Education for Sustainable Development

nt: The role of Physical Education in China

An exploratory qualitative study of teac

hers, attitudes and practices

Type Article

URL

https://knowledge.lancashire.ac.uk/id/eprint/58

0
3
9
/
.
1
0
.
6
9
6
6
5
/
i
s
s
.
v
4
7
i
2
.
1
7
3

tron Mehvish, Curovic, Ivan, Hodgson, Alex,

Oakes, Patand Grecic, David (2025) Educati

on for Sustainable Development: The role of

Physical Education in China – An exploratory to

ry

qualitative study of teachers' attitudes

and practices.

International Sports Studies

s
,
4
7
(
2
)
.
p
p
.
7
2
-
9
7
.
I
S
S
N
1
4
4
3
-
0
7
7
0

or,
s
Mehvish,
Curovic,
Ivan,
Hodgson,
Alex,
O

The Official Journal of the International Society for Comparative Physical Education and Sport

INTERNATIONAL SPORTS STUDIES

ORIGINAL RESEARCH ARTICLE

Education for Sustainable Development: The Role of Physical Education in China – An Exploratory Qualitative Study of Teachers' Attitudes and Practices

Mehvish Bashir [a,b]; Ivan Curovic[a,b]; Alex Hodgson[a,b]; Pat Oakes[a,b]; Li Ping[b]; David Grecic [a,b]

[a]School of Health, Social Work, and Sport, University of Lancashire, Preston, United Kingdom; [b]School of Physical Education, Hunan Normal University, Changsha, China

Keywords:

sustainable development goals, teacher perspectives, China, education for sustainability, physical education

Recommended Citation:

Bashir, M., Curovic, I., Hodgson, A., Oakes, P., Li, P., & Grecic, D. (2025). Education for Sustainable Development: The Role of Physical Education in China – An Exploratory Qualitative Study of Teachers' Attitudes and Practices. *International Sports Studies*, 47(2), 72-97, https://doi.org/10.69665/iss.v47i2.173

ORCID ID

Mehvish Bashir
https://orcid.org/0009-0005-1414-9644
Ivan Curovic
https://orcid.org/0000-0003-1340-9393
Alex Hodgson
https://orcid.org/0000-0003-0136-9064
Li Ping
https://orcid.org/0009-0003-5714-7265
David Grecic
https://orcid.org/0000-0003-1487-8327

Abstract

In the absence of empirical examinations of how school Physical Education (PE) in China aligns with the United Nations' Sustainable Development Goals (SDGs), this study aimed to provide one of the first empirical examinations of this alignment by analysing 34 PE teachers' understandings and pedagogical practices using lesson observations and semi-structured interviews. Deductive thematic analysis, structured around globally identified PE-supported SDGs, was used to capture the points of alignment or divergence between teachers' stated philosophies and classroom practice. Findings indicate a strong rhetorical commitment to lifelong health and holistic learning, consistent with SDGs 3 and 4. However, these intentions were constrained by exam-oriented assessment systems that narrowed curriculum delivery toward fitness-based preparation. Teachers demonstrated inclusive philosophies aligned with SDG 10, but structural barriers restricted equitable participation. Gender equal-ity (SDG 5) was marked by a tension between stereotyped discourse and more equitable observed practice. Environmental and socio-economic dimensions of the SDGs were largely absent. This study calls for targeted efforts in China to align PE with the SDGs by explicitly mapping PE standards to the SDGs, providing teacher training on these goals, and piloting sustainability-focused assessment models. Future research should employ measurable approaches to investigate PE's contribution to sustainability education further.

Introduction

Growing global challenges, such as deepening social inequality, accelerating climate change, and widespread environmental stress, led the United Nations in 2015 to introduce 17 interlinked Sustainable Development Goals (SDGs), which aim to foster a fair, resilient, and inclusive future (United Nations, 2015). To achieve these goals, education has been identified as a critical tool in developing the knowledge, values, attitudes, and competencies that motivate and empower learners to contribute to sustainable development (SD) (Kioupi & Voulvoulis, 2019; Lundvall & Fröberg, 2023).

Consequently, teachers play a vital role in promoting this by equipping students with the knowledge and capacity needed to act as agents of positive change (Rieckmann et al., 2017). Building on this

agenda, school physical education (PE) offers a distinctive space for developing sustainability-related competencies, given its emphasis on health, social interaction, equity, and responsible engagement (Baena-Morales & González-Víllora, 2023; Lohmann et al., 2021). Despite this potential, much of the existing work remains theoretical, and scholars have called for empirical studies that examine SD from the perspectives of PE teachers (Baena-Morales & Ferriz-Valero, 2025).

Currently, most PE teachers are uncertain about what SD means (Baena-Morales et al., 2021), partly because the concept is inherently ambiguous, which requires them to continually interpret, adapt and refine how it is understood and enacted (Bentham, 2013; Fröberg et al., 2023; Purvis et al., 2019).

In recent years, attention to the educational role of school PE has been renewed in response to increasing levels of inactivity and sedentary behaviour among young people (Bailey et al., 2013; Biddle & Asare, 2011). Reflecting these long-standing concerns about inactivity, UNESCO's Quality Physical Education (QPE) guidelines position PE as a curriculum space for holistic learning that promotes inclusion, participation and the development of physical, social and emotional competencies aligned with *Education for Sustainable Development* (UNESCO, 2015).

Within this agenda, Physical Literacy, a holistic concept involving motivation, confidence, competence, knowledge and values that supports lifelong engagement in movement and responsible interaction with one's environment, has been positioned as a key learning outcome of QPE (UNESCO, 2015; Dudley & Cairney, 2021; Whitehead, 2010). In fact, PL could act as a framework through which QPE provides a foundation for PE's potential SDG contribution(Baena-Morales et al., 2021; Fröberg & Lundvall, 2021). PE, therefore, has strong potential to promote SDGs related to health, education, equity, environmental responsibility and peaceful, participatory communities.

In identifying the SDGs most relevant to Physical Education, we drew upon Baena-Morales et al.'s (2021) review, which identified eight of the seventeen SDGs and 24 outcomes relevant to PE. Given the exploratory and context-specific nature of this study in China, in our manuscript, we adopt a more general framing of SDG–PE linkages across the eight headline SDGs rather than engaging with each SDG's individual outcomes in detail.

PE directly advances SDG 3 (health and well-being) by promoting regular physical activity and supporting mental and emotional health (Biddle & Asare, 2011; Salvo et al., 2021). It also contributes to SDG 4 (quality and inclusive education) by developing transferable skills, supporting equitable participation, and enhancing learning outcomes (García-Rico et al., 2021). Moreover, PE directly promotes SDG 5 (gender equality), through co-educational and stereotype-challenging pedagogies (Jiménez Lozano & González-Palomares, 2023; Sánchez-Hernández et al., 2018). Models such as Sport Education nurture employability-related skills by engaging students in roles such as a leader (e.g., coach), referee, or event organiser, thereby linking PE to SDG 8 (decent work and economic growth) (Baena-Morales et al., 2021; MINEPS VI, 2017).

Likewise, inclusive and socially oriented pedagogies that promote equal opportunities for all students align with SDG 10 (reduced inequalities) (Block & Obrusnikova, 2007; Muñoz-Hinrichsen et al., 2024; Rillotta et al., 2018), while activities in natural environments, alongside tasks using recycled or low-impact materials, connect PE to SDG 12 (responsible consumption and production) and SDG 13 (climate action) (Baena-Morales et al., 2021).

Finally, approaches based on cooperation, shared decision-making, and personal and social responsibility support SDG 16 (peace, justice and strong institutions) by

fostering civic values and participatory behaviours (García-García et al., 2020). However, despite these emerging connections, much of this work remains conceptual or policy-oriented, with limited empirical research examining how PE teachers interpret and enact SDG-related ambitions in practice (Baena-Morales & González-Víllora, 2023; Merma-Molina et al., 2023).

Education for sustainable development (ESD) has been on China's agenda since the 1990s (State Council of the People's Republic of China, 1994). Early ESD pilots expanded to more than 1,000 schools by 2009(Lee & Huang, 2009). In the 2010s, the domestic ecological civilisation agenda reframed sustainability, linking ecological protection with economic and social development and gradually filtering into education policy (Meng et al., 2021). This shift emphasised priorities such as fostering diligence and thrift, strengthening environmental awareness, and cultivating values that support sustainable development (Zhou & Lee, 2022).

Despite China's documented progress toward the SDGs (UNDP, 2020), education has still not institutionalised an operational curricular framework (Cheng & Yu, 2022; Li et al., 2022). Instead, it operates as a symbolic reference with limited conceptual clarity and uneven enactment across subjects (Li et al., 2022). China's national strategies, such as "Healthy China 2030," align PE with SDG 3 (Tan et al., 2017), while recent policy has shifted from "strengthening physique" to "fostering virtue through education," broadening the aims of PE (An et al., 2022). Examining how this evolving policy context translates into practice offers valuable insights for global debates on implementing sustainability through PE in similarly centralised, high-stakes education systems.

However, limited teacher training, resource constraints, and a highly centralised, exam-focused education system continue to hinder the integration of sustainability concepts into classroom practice (An et al., 2022), thereby highlighting the need for research on how sustainability is understood and enacted within Chinese schools, especially within PE (Tian et al., 2024; Zhou, 2024).

Despite PE being recognised in research as critical for the SDGs addressing health, sport, and physical activity (Dai & Menhas, 2020; Yuan & Yu, 2024) as well as potentially invaluable for the SDGs such as *Quality Education* (SDG 4), *Gender Equality* (SDG 5), *Reduced Inequalities* (SDG 10), *Sustainable Cities* (SDG 11), *Climate Action* (SDG 13), and *Peace and Justice* (SDG 16) (Dai & Menhas, 2020), current research on PE and sustainability in China suffers from three gaps. These are: (1) a lack of fine-grained, qualitative evidence of how teachers across different school levels understand and enact sustainability; (2) an overreliance on narrative data, without insights into actual classroom practice; and (3) the absence of the use of the SDG framework to explicitly connect teachers' interpretations to global sustainability targets.

Therefore, the significance and originality of this study lie in generating one of the first empirical, practice-based insights into how sustainability is understood and enacted in Chinese PE. It does this by employing a qualitative multiple-case design, sampling teachers across multiple school levels and combining interviews with lesson observations for triangulation. This study applies the SDG lens to analyse how teachers' interpretations and pedagogical actions relate to specific SDGs, ultimately providing a foundation for future directions in both research and policy, and informing professional development on leveraging PE's full potential to contribute to a sustainable future.

Methodology

Study Design

The present study was developed from a broader cross-sectional investigation of Chinese Physical Education (PE) and

teachers' attitudes and practices. Given the relative lack of previous research on PE and the SDGs, the study was exploratory in nature and aimed to develop an initial understanding of the current situation. As the study aimed to generate knowledge from participants' lived experiences, an interpretivist qualitative approach was adopted by the research team when designing, conducting, analysing and presenting the study (Pope, 2013). Overt unstructured observations and semi-structured interviews were utilised to establish commonalities and differences between participants in diverse settings and to identify avenues for future research.

Participants & Sampling

A total of 34 PE teachers (21 male, 13 female) participated in the interview process. Given the exploratory nature of the study, participants were drawn from a range of educational settings, with one government-funded school from each major geographical zone of the city (north, south, east, and west), to provide a cross-section of the issue. Participants were identified and selected by contacting Principals of primary (n=4), middle (n=4) and high schools (n=4) in Changsha City, Hunan Province, China, who provided a list of PE teachers willing to participate in the study.

Potential participants were provided with an information sheet detailing the study's process and purpose, and gave verbal consent to participate. Random sampling was then used to select 2-3 participants from each of the 12 included schools, resulting in a final sample of teachers from Primary (n=11), Middle (n=12), and High School environments (n=11) (see Table 1). None of the candidates approached declined to be involved. One limitation of this approach was the possibility of bias in the Principals' selections, as they may have chosen teachers they felt would provide a favourable representation of the school's practices.

It is also important to acknowledge the power structures and cultural dynamics at play: teachers selected by their Principals may have felt unable to decline participation due to concerns about how their superiors might perceive this. Nevertheless, given the level of access afforded through the Principals' cooperation, the research team determined that this approach was the most feasible and appropriate under the circumstances.

The homogeneous sample allowed the research team to identify patterns between 1) teachers working at different schools in the same age category, 2) teachers working at different schools in different age categories, and 3) teachers working at the same school in the same age category These intra- and inter-school connections allowed for a comprehensive overview of dominant themes and contributed to a rich data set from which diverse perspectives could be accessed and represented in the findings (Male, 2016).

Throughout the presentation of results, participants are referred to using anonymised identifiers that indicate both school level and individual teachers (H1–H11 for high school teachers, M1–M12 for middle school teachers, and P1–P11 for primary school teachers. The demographic details corresponding to these identifiers are presented in Table 1 below.

Table 1. Demographic information of teacher participants

Education Setting	School	Participant	Qualification	Age	Experience
High School	*High School 1*	H1	Undergraduate	25	3 years
		H2	Master's degree	28	3 years
		H3	Undergraduate	23	1 year
	High School 2	H4	Undergraduate	30	8 years
		H5	Undergraduate	24	2 years
	High School 3	H6	Master's degree	27	2 years
		H7	Undergraduate	35	10 years
		H8	Master's degree	30	4 years
	High School 4	H9	Undergraduate	45	20 years
		H10	Master's degree	40	16 years
		H11	Master's degree	33	8 years
Middle School	*Middle School 1*	M1	Undergraduate	25	2 years
		M2	Master's degree	26	1 year
		M3	Master's degree	27	2 years
	Middle School 2	M4	Undergraduate	30	7 years
		M5	Master's degree	42	18 years
		M6	Undergraduate	30	7 years
	Middle School 3	M7	Undergraduate	24	1 years
		M8	Master's degree	44	18 years
		M9	Undergraduate	50	22 years
	Middle School 4	M10	Master's degree	37	10 years
		M11	Undergraduate	34	11 years
		M12	Undergraduate	30	5 years
Primary School	*Primary School 1*	P1	Undergraduate	51	27 years
		P2	Master's degree	39	15 yesrs
		P3	Master's degree	44	18 years
	Primary School 2	P4	Undergraduate	28	4 years
		P5	Undergraduate	23	1 year
	Primary School 3	P6	Master's degree	27	1 year
		P7	Undergraduate	26	2 years
		P8	Undergraduate	27	3 years
	Primary School 4	P9	Master's degree	26	1 year
		P10	Undergraduate	27	2 years
		P11	Undergraduate	29	5 years

Procedure

Ethical approval was granted by Hunan Normal University and the Chinese Ministry of Education. All participants provided informed consent prior to data collection. Following the data collection process, the data were anonymised using randomly assigned identifiers, stored securely on a password-protected, institutionally approved OneDrive system, accessible only to authorised researchers. In accordance with institutional guidelines, data will be retained for 10 years and then permanently deleted from secure storage.

Data Collection

Observations: PE lessons were observed to identify key aspects of current teaching practice. Each participant was observed teaching for n=1 lesson, all of which lasted between 40 and 45 minutes. Given that each participant was observed only once, the findings may not fully represent their teaching practice; they provide insight into a single instance. However, this approach was necessary given the time and resources available to the research team, given the relatively large number of participants involved in the study.

An overt, unstructured approach was adopted; there was no observation framework for observers to follow. Instead, the focus was on gaining an initial understanding of the participants' teaching environment, the organisation of their classes, and the teachers' actions (DeWalt & DeWalt, 2002). Field notes were taken to record lesson aims and objectives, organisational details, practical information (such as location, activity, numbers and tasks), interaction patterns (teacher-pupil, pupil-pupil) and critical incidents during the lesson.

An example of the observation note format is provided in Supplementary File A. These notes provided researchers with valuable context ahead of the interview process, enabling the research team to identify connections and inconsistencies between theory and practice (Kawulich, 2012).

Interviews: A semi-structured approach was adopted to ensure comparability across participants while allowing sufficient flexibility for unanticipated insights to emerge (Creswell & Creswell, 2018). The interview guide was informed by the Epistemic Judgement Framework (EJF), which provides a structure for exploring teachers' underlying values, rationales and decision-making processes in physical education (Grecic et al., 2024). Each element of the framework (Philosophy and Purpose, Environment, Relationships, Goals, Methods, Evaluation, Future Planning) was explored, and questions were subsequently developed to elicit teachers' beliefs, priorities, and everyday practices in domains associated with these elements (see Box 1).

Because many teachers were unlikely to be familiar with the SDG terminology, the guide employed broad, open-ended prompts to reveal the purposes and values that implicitly shape their teaching. For example, the question "What is your teaching philosophy?" was followed by probes such as "Where did this come from?" "Has this changed over time?" and "If so, how?", encouraging reflection on areas linked to health and well-being, inclusion, gender norms, life skills, teacher–student relationships and broader societal expectations. These reflections were later analysed through the SDG framework, enabling the identification of both explicit and implicit sustainability-related practices. Additional prompts (e.g., "How do you address differences between students?", "What do you hope students gain for their future lives?") encouraged further discussion of SDG-related themes such as equity, social responsibility and skills for lifelong development (Cohen et al., 2011).

Box 1. Broad headings of the interview schedule

Philosophy and Purpose of PE – role and values associated with the subject, eg, Holistic development of children, health and wellbeing, competition success etc.

Environment – surroundings/conditions in which teacher and pupils experience PE, eg, Factors that influence teaching and learning, ie, facilities, equipment, weather etc.

Relationships – how people connect with each other, eg, how teacher and pupil, teacher and teacher, pupil and pupil communicate and interact.

Goals – idea of the future and/or desired result, eg, Targets and objectives
Methods – particular procedures for approaching something, eg, instructional practices, communication strategies etc.

Evaluation – making a judgement about something, eg, Assessments and testing.
Future Planning – deciding on how to do something in the future, eg, Next block of lessons, preparation of pupils for next stage of education / life.

Interviews lasted between 45 and 70 minutes and were conducted face-to-face in Mandarin by native-speaking researchers to ensure participants could express themselves fully. All interviews were audio-recorded, transcribed in Mandarin, translated into English and back-translated into Mandarin to resolve discrepancies and maintain the accuracy of participants' intended meanings. Translations were completed using a translation software application (NetEase Youdao) and cross-checked by a member of the research team who is a native Mandarin speaker. Any translations that did not accurately represent the original Mandarin were discussed with the research team and amended to reflect the original statement. Following back-translation using the same translation software (NetEase Youdao), the research team divided the back-translated data evenly and checked them against the original statements (see Table 2). Any discrepancies were raised and reviewed by the research team to ensure the original, translated and back-translated versions were consistent and accurate in their representation of the participants' statements. An example of this verification process is presented in Table 2. The final transcripts formed the dataset for analysis.

Table 2. Translation and back-translation verification

Example Phrase from Original Transcript in Mandarin	*Translation in English*	*Back-Translation in Mandarin*	*Reviewing Researcher Comment*
我觉得体育课能帮助同学们提高对体育的积极性，并且能够看到他们的微笑，我能有成就感	I think physical education classes can help students increase their enthusiasm for sports, and seeing their smiles gives me a sense of accomplishment.	我认为体育课可以帮助学生提高对运动的热情，看到他们的笑容让我很有成就感。	Translation and back-translation are consistent with meaning of original statement

Data Analysis

Data were analysed using deductive thematic analysis to identify patterns within and between the two datasets, derived from observations and interviews (Braun & Clarke, 2019). It was guided by the eight identified SDGs (SDGs 3, 4, 5, 8, 10, 12, 13, and 16) (Baena-Morales et al., 2021), which in turn informed the coding framework. The whole coding framework used in this process is available in Supplementary File B. Data were organised and analysed using Microsoft Excel, with a shared document allowing the research team to collaborate throughout the data analysis process. Analysis began with repeated reading of the interview transcripts and observation field notes to establish familiarity with the data and to note early impressions (Nowell et al., 2017).

Next, each transcript was coded manually by identifying meaning units and allocating them to the SDG category to which they most clearly related. The SDGs served as sensitising concepts rather than a rigid coding frame (Bowen, 2006), allowing for interpretation while remaining open to nuance within each category. Coded segments were then organised into matrices that enabled systematic comparison across teachers and school levels, reflecting, establishing, and charting procedures in Framework Analysis (Gale et al., 2013; Ritchie & Spencer, 1994). Observation data were examined alongside interview accounts to corroborate or challenge teachers' stated philosophies and to identify alignments and tensions between beliefs and practices. Coding and SDG allocations were refined

through iterative team discussions, ensuring shared interpretation and analytic coherence throughout the process.

Reflexivity

The research team included members from five countries (Australia, China, Pakistan, Serbia and the UK). This provided the advantage of a wide range of perspectives on research and PE, enabling consideration of different possible interpretations of data. One limitation of this study was that the research team's common language was English, necessitating translation before analysing the raw data, increasing the possibility that a participant's response was misinterpreted. For this reason, checking by a native speaker and back-translation were utilised to mitigate against this risk. Each member of the research team brought their own experiences and expertise in the field, including teaching, teacher training and research in PE. All members of the research team are based at a teacher training university in Changsha, providing access and facilitating knowledge exchange on the subject. While each member of the research team has their own personal research philosophy, all share the common aim of making a practical impact on PE teaching. This shaped the approach taken throughout the research process: for example. In contrast, the research team recognises the potential bias in the participant selection process. It is hoped that developing relationships with Principals in local schools who are willing to be involved in research will enable the research team to make a positive impact through future studies and interventions.

Trustworthiness

Transparency was maintained by keeping a clear audit trail that documented coding decisions, SDG allocations, analytic notes, and the iterative development of matrices used to map interview and observation data (see Tables 3 & 4)(Koch, 1994). Credibility was strengthened through investigator triangulation. The first author reviewed and coded all transcripts; 20% of transcripts (n=7) were then double-coded by two members of the research team. All authors independently reviewed coded extracts, compared SDG allocations, and met regularly to discuss discrepancies and refine interpretations, until consensus was reached (Cofie et al., 2022; Tobin (Begley, 2004). Examples of initial Code generation and researcher comments are provided in Table 3.

Table 3. Examples of initial code generation with researcher comments

Data	Initial Code	Researcher Comments	Linked SDGs
"Pay attention to the physical and mental health of students." (H4)	Holistic health education	Emphasises balanced attention to physical and mental health, consistent with SDG 3 via integrated health approach.	SDG 3
"PE lessons help students build genuine interest and enjoyment in sports." (H5)	Engaging, enjoyable learning environments	Highlights enjoyment and genuine interest as outcomes, aligning with SDG 4 through meaningful, engaging learning.	SDG 4

In instances where consensus could not be reached, the last author, who has extensive expertise in PE, acted as the adjudicator. Following a team discussion of the conflicting interpretations, as the most experienced qualitative researcher, the last author provided the final judgement to ensure consistency and coherence in the coding process. Data that did not align with any of the SDG categories were excluded in the SDG-focused coding process; however, all original transcripts were retained in full for

transparency and for potential re-examination during later stages of analysis. Observation field notes were used to corroborate or challenge interview accounts, further enhancing credibility through data triangulation.

Examples of this triangulation process are shown in Table 4. Dependability was supported by applying the SDG framework consistently as an organising structure throughout coding and charting (Tobin & Begley, 2004), while remaining open to inductive refinement within each SDG category to capture contextual nuance. This balance ensured that the analysis remained theoretically coherent without constraining emergent insights. Together, these strategies contribute to a transparent, coherent and trustworthy analytic process.

Table 4. Examples of data mapped between observation field notes and corresponding interview transcripts

Observation Data	Interview Data	Researcher Comments
Many lessons were interrupted and students went back to their classrooms and sat there.	"The small size of the venue, especially the indoor facility, becomes problematic during rainy weather, as it lacks sufficient space for the lessons." (M3)	Spatial constraints limit equitable participation in planned PE, in tension with SDG 10 requirement for equal access.
The lesson was entirely teacher-directed. Only in group tasks do students choose their role; the task and level of challenge are decided by teachers.	"Teachers adapt by offering optional activities and promoting student-led choices." (H4)	This shows clear tension between their claim and actual practice, regarding SDG which emphasises student agency.

Results

The analysis revealed a complex picture of how PE in China implicitly engages with the SDGs. Data were identified in relation to SDGs 3, 4, 5, 8, 10, 12, 13, and 16, which are described below. A summary of the alignment and misalignment across interview and observational data is provided in Table 5.

Table 5. SDG alignment and misalignment in PE teaching: combined interview and observation analysis

SDG	Outcome (Baena-Morales et.al.)	Interview Findings (aligned)	Illustrative Quotes	Interview Findings (misaligned)	Illustrative Quotes	Observation Summary
SDG 3 (Good Health and Well-Being)	3.4-Reducing premature mortality and promoting mental health and well-being	Support for health, enjoyment and healthy habits	• "Long term is to develop a lifelong healthy lifestyle." (P1) • "Support students' healthy growth by focusing on both physical and mental well-being…help students develop and pursue individual learning goals." (H9)	Health equated with exam fitness standards	• "Assess fitness and familiarise students with junior high PE exam components… build exam readiness for junior high PE assessments." (H6) • "In 9th grade, the emphasis shifts to preparing students for the high school entrance examination through targeted instruction." (M1)	Observed practice leaned heavily toward exam-focused fitness preparation.
SDG 4 (Quality Education)	3.4-Reducing premature mortality and promoting mental health and well-being	Teachers described playful, interest-driven, student-supportive PE.	• "I tend to let students learn while playing and add some game elements to make students more interested" (H1) • "Build teacher-student relationships through motivational strategies (verbal encouragement + material rewards) to maintain discipline and enhance learning outcomes." (H4)	Discipline, control and narrow learning outcomes focused on skills and fitness	• "Mid-term goal is to encourage consistent physical activity and enhance students' overall physical fitness." (M1) • "I am strict in terms of discipline and have always been a strict teacher image, but I also enjoy being friends with students." (M2)	Lessons were largely teacher-directed; limited student choice despite interview claims.
SDG 5 (Gender Equality)	4.1 - Ensure that all girls and boys complete primary and secondary education, which should be free, equitable, and of good quality	No interview evidence	N/A - No related interview data	Teachers reinforced gendered expectations.	• "Younger students are more playful and mischievous, especially the boys." (H1) • "Most male students show high enthusiasm..." (P11)	Despite gendered expectations in interviews, gender-neutral grouping were observed and teachers encouraged both boys and girls equally.

SDG 8 (Decent Work and Economic Growth)	4.a - Improvement of school facilities and learning environments	No interview evidence	N/A - No related interview data.	No interview evidence	N/A - No related interview data	N/A
SDG 10 (Reduced Inequalities)	5.1 - Elimination of discrimination against all women and girls	Teachers adapt to individual abilities to include all students.	• ……adopting a flexible, student-centered approach that considers individual differences in physical condition and ability" (P11)	Structural constraints limit equity.	• "The small size of the venue, especially the indoor facility, becomes problematic during rainy weather, as it lacks sufficient space for the lessons." (M6) • "Limited teaching facilities and equipment affects my teaching." (P3)	Observed practices tended to limit equal participation due to structural constraints such as large class sizes and restricted space.
SDG 12 (Responsible Consumption and Production)	5.5 - Women's participation and equal opportunities	No interview evidence	N/A - No related interview data.	No interview evidence	N/A - No related interview data	Responsible equipment use and tidiness were observed, but no sustainability themes were evident.
SDG 13 (Climate Action)	8.3 - Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation 8.9 - Devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products	No interview evidence	N/A - No related interview data	No interview evidence	N/A - No related interview data	One teacher mentioned cycling to work, but no other climate-related content was observed.
SDG 16 (Peace, Justice and Strong Institutions)	10.2 - Social, economic and political inclusion of all people	General commitment to respectful relationships.	"...you must be reasonable, persuasive and respectful." [P6]; "Working together, team spirit, rules of sports." [H7]	No interview evidence	N/A - No related interview data	Teacher resolve the conflicts with respect and fairness; however student input and shared decision-making were limited.

SDG 3: Good health and well-being

Teachers consistently framed the primary purpose of PE as cultivating lifelong health behaviours, directly aligning with the SDG on promoting mental and physical well-being and preventing non-communicable diseases. This was articulated as a commitment to fostering durable exercise habits and a holistic view of student health. Many expressed a long-term vision for their students that extended beyond skill acquisition. As one teacher stated, the ultimate goal is to "develop a lifelong healthy lifestyle" (P1).

This philosophy was often linked to a balanced focus on both physical health and psychological well-being. For instance, one teacher explained that their approach was to "support students' healthy growth by focusing on both physical and mental well-being" (H9). Another teacher also connected daily practice to this holistic outcome: "it's also about their physical and mental health. I keep an eye on their physical condition in PE class, and I also care about their mental state" (M5). Indeed, the central role of PE for many was based on positivity and enjoyment. One teacher stated that their main goal is "… to make students happy first. Only by learning happily in physical education class can students take the initiative to practice and consolidate the skills they have learned" (H11). This focus on happiness and enjoyment was seen as foundational to building the lifelong engagement envisioned by SDG 3.

Despite the strong theoretical and philosophical alignment with holistic health, observations and interview data revealed a significant divergence in practice, where health became narrowly defined by performance on high-stakes tests. For some teachers, especially in higher grades, the curriculum was dictated by exam requirements: "In 9th grade, the emphasis shifts to preparing students for the high school entrance examination through targeted instruction" (M1). Another noted their lessons were designed to "Assess fitness and familiarise students with junior high PE exam components (and) build exam readiness" (H6).

Similarly, another teacher described that "Because they are facing the high school entrance examination … I will focus on helping them to solidly master the skills involved in physical education in the [exam], to ensure that they can achieve satisfactory results in the examination." This approach ultimately reoriented PE from a focus on holistic, lifelong health towards short-term, exam-focused fitness, often at odds with the pursuit of SDG 3. Observational data further reinforced this in practice, with lessons often structured around repetitive drills of test components, such as long-distance running, sit-ups, and standing long jump, rather than a variety of holistic, game-based activities.

SDG 4: Quality Education

Teachers' descriptions of their pedagogy highlighted several aspects of quality education (SDG 4), particularly the delivery of engaging instruction and supportive learning environments. A prevalent pedagogical strategy, as depicted in words, was the use of play and games to promote engagement and increase interest in physical activity. One teacher described their method simply as: "I tend to let students learn while playing and add some game elements to make them more interested" (H1). Others saw cultivating interest as a core objective, with one noting, "Interest is the best teacher, only (by) let(ting) the children have an interest in sports, they will take the initiative to participate, to exercise" (M4).

Furthermore, teachers placed a strong emphasis on building supportive and motivational teacher-student relationships. Many described a dual role that balances authority with approachability. One of the teachers explained, "I am strict in terms of discipline and have always been a strict teacher image, but I also enjoy being friends with students" (M2). However, several teachers placed discipline and teacher-centred practices as the central concept to

maintain order. As was present in the majority of interviews, one teacher noted, “First be a strict teacher, then a friend. Another detailed a strategic use of “motivational strategies (verbal encouragement + material rewards) to emphasise discipline and enhance learning outcomes” (H4).

Similar to SDG 3, the concept of "quality education" was often constrained by a performative focus on examination results and discipline. While some teachers did mention student-centred approaches, the majority tended to focus on narrow goals addressing the learning outcomes linked to physical fitness. One teacher’s mid-term goal was solely to “encourage consistent physical activity and enhance students’ overall physical fitness” (M1), with no mention of broader skills or understanding. Observations confirmed that lessons were largely teacher-directed, limiting genuine student autonomy and engagement, the key components of SDG 4's vision for quality education.

SDG 10: Reduced inequalities

Interview data indicated that teachers were philosophically aligned with the inclusive principles of SDG 10, particularly in adapting to their students' varied physical abilities. One teacher explicitly described a shift in philosophy “from expecting all students to meet the same standards to adopting a flexible, student-centred approach that considers individual differences in physical condition and ability” (P11).

However, this alignment in philosophy was consistently reported to be jeopardised by significant structural barriers. Teachers cited “The small size of the venue, especially the indoor facility, becomes problematic during rainy weather, as it lacks sufficient space for the lessons” (M6) and “Limited teaching facilities and equipment” (P3) as major constraints. Observational data confirmed that these material limitations, combined with large class sizes, actively restricted equal participation and constrained valuable approaches to differentiation. The observed practices highlighted limited opportunities for all students, creating a divergence between the teachers' inclusive intent and the equitable enactment of their lessons.

SDG 5: Gender equality

In contrast to SDG 10, there was no evidence from interviews of teachers actively promoting gender equality. Instead, their discourse often reinforced traditional gendered expectations in which boys appeared to be linked more explicitly to engagement in physical activities compared to girls. Teachers frequently described student behaviour and engagement through a gendered lens, making statements such as, “Younger students are more playful and mischievous, especially the boys” (H1) and “Most boys are extremely enthusiastic and active in sports. There is a relatively serious polarisation” (P11). Although these interview data suggested bias toward providing more focus on boys, interestingly, observational data provided a nuanced counterpoint to these findings. In practice, teachers often employed gender-neutral groupings and were observed encouraging both boys and girls equally during activities.

Discussion

This is one of the first studies that investigated the alignment between PE practices and philosophies in China and the United Nations’ SDGs through the lens of teacher interviews and class observations. Our findings reveal that while Chinese PE teachers demonstrate strong philosophical and pedagogical alignment with the *Health and Wellbeing* (SDG 3) and *Quality Education* (SDG 4) agendas, this alignment is critically mediated by the pervasive influence of high-stakes examination systems, which narrows curricula towards exam-focused fitness.

Furthermore, a complex landscape of inequality emerged. While teachers actively strive to include students of differing abilities (SDG10), their efforts are significantly constrained by structural barriers

such as limited space and large class sizes. Despite teachers expressing a traditional bias towards prioritising boys in sports during interviews, classroom observations revealed equal opportunities for participation across both sexes (SDG 5). Notably, the study uncovers a striking absence of engagement with several SDGs (i.e., SDG 8, SDG 12, SDG 13, SDG 16), highlighting a significant gap between the global sustainability agenda and its localised interpretation in Chinese PE. More specifically, there was almost no reference to SDG 8 (*Decent Work and Economic Growth*), and only marginal engagement with SDG 12 (*Responsible Consumption and Production*), SDG 13 (*Climate Action*) and SDG 16 (*Peace, Justice and Strong Institution*). This suggests that teachers conceptualise the purpose of PE primarily through health promotion, skill development and moral education, while environmental and socio-economic dimensions of sustainability remain largely outside their professional awareness. To address these gaps, we recommend the following: (1) the development of explicit curriculum maps linking national PE standards to specific SDG indicators; (2) implemention of targeted teacher training modules to broaden the scope of sustainability in PE; and (3) the initiation of systemic support through pilot model programmes and reforming assessment practices to highlight holistic, sustainability-aligned outcomes.

Our findings reveal some contradictory concepts in Chinese PE where a strong philosophical alignment with the holistic PE targeting *Health and Well-Being* (SDG 3) and Quality Education (SDG 4) seems to be critically undermined by the external examination system, which ranks students based on their physical performances. Teachers' advocacy for "lifelong healthy lifestyles" and well-being demonstrates a clear understanding of SDG 3's aims that are compatible with the 'Healthy China' initiative (Dai & Menhas, 2020).

However, this intent is subverted in practice, where the curriculum narrows to exam-focused fitness drills, potentially eroding the intrinsic motivation essential for sustainable long-term engagement in physical activity (Esmaeilzadeh et al., 2022). This suggests that the current model, while effective for short-term test performance, may fail to support genuine, sustained exercise adherence necessary for lifelong well-being (Liu et al., 2023), a concern echoed in the declining fitness levels of Chinese university students once exam pressure is removed (Ma et al., 2025).

The *Quality Education* (SDG 4) appears to be addressed in the interviews by emphasising game-based pedagogy that was closely aligned with the concept of PL to promote pupils' motivation and competence, with the ultimate goal of improving their self-confidence for lifelong engagement in physical activity (International Physical Literacy Association, 2022). Indeed, contemporary PE pedagogical models reflected in game-based approaches are widely established as pillars of QPE (Bessa et al., 2021; Dudley et al., 2022; Koszałka-Silska et al., 2021), offering significant benefits over traditional methods that can erode the self-esteem (Bessa et al., 2021) essential for sustained student motivation (Estevan et al., 2021).

However, a notable divergence was observed between this stated philosophy and the enacted curriculum. Despite advocating for playful pedagogies, observational data revealed that lessons were largely teacher-directed, with limited genuine student choice or autonomy. This gap was likely exacerbated by the pervasive influence of high-stakes examinations, which narrowed the concept of "quality" to a performative focus on fitness outcomes and exam readiness. Consequently, the potential of QPE to fully realise SDG 4's vision of promoting critical skills, lifelong learning, and student agency was critically constrained by the systemic pressure of standardised testing. Yuan and Yu's (2024) analysis, in fact, has shown that while SDG 4 is nominally present in Chinese national standards, its integration is part of a broader, uneven pattern

with the unclear application across the subcategories. Our findings reveal that SGD 4's broad curricular goals constrain the transformative potential of PE.

This study reveals a critical distinction in how Chinese PE teachers navigate different dimensions of inequality, highlighting a gap between conscious policy alignment and unconscious bias. Teachers demonstrated a clear, intentional commitment to the principles of SDG 10 (i.e., *Reduced Inequalities*) and articulated philosophies of differentiation to support students of varying abilities. This aligns with the call by Dai & Menhas (2020) for sports to be used as a platform to "promote inclusion" and ensure "equal access" in China. However, this intent was made difficult to achieve by structural barriers such as limited facilities and large class sizes, creating a clear divergence between inclusive philosophy and equitable practice.

In contrast, engagement with SDG 5 (i.e., *Gender Equality*) was characterized by a significant discursive blind spot. While observational data showed equitable practices like gender-neutral grouping, teacher interviews consistently reinforced gendered stereotypes, , positioning boys as naturally more enthusiastic and dominant in sports spaces. This uncritical reproduction of bias in discourse, despite fair enactment, underscores a profound global challenge (Kretschmer et al., 2023). It suggests that without explicit pedagogical attention to challenging stereotypes, as advocated by Dai and Menhas (2020) to empower women and girls, PE may passively sustain the inequalities it has the potential to dismantle. The findings indicate that achieving SDG 10 is primarily a battle against external structural constraints, while progress on SDG 5 requires an internal, discursive shift in teacher awareness and professional development.

It is important to acknowledge the contextual limits of this study. Firstly, the findings are drawn from a qualitative multiple-case design within a single city (Changsha) and are therefore subject to selection bias and may not be generalisable to the diverse educational landscapes across China. The involvement of teachers allocated by their school Principals also introduces the influence of institutional power dynamics, possibly selecting for participants who were more willing or available rather than fully representative of their peers. Additionally, the interviews did not pursue or probe deeply into the participants' null responses regarding SDGs 8, 12, 13, or 16. This will need to be rectified in future studies. Gaining a more detailed understanding of what PE teachers can contribute to these essential SDGs, and how, will be a vital step in evidencing PE's fuller role in Education for Sustainability. Furthermore, the focus on teacher perspectives, while central to the research questions, excludes the voices of other key stakeholders such as students, parents, and school leaders whose views would provide a more complete understanding of how sustainability is perceived and enacted within the school ecosystem. Finally, the reliance on translated interview data also introduces the possibility of semantic loss or diminished cultural nuance.

Conclusion

This study offers one of the first empirical analyses of Chinese PE teachers' understanding of sustainable development and how this understanding shapes their pedagogical practice. Findings reveal a landscape of constrained potential. While teachers demonstrated philosophical alignment with Health (SDG 3) and Quality Education (SDG 4), these aims were critically undermined by an exam-focused system. Teachers also actively pursued inclusion (SDG 10) despite structural constraints and, in practice, provided equal opportunities across genders (SDG 5) despite harbouring traditional biases. Notably, environmental and socio-economic SDGs were nearly absent. Therefore, to transform PE into an effective vehicle for *Education for Sustainable Development*, three concrete actions are recommended: (1) the development of explicit curriculum maps linking national PE

standards to specific SDG indicators; (2) the implementation of targeted teacher training modules on topics such as "PE for Ecological Civilisation"; and (3) the initiation of systemic support through pilot "SDG-PE Model Schools" and the reform of assessment practices to highlight holistic outcomes aligned with a sustained and responsible engagement in physical activity.

From a research perspective, future studies need to explore, in much more detail, PE's 'missing pillars' of sustainable development. Large-scale studies that capture a wide range of PE teachers' attitudes and quantify the SDG knowledge base would be helpful for establishing a baseline from which to build. Delphi expert studies that include multidisciplinary perspectives could be conducted to classify and define how the SDGs can be most successfully integrated into the subject.

Finally, the key stakeholders (pupils, teachers, parents, school leaders, Party and Ministry officials) must be approached to provide their perspectives on what is needed and what is possible within modern China's education system. Without such research and direction, PE in China risks reinforcing a very narrow interpretation of sustainability that privileges health and discipline while overlooking its broader ecological and civic responsibilities.

Acknowledgement
The authors would like to thank Hunan Normal University for its institutional support and the schools, teachers, and administrators who participated in the data collection. In line with ISS policy, a generative artificial intelligence tool (OpenAI's ChatGPT, version GPT-3.5) was used solely to support language editing and clarity in parts of the manuscript; however, all scholarly content, analysis, and interpretations remain the responsibility of the authors.

Funding
This study was not supported by any external funding.

Disclosure statement
The authors declare no conflicts of interest.

Contributor Notes

Mehvish Bashir is a is a Senior Lecturer in Physical education at the University of Lancashire. Her PhD research focuses on Physical Education, Sustainable development, teachers practices and examining how the SDGs align with PE curriculum and pedagogy in China. Please direct correspondence to: Mbashir9@lancashir.ac.uk

Ivan Curovic is a Senior Lecturer at the University of Lancashire. His research focuses on strength and conditioning, neurophysiological responses to resistance exercise, and physical literacy support for adults. His work integrates applied sport science with health oriented physical activity interventions. Please direct correspondence to: icurovic@lancashire.ac.uk

Alex Hodgson is a Course Leader and Senior Lecturer in Sport and Physical Education, with a background in strength and conditioning for elite performance. His research interests include how teaching and coaching philosophies are shaped by culture, context, and disciplinary traditions.Please direct correspondence to: ahodgson5@lancashire.ac.uk

Pat Oakes is a Senior Lecturer on the Physical Education at University of Lancashire. His PhD theme deals with the importance of training in professional soccer players and Physical education. Please direct correspondence to: POakes@lancashire.ac.uk

Li Ping is a Professor at the School of Physical Education, Hunan Normal University. Changsha. She is a Chinese PE professor with bilingual skills that proved very vauable in this research. She supported this study by assisting with data collection and

ensuring bilingual accuracy during Mandarin-English translation. Please direct correspondence to: lping@hunnu.edu.cn

David Grecic is Professor of Sport and Physical Education and Head of Research and Innovation for Sport and Health Sciences at the University of Lancashire, UK. His research focuses on learning in sport, holistic curriculum co-creation the C.A.R.E. curriculum, and collaborative work with schools, universities, and sport organisations. Please direct correspondence to: dgrecic1@lancashire.ac.uk

References

An, Y., Yang, J., Niu, S. J., & Wang, J. (2022). Health first: The sustainable development of physical education in Chinese schools. *Sustainability, 14*(5), 3133. https://doi.org/10.3390/su14053133

Baena-Morales, S., & Ferriz-Valero, A. (2025). What about physical education and Sustainable Development Goals? A scoping review. *Physical Education and Sport Pedagogy*. Advance online publication. https://doi.org/10.1080/17408989.2023.2214572

Baena-Morales, S., & González-Víllora, S. (2023). Physical education for sustainable development goals: Reflections and comments for contribution in the educational framework. *Sport, Education and Society, 28*(6), 697–713.

Baena-Morales, S., Jerez-Mayorga, D., Delgado-Floody, P., & Martínez-Martínez, J. (2021). Sustainable Development Goals and physical education: A proposal for practice-based models. *International Journal of Environmental Research and Public Health, 18*(4), 2129. https://doi.org/10.3390/ijerph18042129

Bailey, R., Hillman, C., Arent, S., & Petitpas, A. (2013). Physical activity: An underestimated investment in human capital? *Journal of Physical Activity and Health, 10*(3), 289–308. https://doi.org/10.1123/jpah.10.3.289

Bentham, H. (2013). Clearing the path that has been laid: A conceptualisation of education for sustainable development. *Journal of Teacher Education for Sustainability, 15*(2), 25–41. https://doi.org/10.2478/jtes-2013-0009

Bessa, C., Hastie, P., Rosado, A., & Mesquita, I. (2021). Sport education and traditional teaching: Influence on students' empowerment and self-confidence in high school physical education classes. *Sustainability, 13*(2), 578. https://doi.org/10.3390/su13020578

Biddle, S. J. H., & Asare, M. (2011). Physical activity and mental health in children and adolescents: A review of reviews. *British Journal of Sports Medicine, 45(*11), 886–895. https://doi.org/10.1136/bjsports-2011-090185

Block, M. E., & Obrusnikova, I. (2007). Inclusion in physical education: A review of the literature from 1995–2005. *Adapted Physical Activity Quarterly, 24*(2), 103–124. https://doi.org/10.1123/apaq.24.2.103

Bowen, G. A. (2006). Grounded theory and sensitizing concepts. *International Journal of Qualitative Methods, 5*(3), 12–23. https://doi.org/10.1177/160940690600500304

Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health, 11*(4), 589–597. https://doi.org/10.1080/2159676X.2019.1648268

Cheng, C., & Yu, Y. (2022). Early childhood educators' practices in Education for Sustainable Development in China: Evidence from Shandong Province. *Sustainability, 14*(4), 2019. https://doi.org/10.3390/su14042019

Cofie, N., Braund, H., & Dalgarno, N. (2022). Eight ways to get a grip on intercoder reliability using qualitative-based measures. *Canadian Medical Education Journal, 13*(2), 73–76. https://doi.org/10.36834/cmej.72504

Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education* (7th ed.). Routledge.

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE.

Dai, J., & Menhas, R. (2020). Sustainable Development Goals, sports and physical activity: The localization of health-related Sustainable Development Goals through sports in China: A narrative review. *Risk Management and Healthcare Policy, 13*, 1419–1430. https://doi.org/10.2147/RMHP.S257844

DeWalt, K. M., & DeWalt, B. R. (2002). *Participant observation: A guide for fieldworkers.* Walnut Creek, CA: AltaMira Press.

Dudley, D., & Cairney, J. (2021). Physical literacy: Answering the call for quality education and sustainable development. *Prospects, 50*(1–2), 5–11. https://doi.org/10.1007/s11125-020-09512-y

Dudley, D., Mackenzie, E., Van Bergen, P., Cairney, J., & Barnett, L. (2022). What drives quality physical education? A systematic review and meta-analysis of learning and development effects from physical education-based interventions. *Frontiers in Psychology, 13,* 799330. https://doi.org/10.3389/fpsyg.2022.799330

Esmaeilzadeh, S., Rodriquez-Negro, J., & Pesola, A. J. (2022). A greater intrinsic, but not external, motivation toward physical activity is associated with a lower sitting time. *Frontiers in Psychology, 13,* 888758. https://doi.org/10.3389/fpsyg.2022.888758

Estevan, I., Bardid, F., Utesch, T., Menescardi, C., Barnett, L. M., & Castillo, I. (2021). Examining early adolescents' motivation for physical education: Associations with actual and perceived motor competence. *Physical Education and Sport Pedagogy, 26*(4), 359–374. https://doi.org/10.1080/17408989.2020.1806995

Fröberg, A., & Lundvall, S. (2021). The distinct role of physical education in the context of Agenda 2030 and Sustainable Development Goals: An explorative review and suggestions for future work. *Sustainability, 13*(21), 11900. https://doi.org/10.3390/su132111900

Fröberg, A., Wiklander, P., Baena-Morales, S., & Lundvall, S. (2023). How to teach about sustainable development in physical education? Examples from the perspectives of certified teachers in Sweden. *Frontiers in Education, 8,* 1294763. https://doi.org/10.3389/feduc.2023.1294763

Gale, N. K., Heath, G., Cameron, E., Rashid, S., & Redwood, S. (2013). Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Medical Research Methodology, 13,* 117. https://doi.org/10.1186/1471-2288-13-117

García-García, J., Manzano-Sánchez, D., Belando-Pedreño, N., & Valero-Valenzuela, A. (2020). Personal and social responsibility programme effects, prosocial behaviours, and physical activity levels in adolescents and their families. *International Journal of Environmental Research and Public Health, 17*(9), 3184. https://doi.org/10.3390/ijerph17093184

García-Rico, L., Martínez-Muñoz, L. F., Santos-Pastor, M. L., & Chiva-Bartoll, O. (2021). Service-learning in physical education teacher education: A pedagogical model towards Sustainable Development Goals. *International Journal of Sustainability in Higher Education, 22*(4), 747–765. https://doi.org/10.1108/IJSHE-09-2020-0325

Grecic, D., Collins, D., & Cruickshank, A. (2024). The epistemic judgement framework: Understanding teacher decision-making in physical education. *Physical Education and Sport Pedagogy.* Advance online publication.

International Physical Literacy Association. (2022). *About physical literacy.* https://www.physical-literacy.org.uk/about/

Jiménez Lozano, S., & González-Palomares, A. (2023). "ODS 5. Igualdad de género" y Educación Física: Propuesta de intervención mediante los deportes alternativos ["SDG 5. Gender equality" and physical education: A proposal for intervention through alternative sports]. *Retos, 49*, 595–602. https://doi.org/10.47197/retos.v49.95791

Kawulich, B. B. (2012). Collecting data through observation. In C. Wagner, B. Kawulich, & M. Garner (Eds.), *Doing social research: A global context* (pp. 150–160). McGraw-Hill.

Kioupi, V., & Voulvoulis, N. (2019). Education for sustainable development: A systemic framework for connecting the SDGs to educational outcomes. *Sustainability, 11*(21), 6104. https://doi.org/10.3390/su11216104

Koch, T. (1994). Establishing rigour in qualitative research: The decision trail. *Journal of Advanced Nursing, 19*(5), 976–986. https://doi.org/10.1111/j.1365-2648.1994.tb01177.x

Koszałka-Silska, A., Korcz, A., & Wiza, A. (2021). The impact of physical education based on the Adventure Education programme on self-esteem and social competences of adolescent boys. *International Journal of Environmental Research and Public Health, 18*(6), 3021. https://doi.org/10.3390/ijerph18063021

Kretschmer, L., Salali, G. D., Andersen, L. B., Hallal, P. C., Northstone, K., Sardinha, L. B., Dyble, M., Bann, D., & International Children's Accelerometry Database (ICAD) Collaborators. (2023). Gender differences in the distribution of children's physical activity: Evidence from nine countries. *International Journal of Behavioral Nutrition and Physical Activity, 20*(1), 103. https://doi.org/10.1186/s12966-023-01496-0

Lee, J. C.-K., & Huang, Y. (2009). Education for Sustainable Development projects and curriculum reform in China: The EEI and the EPD. In M. Williams & J. C.-K. Lee (Eds.), *Schooling for sustainable development in Chinese communities: Experience with younger children* (pp. 115–135). Springer. https://doi.org/10.1007/978-1-4020-9686-0_6

Li, G., Xi, Y., & Zhu, Z. (2022). The way to sustainability: Education for sustainable development in China. *Asia Pacific Education Review, 23*(4), 611–624. https://doi.org/10.1007/s12564-022-09782-5

Liu, Y., Ke, Y., Liang, Y., Zhu, Z., Cao, Z., Zhuang, J., Cai, Y., Wang, L., Chen, P., & Tang, Y. (2023). Results from the China 2022 report card on physical activity for children and adolescents. *Journal of Exercise Science and Fitness, 21*(1), 1–5. https://doi.org/10.1016/j.jesf.2022.10.004

Lohmann, J., Breithecker, J., Ohl, U., Gieß-Stüber, P., & Brandl-Bredenbeck, H. P. (2021). Teachers' professional action competence in education for sustainable development: A systematic review from the perspective of physical education. *Sustainability, 13*(23), 13343. https://doi.org/10.3390/su132313343

Lundvall, S., & Fröberg, A. (2023). From individual to lifelong environmental processes: Reframing health in physical education with the Sustainable Development Goals. *Sport, Education and Society, 28*(6), 684–696. https://doi.org/10.1080/13573322.2022.2062320

Ma, S.-S., Zhu, Z., Cai, D., Li, C.-X., Li, Y.-X., Li, B., Zhu, S., & Geng, J. (2025). From gym to joy: The serial mediation of motor competence and health literacy in Chinese university students' exercise–life satisfaction pathway. *PLOS ONE, 20(*11), e0335180. https://doi.org/10.1371/journal.pone.0335180

Male, T. (2016). Analysing qualitative data. In I. Palaiologou, D. Needham, & T. Male (Eds.), *Doing research in education* (pp. 177–191). SAGE.

Meng, F., Guo, J., Guo, Z., Lee, J. C.-K, Liu, G., & Wang, N. (2021). Urban ecological transition: The practice of ecological civilization construction in China. *Science of the Total Environment, 755,* 142633. https://doi.org/10.1016/j.scitotenv.2020.142633

Merma-Molina, G., Urrea-Solano, M., González-Víllora, S., & Baena-Morales, S. (2023). Future physical education teachers' perceptions of sustainability. *Teaching and Teacher Education, 132,* 104254. https://doi.org/10.1016/j.tate.2023.104254

MINEPS VI. (2017). *Sixth International Conference of Ministers and Senior Officials Responsible for Physical Education and Sport (MINEPS VI).* UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000231547

Muñoz-Hinrichsen, F. I., Camargo-Rojas, D. A., Grassi-Roig, M., Torres-Paz, L., Martínez-Aros, A., & Herrera-Miranda, F. (2024). Facilitadores y barreras para la inclusión de estudiantes con discapacidad en Educación Física en Colombia, Chile, España y Perú. *Apunts Educación Física y Deportes, 158,* 34–43. https://doi.org/10.5672/apunts.2014-0983.es.(2024/4).158.04

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods, 16*(1), 1609406917733847. https://doi.org/10.1177/1609406917733847

Pope, C. (2013). Interpretive perspectives in physical education research. In D. Kirk, D. Macdonald, & M. O'Sullivan (Eds.), *The handbook of physical education* (pp. 116–133). SAGE.

Purvis, B., Mao, Y., & Robinson, D. (2019). Three pillars of sustainability: In search of conceptual origins. *Sustainability Science, 14*(3), 681–695. https://doi.org/10.1007/s11625-018-0627-5

Rieckmann, M., Mindt, L., & Gardiner, S. (2017). *Education for Sustainable Development Goals: Learning objectives.* Paris: UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000247444

Rillotta, F., Raghavendra, P., & Thirumanickam, A. (2018). *Inclusion of students with disability at school: Impact of disability awareness training and physical activity on attitudes of students without disabilities* [Paper presentation]. The Inclusive Education Summit, Geelong, Victoria, Australia.

Ritchie, J., & Spencer, L. (1994). Qualitative data analysis for applied policy research. In A. M. Huberman & M. B. Miles (Eds.), *The qualitative researcher's companion* (pp. 305–329). SAGE Publications. https://doi.org/10.4135/9781412986274.n12

Salvo, D., Garcia, L., Reis, R. S., Stankov, I., Goel, R., Schipperijn, J., Hallal, P. C., Ding, D., & Pratt, M. (2021). Physical activity promotion and the United Nations Sustainable Development Goals: Building synergies to maximize impact. *Journal of Physical Activity and Health, 18*(10), 1163–1180. https://doi.org/10.1123/jpah.2021-0413

Sánchez-Hernández, N., Martos-García, D., Soler, S., & Flintoff, A. (2018). Challenging gender relations in physical education through cooperative learning and critical reflection. *Sport, Education and Society, 23*(8), 812–823. https://doi.org/10.1080/13573322.2018.1487836

State Council of the People's Republic of China. (1994). *China's Agenda 21: White Paper on China's Population, Environment, Development in the 21st Century: Adopted at the 16th Executive Meeting of the State Council of the People's Republic of China on 25 March 1994.* China Environmental Science Press.

Tan, X., Liu, X., & Shao, H. (2017). Healthy China 2030: A vision for health care. *Value in Health Regional Issues, 12,* 112–114. https://doi.org/10.1016/j.vhri.2017.04.001

Tian, W., Ge, J., Zheng, X., Zhao, Y., Deng, T., & Yan, H. (2024). Understanding the landscape of education for sustainable development in China: A bibliometric review and

trend analysis of multicluster topics (1998–2023). *Humanities and Social Sciences Communications, 11*(1), 1213. https://doi.org/10.1057/s41599-024-03713-y

Tobin, G. A., & Begley, C. M. (2004). Methodological rigour within a qualitative framework. *Journal of Advanced Nursing, 48*(4), 388–396. https://doi.org/10.1111/j.1365-2648.2004.03207.x

UNDP. (2020). *The SDGs in Chinese cities: Progress assessment report 2020.* UNDP. https://www.undp.org/china/publications/sdgs-chinese-cities-progress-assessment-report-2020

UNESCO. (2015). *Quality Physical Education (QPE): Guidelines for policy makers.* Paris: UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000231101

United Nations. (2015). *Transforming our world: The 2030 Agenda for Sustainable Development.* https://sustainabledevelopment.un.org/post2015/transformingourworld

Whitehead, M. (2010). *Physical literacy: Throughout the lifecourse* (1st ed.). Routledge. (ISBN 9780415487436)

Yuan, X., & Yu, L. (2024). Integrating Sustainable Development Goals in China's education curriculum: Analysis and future directions. *Geo: Geography and Environment, 11*(1), e00145. https://doi.org/10.1002/geo2.145

Zhou, R. (2024). Education for sustainable development in China: Experiences from school teachers' perspectives and enactments. *Discover Sustainability*, *5*(1), 388. https://doi.org/10.1007/s43621-024-00617-4

Zhou, R. (Kevin), & Lee, N. (2022). The reception of Education for Sustainable Development (ESD) in China: A historical review. *Sustainability*, *14*(7), 4333. https://doi.org/10.3390/su14074333

Supplementary Material 1

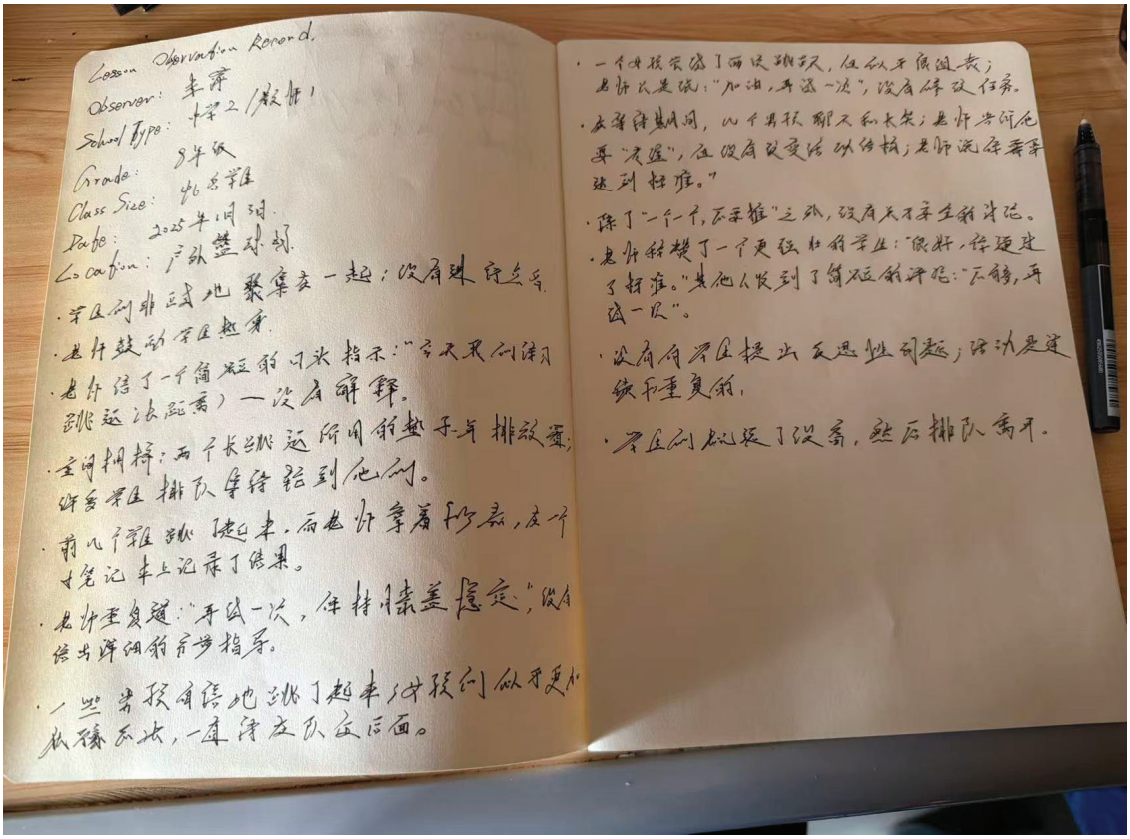

Figure 1. Observation notes

Supplementary Material 2

Table 6. Code framework

SDGs	*SDG out-come*	SDG Outcome (As described in Baena-Morales et.al.)	Potential PE interpretation
SDG 3 (Good Health and Well-Being)	*3.4*	Reducing premature mortality and promoting mental health and well-being	Plan PE so pupils engage in regular physical activity and experience enjoyment, social connection and stress relief, helping them build habits that support long term physical and mental health.
	3.5	Reduction of substance abuse	Use PE to promote healthy, active lifestyles and positive peer networks, and to open discussion about how physical activity can be a protective factor against smoking, alcohol and other substance use.
	3.6	Halve the number of deaths and injuries caused by road traffic accidents worldwide	Integrate road-safety topics into PE, for example safe cycling, helmet use and safe routes to school, and promote active travel behaviours that reduce risk during pupils' daily journeys.
	3.7	Ensuring universal access to sexual and reproductive health services	Use PE to develop body awareness, respect for self and others, and safe relationship skills, and signpost pupils to age-appropriate sexual and reproductive health information and school health services.
SDG 4 (Quality Education)	*4.1*	Ensure that all girls and boys complete primary and secondary education, which should be free, equitable, and of good quality	Guarantee access to regular, high quality PE for all pupils, using inclusive teaching so that PE supports engagement with school, attendance, and broader learning.
	4.4	Improving skills for access to employment, decent work, and entrepreneurship	Design PE units that develop transferable skills such as teamwork, communication, leadership, self-management and problem solving, and make these links to future study and work explicit.
	4.5	Reduction of gender disparities in education and equality of vulnerable people	Structure PE to ensure equitable access, adapted tasks and visible success for all, actively challenging stereotypes or exclusionary practices.

	4.7	Improving knowledge to promote sustainable development (e.g., sustainable lifestyles)	Embed sustainability themes in PE, for example active transport, outdoor learning, energy balance, and reflection on how active lifestyles relate to personal, social and environmental well-being.
	4.a	Improvement of school facilities and learning environments	Use PE lessons to model safe, inclusive use of facilities, involve pupils in identifying facility needs or hazards, and advocate for accessible, gender-sensitive and child-friendly PE spaces.
SDG 5 (Gender Equality)	*5.1*	Elimination of discrimination against all women and girls	Ensure that curriculum, grouping, activity choice and feedback in PE do not discriminate by gender and that girls have the same range and quality of participation opportunities as boys.
	5.2	Eliminate all forms of violence against all women and girls in public and private spheres	Establish clear behaviour norms in PE that prohibit bullying, harassment and gender-based violence, respond quickly to incidents, and teach conflict resolution and respect.
	5.5	Women's participation and equal opportunities	Provide female students with leadership, officiating and organisational roles in PE and school sport, and highlight female role models in sport to normalise women's participation and leadership.
	5.c	Promoting gender equality and empowerment of women and girls	Use PE discussions and tasks to question gender stereotypes in sport and physical culture, and design experiences that build girls' confidence, competence and voice in physical settings.
SDG 8 (Decent Work and Economic Growth)	*8.3*	Entrepreneurship, creativity and innovation, and promoting the formalization and growth of enterprises	Provide pupils roles such as coach, organiser, official or media reporter, encouraging creativity, initiative and basic enterprise skills within sport and PE projects.

	8.9	Promote sustainable tourism that creates jobs and promotes local culture and products	Connect PE with local environments and cultures through traditional games, outdoor activities and school events showcasing regional activities.
SDG 10 (Reduced Inequalities)			
	10.2	*Social, economic and political inclusion of all people*	*Use inclusive pedagogies such as mixed-ability grouping, cooperative tasks and varied roles.*
	10.3	*Ensuring equal opportunities and reducing inequality of outcomes*	*Adapt rules, tasks and assessment criteria in PE to reduce achievement gaps, using differentiated challenges, formative feedback and cooperative goals so diverse learners can experience success.*
SDG 12 (Responsible Consumption and Production)			
	12.1	*Sustainable consumption and production*	*Prioritise low-resource, human-powered activities in PE, minimise unnecessary equipment use, and discuss the environmental impact of sports goods and consumer choices.*
	12.2	*Sustainable management and efficient use of natural resources*	*Teach pupils to use water, energy, spaces and equipment efficiently during PE, and to understand how careful planning of activities can reduce their environmental footprint.*
	12.5	*Significantly reduce waste generation*	*Incorporate self-made or recycled equipment in PE, encourage repair rather than replacement of materials, and involve pupils in reusing and recycling sports resources.*

	12.8	*Ensure information and knowledge relevant to sustainable development*	*Use PE as a context to raise awareness of how movement choices affect the environment, such as benefits of active travel, park use and the ecological costs of large sports events or products.*
SDG 13 (Climate Action)	*13.1*	Strengthen capacity to adapt to climate and natural disaster-related risks in all countries	Through outdoor and adventure-type PE, help pupils learn safe behaviours in heat, cold and extreme weather, and discuss how communities can stay active and safe during climate related events.
	13.3	Improve education, awareness, and human and institutional capacity for climate change mitigation, adaptation, and early warning	Integrate climate change themes into PE, for example by linking outdoor activity to discussion of local environmental change, organising litter picks or plogging, and modelling low carbon activity choices.
SDG 16 (Peace, Justice and Strong Institutions)	*16.7*	Ensure inclusive, participatory, and representative decisions that respond to the needs	Use cooperative learning and student voice so pupils help design rules, roles, activities and evaluation in PE, giving them practical experience of fair, inclusive and participatory decision making.