the narrative. Children commonly attributed the narrative to be appropriate due to their previous input (co-development process) and the link between the narrative and activities: 'all the activities linked to the story' (Child A). The latter subtheme was also commonly reported by teachers: 'they understand the activities because it's related to the narrative' (Teacher A). Another common subtheme reported by teachers was the novelty: 'it was something the children hadn't done before' (Teacher C) and coherency of the narrative: 'the children understood and were familiar with the narrative concepts' (Teacher B). However, a child indicated that the narrative (escaping Alcatraz as a prisoner) could be considered 'controversial', suggesting: 'It's a bit controversial, if they learn violence from it, since you know cops, if prisoners don't listen, they try to inflict violence' (Child B).

Overall, teachers reported that the lessons aligned with the English National Curriculum for PE: 'It covered learning aims for now, and previously for PE' (Teacher B), and linked to other curriculum areas: 'the PE lessons linked to other areas of the curriculum' (Teacher C).

Satisfaction

As shown in Table 3, teachers and children reported high satisfaction. The most commonly expressed subthemes from both teachers and children were high satisfaction with the obstacle course lessons: 'I enjoyed seeing all the children working together' (Teacher C); the gamification strategies: 'I loved using gamification, it's easier to deliver something when you enjoy it' (Teacher B); and the intervention generally: 'sometimes I find PE un-fun, but this was fun' (Child C). Children's examples of gamification strategies are provided in Supplemental File E.

Usefulness of the lessons in promoting social and movement skills. Teachers reported the usefulness of the lessons in promoting different skills. The most expressed subthemes were teamwork, peer encouragement, and positive leadership. Other subthemes included increased participation: 'one child usually just stands on the side, but they joined in' (Teacher B). Children also noted the promotion of social skills.

Table 3. Example quotes from children and teachers on satisfaction with the gamified PE interventions.

Participant	Theme	Subtheme	Example quote
Children	Enjoyment and engagement	Enjoyment	'Because it was fun'
		Competition	'That we sometimes got to go against each other'
		Creativity	'We got to make our own obstacle course and be creative'
		Range of activities	'When we used the hoops and jumped across'
	Skill development	Skill development	'We learnt new skills'
		Lesson difficulty	'It was easy, medium, and hard. There was always a choice of difficulty, it was good'
	Narrative	Lesson narrative	'When we got to go to Alcatraz'
	Resources	Use of equipment	'We got to use the ropes and equipment that we haven't been on since reception'
Teachers	Enjoyment and engagement	Children's enjoyment	'The children loved it'
		Novelty	'It was something different for the children'
	Skill development	Physical skill development	'Children knew which movement skill they were aiming to develop and improve'
	Structure and narrative	Lesson narrative	'Children enjoyed the story; they knew what was coming each week'
	Inclusion	Inclusive lessons	'Children with autism, or anxiety around PE really enjoyed the lessons, there have been times where they struggle'

Commonly expressed subthemes were kindness, due to the reduced competition: 'people were kinder to each other because there aren't winners and losers' (Child B); co-operation: 'I worked with people I don't usually and got better at it' (Child C) and teamwork: 'we worked better as a team' (Child B). Another subtheme expressed by children was that the lessons helped them improve specific movement skills: 'throwing and catching, now I can catch the ball, and it doesn't just go in my face' (Child C).

Dissatisfaction. A minority of children indicated dissatisfaction. Common subthemes included lesson difficulty: 'it needed to be harder' (Child B); specific skills: 'I didn't like how you had to land when you jumped' (Child C); lesson pace: 'it needed to be faster' (Child B); unclear rules: 'the rules needed to be clearer' (Child C) and peers' behaviour: 'people didn't listen properly' (Child B).

Intention for future use. Two out of three teachers demonstrated intent to continue using the gamified PE lessons. Teacher A reported: 'I have loved doing it, I plan to try it next year with a new class'. Teacher C indicated plans to use it for either (a) cross-curricular teaching: 'we can use different parts of the curriculum for areas of learning in different subjects' or (b) specific skill development: 'I can use the curriculum if the children are struggling on a specific skill'. One teacher demonstrated no intent to use the curriculum: 'no, I am moving down to Year 1, and the skill level and narrative wouldn't be appropriate for that age' (Teacher B).

Secondary outcomes

At T0 and T1, 63 children ($n = 28$ boys, $n = 35$ girls; 9.43 ± 0.05 years) completed all pre-post assessments and were included in complete case analyses of intervention effects. Table 4 presents descriptive statistics.

Table 4. Mean and standard deviation (*SD*) from the raw scores for each child-level outcome at pre (T0) and post (T1) intervention ($n = 63$).

Outcome	T0 (mean, *SD*)	T1 (mean, *SD*)	*t*	*p*	Effect size (Cohen's *d*)
Emotional intelligence					
Global EI	95.20 (13.92)	105.55 (11.52)	5.87	<.001	.74
Motor competence: KTK3+					
Jumping sideways	52.33 (14.86)	65.90 (14.73)	7.31	<.001	.92
Moving sideways	30.06 (7.14)	32.46 (8.28)	2.25	.028	.28
Balancing backwards	35.60 (15.53)	39.22 (14.53)	2.32	.024	.29
Eye–hand coordination	19.71 (15.53)	28.55 (15.38)	4.60	<.001	.58
Motor competence: MCA					
Ball kicking velocity		26.33 (3.50)			
Ball throwing velocity		29.60 (4.74)			
Standing long jump		145.74 (18.51)			
Shuttle run		14.00 (1.52)			
Jumping sideways		36.95 (7.22)			
Shifting platforms		17.93 (3.96)			
Needs satisfaction (BPNSFS)					
Total satisfaction	3.51 (0.67)	3.56 (0.66)	.44	.655	.05
Total frustration	2.67 (0.74)	2.63 (0.81)	−.33	.742	−.04
Motivational regulations (PA)					
Intrinsic motivation	4.08 (1.13)	4.37 (0.67)	2.22	.060	.22
Identified regulation	3.96 (1.00)	4.30 (0.63)	3.33	.001	.41
Introjected regulation	2.57 (1.01)	2.69 (0.98)	.84	.401	.10
External regulation	2.21 (1.18)	2.57 (1.22)	1.92	.049	.24
Motivational regulations (PE)					
Intrinsic motivation	3.86 (1.12)	4.29 (0.71)	2.86	.006	.36
Identified regulation	3.65 (1.11)	4.10 (0.71)	3.22	.302	.18
Introjected regulation	2.60 (1.01)	2.69 (0.97)	.62	.532	.07
External regulation	1.96 (.83)	2.10 (0.93)	.96	.169	.12

Note. Global emotional intelligence score is based on Gignac et al.'s (2005) model. KTK3+: the Körperkoordinationtest für Kinder; MCA: Motor Competence Assessment; BPNSFS: Basic Psychological Need Satisfaction and Frustration Scale; PA: physical activity; PE: physical education.

Emotional intelligence. The SSEIT had poor internal consistency for the majority of the subdomains, both under the original Schutte structure and alternative structures (Cronbach's $\alpha = .21–.60$; see Supplemental File F for detailed results). The global EI score derived from the Gignac et al. (2005) model demonstrated good reliability ($\alpha = .80$) and was retained as the primary outcome. Global EI significantly improved from pre-test to post-test: $F(1, 61) = 38.02$, $p < .001$, $\eta_p^2 = .384$, with scores higher at post-test.

Motor competence. KTK3+ scores significantly improved from pre-test to post-test for jumping sideways: $F(1, 61) = 51.55$, $p < .001$, $\eta_p^2 = .458$; moving sideways: $F(1, 61) = 5.38$, $p = .024$, $\eta_p^2 = .075$; balancing backwards: $F(1, 61) = 4.96$, $p = .030$, $\eta_p^2 = .075$; and eye–hand coordination: $F(1, 61) = 19.87$, $p < .001$, $\eta_p^2 = .246$. As the MCA was administered only at T1, only descriptive statistics are presented.

Needs satisfaction. The BPN satisfaction and frustration scale had good internal consistency: ≥.80. No significant pre- to post-test differences were observed for needs satisfaction: $F(1, 61) = .224$, $p = .638$, $\eta_p^2 = .005$ and needs frustration: $F(1, 61) = .131$, $p = .719$, $\eta_p^2 = .002$.

Motivational regulations (PA). The BREQ adapted to PA had good internal reliability: ≥.80. Increases from pre-test to post-test were found for identified regulation: $F(1, 61) = 11.84$, $p < .001$, $\eta_p^2 = .386$, and external regulations: $F(1, 61) = 4.15$, $p = .046$, $\eta_p^2 = .064$.

Motivational regulations (PE). The BREQ adapted to PE had good internal consistency: ≥.80. Increases from pre-test to post-test were found for intrinsic motivation: $F(1, 61) = 10.08$, $p = .002$, $\eta_p^2 = .142$. No significant increases from pre-test to post-test were found for identified regulation: $F(1, 61) = .712$, $p = .402$, $\eta_p^2 = .012$, introjected regulation: $F(1, 61) = .712$, $p = .402$, $\eta_p^2 = .012$, and external regulation: $F(1, 61) = 1.51$, $p = .223$, $\eta_p^2 = .024$.

Discussion

This study investigated the feasibility, acceptability and preliminary effectiveness of a co-developed, gamified PE intervention. To the best of our knowledge, this is the first study in England to investigate these specific aims, with only one other study conducted in Spain (Fernandez-Rio et al., 2020). In addition, this is the first gamified PE intervention targeting both MC and EI. Findings suggest the study trial to be feasible in a primary school context, with excellent child recruitment and retention rates, indicating that scale up to a definitive experimental trial is feasible. These recruitment and retention findings are consistent (Fairclough et al., 2024) or better (Johnstone et al., 2019) than those previously reported for school-based interventions. High recruitment and retention could be attributed to the schools' previous involvement in the co-development phase (Rice et al., 2025) and clear communication of the research programme and benefits during recruitment, which likely minimised attrition. Attrition rates, which are typically high in school-based research (Henneberger et al., 2023), were excellent in this study, likely due to the co-development of the intervention (Rice et al., 2025), flexible scheduling, and advance notice of data collection. Adherence rates were good, with missed lessons communicated to the first author via email. However, it remains unclear whether one school taught the lessons, due to reporting discrepancies between the teacher and children. This may reflect challenges faced by the teacher, possibly due to external pressures or time constraints. To address this, weekly evaluation logs should be provided to the teachers to triangulate data (Wong et al., 2022).

The findings indicated that the gamified PE lessons were feasible. Teachers attributed this to the high-quality teaching resources, which are important indicators of intervention feasibility, as they can increase children's participation and learning (Jago et al., 2019). Teachers also highlighted the importance of the CPD workshops, which enhanced their pedagogical practice to provide optimal learning conditions (Morgan et al., 2013). These findings strengthen the argument that high-quality PE is supported by CPD that focuses on pedagogy (i.e. gamification), to further children's engagement and enjoyment (Morgan et al., 2019). While findings suggest implementation was not overly complex, some logistical and behavioural challenges were present, consistent with previous research (Quarmby et al., 2019). Adaptations were feasible, particularly for those with SEN, contrary to the notion that PE neglects such students (Maher, 2018). Furthermore, teachers' willingness to adapt the lessons suggests their competence and confidence in implementing the lessons (Bowins and Beaudoin, 2011). Findings also indicated that the gamified PE lessons could be implemented in other schools due to their inclusive and enjoyable nature (Fernandez-Rio et al., 2020).

The findings also demonstrated acceptability. Teachers expressed the novelty of using gamification in PE, and the quantity of strategies did not increase their workload, as previously reported (Fernandez-Rio et al., 2020), further supporting the decision to include a minimum of four strategies

per lesson (Rice et al., 2025). The children particularly valued teamwork, supporting the idea that gamification has the potential to foster social interaction (Gil-Madrona et al., 2022). Given that children develop MC and EI through social interactions (Holloway and Long, 2019), these findings are important. Teachers also noted that the interventions were effective in promoting both physical and social skills (Abusleme-Allimant et al., 2023). However, some children expressed dissatisfaction with unclear rules, lesson difficulty and disliking of specific skills (Mclellan et al., 2022), necessitating rule adjustments in future studies. While some teachers expressed the intention to continue using the lessons post-intervention, one teacher considered them unsuitable for their new Year 1 class (aged 5–6). This is unsurprising given differences in expected age-related movement skill development and difficulty of the respective activities (Bolger et al., 2018).

A key consideration in interpreting our EI findings was the suitability of the SSEIT. Although the SSEIT has previously been used with children (e.g. Mohammadi Orangi et al., 2023; Williams et al., 2009), analyses revealed the subdomains across both the original and alternative structures were unreliable in this sample, consistent with previous critiques (Petrides and Furnham, 2000). In contrast, the global EI score derived from the Gignac et al. (2005) model demonstrated good reliability and was retained as the primary outcome. Findings revealed a significant improvement in global EI from pre- to post-test, suggesting that the intervention had a positive impact. This improvement could possibly be attributed to the increased social interaction facilitated by the gamification strategies (i.e. narrative and relationships) embedded in the intervention. Previous evidence has indicated these strategies as beneficial for improving EI in other populations (Navarro-Mateos et al., 2024).

In contrast to a previous gamified intervention that showed only an effect on balance (Fernández-Vázquez et al., 2024), the present study found a positive effect on children's MC, as indicated by the KTK3+ results. These findings are encouraging, as pre-test scores were significantly below the normative values for the KTK3+ (Coppens et al., 2021). However, at post-test, scores for jumping sideways and eye–hand coordination were higher than the normative values for children aged 9 and 10, while scores for moving sideways and balancing backwards were close to the normative value (Coppens et al., 2021), suggesting a regression to the mean. There are two plausible explanations for this increase in MC. Firstly, the gamified PE interventions in the current study were explicitly designed to target MC, and PE interventions specifically designed to target MC are more effective than standard PE interventions (Foweather and Rudd, 2020). Second, gamification strategies, such as levels and challenges, may have contributed to the improvements since they theoretically support competence need satisfaction (Blain et al., 2022). These gamification strategies were either absent or not clearly described in the intervention by Fernández-Vázquez et al. (2024), which could explain the lack of observed effects in their study, as well as a potential ceiling effect in young adults.

An increase in needs satisfaction and a decrease in needs frustration were also observed, although these changes were negligible, possibly due to inconsistent lesson delivery. Consistent with Ferriz-Valero et al. (2020), we observed a significant increase in external regulation in PA, which could be attributed to the use of points. While external rewards can reduce autonomous motivation, such tangible elements are important for the successful implementation of gamification (Fernandez-Rio et al., 2020). Importantly, and consistent with previous research (Fernández-Río et al., 2020; Sotos-Martinez et al., 2024), a significant increase in intrinsic motivation in PE was also observed, suggesting the gamified intervention supported more self-determined forms of motivation, despite the presence of points. These findings are positive, as more autonomous forms of motivation have been positively associated with affective (enjoyment) and behavioural (effort) outcomes in PE (de Bruijn et al., 2023). A significant increase in identified regulation for PA was also

observed, possibly reflecting a change in personal importance and conscious valuing of PA (Vasconcellos et al., 2020). However, as Lonsdale et al. (2011) suggest, children may struggle to differentiate between what they enjoy (intrinsic) and what they value (identified), providing some context to these findings. Overall, preliminary findings are encouraging (Dowling and Barry, 2020), but a comparison group is needed in a future study to determine causality.

Limitations and future directions

Although this study demonstrates valuable findings, there are also limitations. As this was a single-group design, there was no control group, so we are unable to determine if the improvements were related to the gamified PE lessons or other unaccounted factors, such as growth and maturation (Lopes et al., 2020). A future pilot study should examine the relative impact of the gamified PE lessons through a randomised controlled trial. Furthermore, the data collection was carried out with a small sample, so a future definitive study should include a larger sample to ensure generalisability of findings. The MCA data were only collected at post-test, limiting interpretations of intervention effectiveness on MC. Finally, while the SSEIT has been used in previous studies (e.g. Williams et al., 2009), our analyses indicated that the subdomains were not reliable in this sample. This highlights an important feasibility finding: the SSEIT may not be suitable for measuring specific EI domains in primary school-aged children. Future work should therefore prioritise validating EI measures in this population in line with COSMIN guidance (Mokkink et al., 2018), and consider alternative instruments where available (e.g. TEIQue-Child; Mavroveli et al., 2008).

Conclusion

Our findings suggest a full-scale trial would be feasible. The findings demonstrated the gamified PE lessons to be feasible and acceptable, and it is encouraging to see that they could be implemented by non-specialist PE teachers. In addition, preliminary data showed favourable changes in children's EI and MC following participation in the intervention. Future studies including a control group and a larger sample size are needed to evaluate the effectiveness. Specifically, a cluster randomised controlled trial, comparing gamified vs. traditional PE, is recommended to isolate intervention effects. Furthermore, to enhance intervention adherence and fidelity, weekly logs and video observation ($n = 3$ over the 10 weeks) would need to be implemented in the full trial.

ORCID iDs

Jenna Rice https://orcid.org/0009-0000-2876-4553
Lawrence Foweather https://orcid.org/0000-0001-9851-5421
Ceriann Magill https://orcid.org/0000-0002-6043-6864
Jonathan Foulkes https://orcid.org/0000-0002-7373-4190
Katie Fitton Davies https://orcid.org/0000-0002-1853-9667

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Supplemental material

Supplemental material for this article is available online.

References

Abusleme-Allimant R, Hurtado-Almonacid J, Reyes-Amigo T, et al. (2023) Effects of structured and unstructured physical activity on gross motor skills in preschool students to promote sustainability in the physical education classroom. *Sustainability* 15(13): 10167.

Adler K, Salanterä S and Zumstein-Shaha M (2019) Focus group interviews in child, youth, and parent research: An integrative literature review. *International Journal of Qualitative Methods* 18: 1609406919887274.

Amado-Alonso D, León-del-Barco B, Mendo-Lázaro S, et al. (2019) Emotional intelligence and the practice of organized physical-sport activity in children. *Sustainability* 11(6): 1615.

Avery KN, Williamson PR, Gamble C, et al. (2017) Informing efficient randomised controlled trials: Exploration of challenges in developing progression criteria for internal pilot studies. *BMJ Open* 7(2): e013537.

Beets MW, von Klinggraeff L, Weaver RG, et al. (2021) Small studies, big decisions: The role of pilot/feasibility studies in incremental science and premature scale-up of behavioral interventions. *Pilot and Feasibility Studies* 7: 1–9.

Blain DO, Standage M and Curran T (2022) Physical education in a post-COVID world: A blended-gamified approach. *European Physical Education Review* 28(3): 757–776.

Bolger LE, Bolger LA, O'Neill C, et al. (2018) Age and sex differences in fundamental movement skills among a cohort of Irish school children. *Journal of Motor Learning and Development* 6(1): 1–100.

Bowen DJ, Kreuter M, Spring B, et al. (2009) How we design feasibility studies. *American Journal of Preventive Medicine* 36(5): 452–457.

Bowins W and Beaudoin C (2011) Experienced physical education teachers adapting to a new curriculum: Perceived facilitators and inhibitors. *Revue phénEPS/PHEnex Journal* 3: 1.

Braun V and Clarke V (2019) Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health* 11(4): 589–597.

Cairney J, Rigoli D and Piek J (2013) Developmental coordination disorder and internalizing problems in children: The environmental stress hypothesis elaborated. *Developmental Review* 33(3): 224–238.

Castillo-Viera E, Moreno-Sanchez E, Tornero-Quiñones I, et al. (2020) Development of emotional intelligence through dramatization. *Apunts Educación Fısica Y Deportes* 143: 27–32.

Coppens E, Laureys F, Mostaert M, et al. (2021) Validation of a motor competence assessment tool for children and adolescents (KTK3+) with normative values for 6- to 19-year-olds. *Frontiers in Physiology* 12: 652952.

Davies KF, Clarke S, Martins R, et al. (2024) The effect of a home-based, gamified stability skills intervention on 4-5-year-old children's physical and cognitive outcomes: A pilot study. *Psychology of Sport and Exercise* 73: 102636.

Davis SK, Nowland R and Qualter P (2019) The role of emotional intelligence in the maintenance of depression symptoms and loneliness among children. *Frontiers in Psychology* 10: 1672.

de Bruijn AG, de Greeff JW, Temlali TY, et al. (2023) Objectively measured physical activity during primary school physical education predicts intrinsic motivation independently of academic achievement level. *British Journal of Educational Psychology* 93: 90–112.

den Uil AR, Janssen M, Busch V, et al. (2023) The relationships between children's motor competence, physical activity, perceived motor competence, physical fitness and weight status in relation to age. *PLoS One* 18(4): e0278438.

Deterding S, Sicart M, Nacke L, et al. (2011) Gamification. Using game-design elements in non-gaming contexts. In: *CHI'11 extended abstracts on human factors in computing systems*, Vancouver, BC, Canada, pp. 2425–2428.

Di Leo G and Sardanelli F (2020) Statistical significance: *P* value, 0.05 threshold, and applications to radiomics – reasons for a conservative approach. *European Radiology Experimental* 4: 1–8.

Dowling K and Barry MM (2020) The effects of implementation quality of a school-based social and emotional well-being program on students' outcomes. *European Journal of Investigation in Health, Psychology and Education* 10(2): 595–614.

Eldridge SM, Chan CL, Campbell MJ, et al. (2016) CONSORT 2010 Statement: Extension to randomised pilot and feasibility trials. *BMJ* 355: i5239.

Fairclough SJ, Clifford L, Foweather L, et al. (2024) Move well, feel good: Feasibility and acceptability of a school-based motor competence intervention to promote positive mental health. *PLoS One* 19(6): 0303033.

Fernandez-Rio J, de las Heras E, González T, et al. (2020) Gamification and physical education. Viability and preliminary views from students and teachers. *Physical Education and Sport Pedagogy* 25(5): 509–524.

Fernández-Vázquez D, Navarro-López V, Cano-de-la-Cuerd R, et al. (2024) Influence of virtual reality and gamification combined with practice teaching style in physical education on motor skills and students' perceived effort: A mixed-method intervention study. *Sustainability* 16(4): 1584.

Ferriz-Valero A, Østerlie O, García Martínez S, et al (2020) Gamification in physical education: Evaluation of impact on motivation and academic performance within higher education. *International Journal of Environmental Research and Public Health* 17(12): 4465.

Foweather L and Rudd JR (2020) Fundamental movement skill interventions. In: *The Routledge Handbook of Youth Physical Activity*. Routledge, 715–737.

Gignac GE, Palmer BR, Manocha R, et al. (2005) An examination of the factor structure of the Schutte self-report emotional intelligence (SSREI) scale via confirmatory factor analysis. *Personality and Individual Differences* 39(6): 1029–1042.

Gil-Madrona P, López PJC, Martín IP, et al. (2022) Gamification in physical education through the popular games of Don Quijote de la Mancha to improve affective domain and social interactions. In: *Handbook of Research on Using Motor Games in Teaching and Learning Strategy*. Spain: IGI Global Scientific Publishing, 20–44.

Goodyear VA (2017) Sustained professional development on cooperative learning: Impact on six teachers' practices and students' learning. *Research Quarterly for Exercise and Sport* 88(1): 83–94.

Guadagnoli MA and Lee TD (2004) Challenge point: A framework for conceptualizing the effects of various practice conditions in motor learning. *Journal of Motor Behavior* 36(2): 212–224.

Guba EE and Lincoln YS (2005) Paradigmatic controversies, contradictions, and emerging confluences. In: Denzin NK and Lincoln YS (eds) *The SAGE Handbook of Qualitative Research*, 3rd ed. Thousand Oaks, CA: Sage Publications, 191–216.

Guijarro-Romero S, Mayorga-Vega D, Casado-Robles C, et al. (2024) Effect of a gamified-based intermittent teaching unit in physical education on school children's accelerometer-measured weekly physical activity: A cluster-randomized controlled trial. School-fit study. *Revista de Psicodidáctica (English ed.)*: 500156.

Hastie PA and Casey A (2014) Fidelity in models-based practice research in sport pedagogy: A guide for future investigations. *Journal of Teaching in Physical Education* 33(3): 422–431.

Henneberger AK, Rose BA, Feng Y, et al. (2023) Estimating student attrition in school-based prevention studies: Guidance from state longitudinal data in Maryland. *Prevention Science* 24(5): 1035–1045.

Hill PJ, McNarry MA, Mackintosh KA, et al. (2024) The influence of motor competence on broader aspects of health: A systematic review of the longitudinal associations between motor competence and cognitive and social-emotional outcomes. *Sports Medicine* 54(2): 375–427.

Holloway JM and Long TM (2019) The interdependence of motor and social skill development: Influence on participation. *Physical Therapy* 99(6): 761–770.

Jago R, Tibbitts B, Sanderson E, et al. (2019) Action 3: 30R: Results of a cluster randomised feasibility study of a revised teaching assistant-led extracurricular physical activity intervention for 8 to 10 year olds. *International Journal of Environmental Research and Public Health* 16(1): 131.

Johnstone A, Hughes AR, Bonnar L, et al. (2019) An active play intervention to improve physical activity and fundamental movement skills in children of low socio-economic status: Feasibility cluster randomised controlled trial. *Pilot and Feasibility Studies* 5: 1–13.

Judd CM, McClelland GH and Ryan CS (2017) *Data Analysis: A Model Comparison Approach to Regression, ANOVA, and Beyond*. New York: Routledge.

Kapp KM (2012) *The Gamification of Learning and Instruction: Game-Based Methods and Strategies for Training and Education*. John Wiley & Sons.

Lane AM, Meyer BB, Devonport TJ, et al. (2009) Validity of the emotional intelligence scale for use in sport. *Journal of Sports Science & Medicine* 8(2): 289.

Lea RG, Davis SK, Mahoney B, et al. (2019) Does emotional intelligence buffer the effects of acute stress? A systematic review. *Frontiers in Psychology* 10: 810.

Leahy AA, Kennedy SG, Smith JJ, et al. (2021) Feasibility of a school-based physical activity intervention for adolescents with disability. *Pilot and Feasibility Studies* 7(1): 120.

Lonsdale CC, Sabiston CM, Taylor IM, et al. (2011) Measuring student motivation for physical education: Examining the psychometric properties of the perceived locus of causality questionnaire and the situational motivation scale. *Psychology of Sport and Exercise* 12: 284–292.

Lopes L, Santos R, Coelho-E-Silva M, et al. (2020) A narrative review of motor competence in children and adolescents: What we know and what we need to find out. *International Journal of Environmental Research and Public Health* 18(1): 18.

Luz C, Rodrigues LP, Almeida G, et al. (2016) Development and validation of a model of motor competence in children and adolescents. *Journal of Science and Medicine in Sport* 19(7): 568–572.

Maher AJ (2018) 'Disable them all': SENCO and LSA conceptualisations of inclusion in physical education. *Sport, Education and Society* 23(2): 149–161.

Mancini VO, Rigoli D, Heritage B, et al. (2016) The relationship between motor skills, perceived social support, and internalizing problems in a community adolescent sample. *Frontiers in Psychology* 7: 183119.

Mavroveli S, Petrides KV, Shove C, et al. (2008) Validation of the construct of trait emotional intelligence in children. *European Child & Adolescent Psychiatry* 17: 516–526.

McLellan G, Arthur R, Donnelly S, et al. (2022) Feasibility and acceptability of a classroom-based active breaks intervention for 8–12-year old children. *Research Quarterly for Exercise and Sport* 93: 813–824.

Miles J and Shevlin M (2001) *Applying Regression and Correlation: A Guide for Students and Researchers*. London: Sage Publications.

Mohammadi Orangi B, Lenoir M, Yaali R, et al. (2023) Emotional intelligence and motor competence in children, adolescents, and young adults. *European Journal of Developmental Psychology* 20(1): 66–85.

Mokkink LB, De Vet HC, Prinsen CA, et al. (2018) COSMIN risk of bias checklist for systematic reviews of patient-reported outcome measures. *Quality of Life Research* 27(5): 1171–1179.

Morgan K, Bryant A and Diffey F (2013) The effects of a collaborative mastery intervention programme on physical literacy in primary PE. *International Council of Sport Science and Physical Education (ICSSPE) - Journal of Sport Science and Physical Education* 65. https://www.icsspe.org/content/no-65-cd-rom

Morgan K, Bryant AS, Edwards LC, et al. (2019) Transferring primary generalists' positive classroom pedagogy to the physical education setting: A collaborative PE-CPD process. *Physical Education and Sport Pedagogy* 24(1): 43–58.

Mullan E, Markland D and Ingledew DK (1997) A graded conceptualisation of self-determination in the regulation of exercise behaviour: Development of a measure using confirmatory factor analytic procedures. *Personality and Individual Differences* 23(5): 745–752.

Navarro-Mateos C, Mora-Gonzalez J and Pérez-López IJ (2024) The "STAR WARS: The first Jedi" program – effects of gamification on psychological well-being of college students. *Games for Health Journal* 13(2): 65–74.

Ng KM, Wang C, Kim DH, et al. (2010) Factor structure analysis of the Schutte self-report emotional intelligence scale on international students. *Educational and Psychological Measurement* 70(4): 695–709.

Niemistö D, Barnett LM, Laukkanen A, et al. (2023) Perceived motor competence in early childhood predicts perceived and actual motor competence in middle childhood. *Scandinavian Journal of Medicine & Science in Sports* 33(10): 2025–2038.

Noble S, Mclennan D, Noble M, et al. (2019) *Ministry of Housing, Communities and Local Government. The English Indices of Deprivation*.

Opstoel K, Chapelle L, Prins FJ, et al. (2020) Personal and social development in physical education and sports: A review study. *European Physical Education Review* 26(4): 797–813.

Pearson N, Naylor PJ, Ashe MC, et al. (2020) Guidance for conducting feasibility and pilot studies for implementation trials. *Pilot and Feasibility Studies* 6: 1–12.

Petrides KV and Furnham A (2000) On the dimensional structure of emotional intelligence. *Personality and Individual Differences* 29(2): 313–320.

Petrides KV, Mikolajczak M, Mavroveli S, et al. (2016) Developments in trait emotional intelligence research. *Emotion Review* 8(4): 335–341.

Quarmby T, Daly-Smith A and Kime N (2019) 'You get some very archaic ideas of what teaching is…': Primary school teachers' perceptions of the barriers to physically active lessons. *Education 3-13* 47(3): 308–321.

Reed H, Couturiaux D, Davis M, et al. (2021). Co-production as an emerging methodology for developing school-based health interventions with students aged 11–16: systematic review of intervention types, theories and processes and thematic synthesis of stakeholders' experiences. *Prevention Science* 22(4): 475–491.

Rice J, Foweather L, Foulkes J, et al. (2025) Co-development of a gamified physical education movement competence intervention with school stakeholders. *European Physical Education Review* 31(4): 655–675. https://doi.org/10.1177/1356336X241301352.

Rico-González M (2023) Developing emotional intelligence through physical education: A systematic review. *Perceptual and Motor Skills* 130(3): 286–1323.

Ryan RM and Deci EL (2020) Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology* 61: 101860.

Saiz-González P, Iglesias D and Fernandez-Rio J (2024) Can pedagogical models promote students' basic psychological needs in physical education? A systematic review and meta-analysis. *Quest (Grand Rapids, Mich)* 76(2): 247–267.

Schulz KF, Altman DG and Moher D (2010) CONSORT 2010 Statement: Updated guidelines for reporting parallel group randomised trials. *Journal of Pharmacology and Pharmacotherapeutics* 1(2): 100–107.

Schutte NS, Malouff JM, Hall LE, et al. (1998) Development and validation of a measure of emotional intelligence. *Personality and Individual Differences* 25(2): 167–177.

Sebire SJ, Jago R, Fox KR, et al. (2013) Testing a self-determination theory model of children's physical activity motivation: A cross-sectional study. *International Journal of Behavioral Nutrition and Physical Activity* 10: 1–9.

Sotos-Martínez VJ, Tortosa-Martínez J, Baena-Morales S, et al. (2024) It's game time: Improving basic psychological needs and promoting positive behaviours through gamification in physical education. *European Physical Education Review* 30(3): 435–457.

Stodden DF, Goodway JD, Langendorfer SJ, et al. (2008) A developmental perspective on the role of motor skill competence in physical activity: An emergent relationship. *Quest (Grand Rapids, Mich)* 60(2): 290–306.

Tavakol M and Dennick R (2011) Making sense of Cronbach's alpha. *International Journal of Medical Education* 2: 53.

Thabane L and Lancaster G (2018) Improving the efficiency of trials using innovative pilot designs: The next phase in the conduct and reporting of pilot and feasibility studies. *Pilot and Feasibility Studies* 4: 1–3.

Utesch T and Bardid F (2019) Motor competence. In: *Dictionary of Sport Psychology: Sport, Exercise, and Performing Arts*, 1st ed. Amsterdam: Elsevier, 186.

Van Der Kaap-Deeder J, Soenens B, Ryan R, et al. (2020) *Manual of the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS)*, Vol. 8. Ghent: Ghent University.

Vasconcellos D, Parker PD, Hilland T, et al. (2020) Self-determination theory applied to physical education: A systematic review and meta-analysis. *Journal of Educational Psychology* 112(7): 1444.

Vlachopoulos SP, Katartzi ES and Kontou MG (2011) The basic psychological needs in physical education scale. *Journal of Teaching in Physical Education* 30(3): 263–280.

Werbach K and Hunter D (2015) *The Gamification Toolkit: Dynamics, Mechanics, and Components for the Win*. Philadelphia: University of Pennsylvania Press.

Williams C, Daley D, Burnside E, et al. (2009) Measuring emotional intelligence in preadolescence. *Personality and Individual Differences* 47(4): 316–320.

Wong LS, Muirhead F, Powell E, et al. (2022) Feasibility of an intervention for increasing moderate-to-vigorous intensity physical activity (MVPA) in primary school physical education: A study protocol. *F1000Research* 2022: 258.

Author biographies

Jenna Rice is a Research Fellow in Implementation Science at Northumbria University, UK. Her research focuses on motor competence, emotional intelligence, and gamified physical education interventions in primary school-aged children.

Lawrence Foweather is a Reader in Physical Activity and Health in the School of Sport and Exercise Sciences at Liverpool John Moores University, UK. His research focuses on understanding factors and developing interventions to promote physical activity and sport participation among children and young people.

Ceriann Magill is a Lecturer in Physical Education within the School of Sport and Exercise Sciences at Liverpool John Moores University, UK. Ceri is currently working towards her PhD, which is focused on the exploration and development of physical education teaching efficacy of pre-service teachers.

Jonathan Foulkes is a Lecturer in Physical Education within the School of Sport and Exercise Sciences at Liverpool John Moores University, UK. His research interests are primarily focused on fundamental movement skill development, physical literacy and physical activity.

An De Meester is an Associate Professor in the Department of Educational and Developmental Science at the University of South Carolina, USA. Her research focuses on the dynamic relationship between children's and adolescents' actual and perceived motor competence and its impact on physical activity and wider development.

Matthieu Lenoir (PhD in physical education) is an expert in motor control, learning and development at Ghent University, Belgium, focusing on motor competence in various populations, including typically developing children, children with obesity, and identifying young talented sport participants. He also researches the role of visual information in sports decision-making and traffic safety for young cyclists.

David Stodden is the Director of the Human Performance and Development Laboratory and a Professor in the College of Education's Department of Educational Science within the University of South Carolina, USA. David's research explores mechanisms that impact developmental trajectories in physical, psychological, cognitive, and social-emotional domains, health-related outcomes, and human performance across the life course.

Katie Fitton Davies is a Senior Lecturer in Physical Education and Movement Science at Liverpool John Moores University, UK. Her research focuses on exploring movement skills, physical activity and motivation of primary school-aged children.