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EDITORIAL

From Draft to Publication: 10 Grounded Tips for Getting Your Work Published

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What does it take to get your paper published?

This is a question we have both been asked countless times—by early-career scholars anxiously preparing their first submission, by doctoral students unsure of when to send their work out into the world, and yes—even by seasoned academics who have grown somewhat weary of reviewer feedback that reads more like code than critique. The truth is, getting published is not a test of academic brilliance; it is a craft. Like all crafts, it requires sustained attention, multiple revisions, and a clear understanding of the scholarly context.

In this editorial, we offer ten grounded and practice-informed tips that reflect our shared editorial experience with *International Sports Studies (ISS)*. These suggestions aim to support authors, especially those working in non-dominant research contexts, such as underrepresented regions or emerging academic institutions, who are eager to strengthen their manuscripts and share their insights with the broader international community. This is not a formula. It is an invitation to reflect, revise, and contribute that meaningfully to scholarly discourse.

1. Know the journal

Understanding your target journal is the foundation of a successful publishing strategy. Too many manuscripts are submitted with little regard for the journal's scope or priorities. *ISS* is an interdisciplinary journal that values cultural insight, critical inquiry, and international relevance. If your work does not align with these values, it may not be a good fit for you. Read the aims. Examine the scope. Scan recent issues. Publishing is not about forcing your work into the wrong venue—it is about joining a community that values your scholarly contribution.

Ask yourself: Have I positioned my manuscript within the values and scope of the journal I am submitting to?

2. Follow author guidelines

Author guidelines exist for an essential purpose—not to make your life difficult, but to facilitate a smooth review and publication workflow for everyone involved in the draft-to-publication process. The task is not about ticking off a checklist of what to do or what to avoid. It is a demonstration of respect—for the journal, for the editors, and for the process. Pay close attention to formatting, structure, referencing style, and file naming conventions. A complete and correctly formatted submission saves time for editors and reviewers. Follow the guidelines as an act of professional courtesy that communicates, "I value your time, and I am ready to be taken seriously."

Ask yourself: Have I followed the author guidelines thoroughly?

3. Craft a strong title and abstract

Think of your title and abstract as your first handshake with the reader —they set the tone for everything that follows. That handshake may be your only opportunity to establish engagement. Is your handshake firm, clear, and engaging? Or is it vague and forgettable? A strong title is concise, informative, and engaging. It should capture the core idea of your paper without being excessively technical or cryptic. Meanwhile, the abstract is your best opportunity to tell the reader (and the reviewer) precisely what to expect: what you studied, why it matters, how you did it, and what you found. Avoid obscuring or exaggerating your findings.

Ask yourself: *If someone unfamiliar with my work read only my title and abstract, would they understand my study and why it matters?*

4. Engage critically with the literature

A literature review is not simply a summary of research related to your study; it is a dialogue with past and present scholars. You are not writing in isolation; instead, you are entering a conversation already in progress. Acknowledge the people behind the ideas. Cite foundational works while affirming newer contributions and diverse perspectives. Position your study within the scholarly context—what you reinforce, challenge, or extend. Be mindful of whose voices are included in the review of literature, and whose voices are excluded. After listening carefully to the ongoing discourse, you can identify something meaningful to contribute. This is where your research contribution begins.

Ask yourself: *What has been said before, and what needs to be said now?*

5. Mind the gap

Research begins with curiosity and often with a gap—a verbal space where knowledge is inadequate, assumptions are unchallenged, or diverse perspectives are missing. Your challenge is to frame your work as responding to a gap in a specific conversation. Perhaps it is a population that has been underrepresented, a method that has not been fully tested, or a dominant narrative that warrants reconsideration. Avoid making blanket statements, such as "this has not been studied yet," which may reveal a lack of engagement with the literature. Research gaps are not holes to be patched; they are openings to expand knowledge.

Ask yourself: *What specific conversation in the literature does my research extend, challenge, or reframe—and why does it matter now?*

6. Articulate a clear research question

A well-framed research question is the compass of any strong academic paper—it sets the direction and keeps the inquiry focused. Without it, you risk wandering through pages of writing with no clear destination. It also functions as the backbone of your scholarly work; without it, even the most interesting topic can appear confusing or disjointed. A solid research question should flow logically from your engagement with the literature, identifying a specific gap or tension in the field and laying the foundation for your chosen methodology. It informs the reader about the core intent of your research and the significance of your contribution.

Ask yourself: *What exactly am I trying to find out?*

7. Write with clarity and purpose

Academic writing is not a puzzle for the reader to solve. Readers should never have to guess what you mean or why it matters. Make it easy for them to appreciate your work by guiding them through your ideas with purpose. Writing for publication is about making your ideas accessible, precise, and impactful. Avoid jargon unless essential—and define it when you must use it. Explain your ideas concisely. Organise your paper so that each section builds logically on the previous sections. More importantly, write with consideration for your time-constrained readers. Writing well is not about showing off—it is about communicating clearly.

Ask yourself: *Would an informed but non-specialist reader understand what I am saying and why it matters?*

8. Demonstrate methodological rigour

You do not need to employ the most advanced methods to be rigorous in your study. However, your approach must be transparent, systematic, and sound. Describe your research design in detail. Justify your choices. Show how your methods help achieve your research objectives,

answer your research questions, and support the credibility of your findings. Whether you are using quantitative or qualitative approaches, or a mix of both, the goal is to ensure your methods facilitate coherence between your research question, your data, and your interpretation. Rigour is not about complexity—it is about integrity. A clearly explained and well-justified method is more effective than a complex one that is poorly applied.

Ask yourself: *Do my methods demonstrate how I arrived at my findings, and are they appropriate for my research question?*

9. Highlight local insights with global relevance

At *ISS*, we welcome research grounded in specific cultural, national, regional, or community contexts. These local perspectives offer valuable insights, especially when highlighting underrepresented experiences or challenging dominant narratives. However, we also ask, "How are these local perspectives incorporated into the international discourse?" A paper anchored in local realities becomes more significant when it confronts broader issues, such as equity, development, inclusion, or identity. While your work should reflect the distinct particularities of your locality or community, it should be positioned to engage with international or cross-disciplinary discourse. Effective manuscripts do more than describe; they also contextualise. As such, anchor your study in context but extend its relevance.

Ask yourself: *How do my research findings resonate beyond their borders?*

10. Respond to feedback with professionalism

Peer review is not a personal judgement—it is a collaborative process designed to enhance the quality and rigour of your work. Reviewers offer critical insights to refine your arguments, strengthen your methodology, and clarify your contributions. Read their comments with an open mind, even when it is challenging to receive critique. You do not have to agree with every comment, but you do need to respond respectfully and constructively. This means acknowledging the reviewer's perspective, explaining your reasoning for accepting or rejecting their suggestions, and making revisions that improve the quality and clarity of your work. How you respond to reviewer feedback reveals more than just your ability to revise—it demonstrates your intellectual maturity, openness to dialogue, and commitment to producing robust scholarship.

Ask yourself: *How do I respond to the reviewers' comments for a meaningful improvement of my work?*

Final Thoughts

To publish is not merely to produce a paper. It is to *participate* in a scholarly community with the shared goal of knowledge generation. If there is one central takeaway from these ten tips, it is this: Writing for publication is not about perfection. It is about contribution. And if your work speaks with clarity, rigour, and purpose, it deserves a place in that conversation.

We look forward to reading what you have to say and supporting you on your journey to publication. Remember, at *ISS*, we are committed to helping authors bring their work to publication and advancing of knowledge in the field of sports studies.

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

INTERNATIONAL SPORTS STUDIES

ORIGINAL RESEARCH

Teaching through Turbulence: Post-Pandemic Pedagogical Shifts in Physical Education Teacher Training

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Abstract

This study explores the resilience and adaptability of physical education (PE) teacher educators in Israel during and after the COVID-19 pandemic. Set within a technologically advanced, centralised education system marked by cultural and security complexities, the research offers a unique perspective on how teacher education evolves under crisis. Key findings show a strong preference for returning to traditional face-to-face instruction post-pandemic, with 85% of educators maintaining existing grading systems and 40–50% reporting no change in evaluation methods. However, subtle but lasting shifts emerged, particularly an increasing emphasis on theoretical content and self-directed learning in sport and field experience courses. Using a mixed-methods triangulation design, the study combined quantitative surveys from 50 PE teacher educators with qualitative insights from 15 in-depth Zoom interviews. Quantitative data addressed demographics, teaching practices, and evaluation methods, while qualitative data focused on perceived changes and future outlooks. Analyses were conducted using SPSS for the survey data and thematic analysis for interviews. While temporary adaptations, such as hybrid teaching and modified assessment, were implemented during the pandemic, the post-crisis trend favours a return to pre-pandemic norms, with limited structural transformation. Nevertheless, the growing focus on independent learning and theoretical depth indicates evolving pedagogical priorities. These findings underscore the importance of flexible policy frameworks and continuous professional development to support sustainable innovation in teacher education. To ensure resilience in the face of future disruptions, training programmes should intentionally incorporate hybrid models and student-centred approaches that balance traditional and emerging practices.

Keywords:
evaluation methods, pedagogical innovation, quality education, resilience during crisis, student engagement

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Introduction

Following the outbreak of the COVID-19 pandemic, education systems were forced to rapidly transition from on-campus, face-to-face learning to online delivery (Radha et al., 2020) – thus posing significant challenges for the higher education community worldwide (Crawford et al., 2020) and leading to substantial changes in teaching and learning methods (Liguori & Winkler, 2020). At the onset of the pandemic, emergency measures were implemented, with higher education systems primarily focused on survival amid the considerable uncertainty that characterised the crisis (Carugati et al., 2020). However, with the pandemic – and related social restrictions – lasting more than two years, higher education systems needed to be both flexible and resilient; in turn, educational leaders and decision-makers

were forced to introduce effective and sustainable changes, for both the present (i.e., during the pandemic) and the uncertain future (Cutri et al., 2020; Nandy et al., 2021).

These global shifts in education during the pandemic were also addressed in international frameworks. UNESCO's *Education Response to COVID-19* emphasised the importance of ensuring educational continuity, equity, and innovation across all levels of learning during times of crisis. In parallel, Sustainable Development Goal 4 (SDG 4) highlights the importance of inclusive and equitable quality education, as well as the promotion of lifelong learning opportunities for all. These goals became increasingly urgent during the pandemic's disruptions. Positioning teacher education within these global agendas underscores the need for systemic adaptability and resilience to meet both immediate and long-term educational challenges.

The COVID-19 pandemic has presented a unique opportunity to examine the adaptability and resilience of teacher education systems (Surendran et al., 2023). Recent meta-analyses have highlighted significant developments in the teaching and evaluation methods employed in physical education (PE), particularly in the context of integrating innovative pedagogies (e.g., Shen & Shao, 2022; Wang et al., 2025). Beyond the adoption of digital technologies such as fitness apps and virtual platforms, researchers have examined the shift toward student-centred instructional strategies, including game-based learning, inquiry-based models, and cooperative learning (Casey et al., 2017; Chandiok & Kukreja, 2025). These approaches are often associated with higher levels of student engagement and motivation, as well as improvements in skill acquisition and affective outcomes. Furthermore, alternative assessment strategies, such as portfolio assessments, peer evaluations, and video-based performance analysis, have gained traction as valid tools for formative and summative evaluation in PE (Herrero-González et al., 2024). These findings underscore the importance of aligning teaching and assessment methods with learning objectives to promote holistic development in PE contexts (Alhassan & Ibrahim, 2024).

The COVID-19 pandemic presented substantial challenges to PE instruction and evaluation, necessitating rapid adjustments in pedagogy. During lockdowns and remote learning periods, PE teachers were required to shift away from traditional in-person activities and adopt flexible instructional and assessment frameworks that could be implemented online (Varea & González-Calvo, 2021). Studies report a widespread reliance on asynchronous video tasks, online journals, and self-assessment tools to monitor student progress and encourage physical activity at home (Merino-Campos & Del-Castillo, 2025). However, the effectiveness of these strategies varied widely, depending on students' access to space, technology, and family support. In particular, the absence of embodied interaction and immediate feedback posed limitations to authentic assessment in PE, raising concerns about the validity and equity of remote evaluation methods (Herrero-González et al., 2024).

Teacher training has emerged as a critical factor in the successful implementation of evolving teaching and assessment methods in PE. Recent reviews emphasise that both pre-service and in-service teacher education must address not only digital competencies but also pedagogical adaptability and assessment literacy (Martinez-Rico et al., 2021). However, PE teacher education programmes often fall short in equipping educators with practical experience in using diverse pedagogical models or alternative assessments. Compared to general teacher

education, which has seen broader institutional support for incorporating 21st-century skills and reflective teaching frameworks, PE-specific training still lags, particularly in the integration of embodied pedagogies within digital or hybrid environments (Isgren Karlsson, 2024; Goodyear & Casey, 2015). Bridging this gap requires systemic changes in curriculum design, emphasising experiential learning, critical reflection, and adaptive teaching strategies tailored to the unique demands of PE.

Imran et al. (2023) reviewed the geographical distribution of published articles, finding that Australia, the United States, and the United Kingdom led in the number of studies. This indicates a global interest in the impact of COVID-19 on educational practices. Nevertheless, they recommended that other countries should also join this field of study to enrich the global knowledge and its practical implications. Their study's results underscore the *ongoing evolution of educational practices in response to the pandemic* and the importance of adapting teaching methods to enhance student learning outcomes.

The current study examines the methods of teaching and evaluation used in higher education over three consecutive semesters, starting before the COVID-19 crisis. Specifically, this research focuses on a PE teacher training program, comprised of four main course clusters: (1) Mandatory *theoretical courses*, such as anatomy, physiology, and psychology; (2) *sports courses*, such as basketball, swimming, and dancing; and (3) *field experience*, i.e., learning (how to teach) by doing. In an earlier study (Fox et al., 2023), student grades were examined across four consecutive semesters, spanning the pre-pandemic to post-pandemic period. Although it was hypothesised that changes to teaching methods during the pandemic would affect student grades, unexpectedly, the changes observed in the four clusters were minimal to none. The aim of the current study, therefore, is to conduct an in-depth examination of how teacher educators perceive and respond to assessment goals and methods and to determine whether the pandemic has affected their evaluations and grading practices.

Over the past three decades, changes have been seen in the goals and methods of student assessments, evaluations, and grading in higher education in general and teacher education programmes in particular (Harland & Wald, 2021)—especially since the introduction of the Bologna Process (see review by Pereira et al., 2016). These have been influenced by the content and context of the teaching and learning environment and culture, as well as the participants' characteristics, including age, social-cognitive, physical, and emotional needs and competencies (e.g., Fernandes & Flores, 2022). Student evaluation has four main functions: (1) *formative* (also referred to as assessment for learning), used for the improvement and development of an on-going activity (Prashanti & Ramnarayan, 2019). It should therefore facilitate learning while fostering strong, active partnerships between students and their instructors (Brown, 2019); (2) *summative*, used for accountability, certification, or selection (Ketonen & Nieminen, 2024); (3) *psychological* or *sociopolitical*, used for motivating students to increase their learning efforts and awareness (Ruziyevna, 2025); and (4) *administrative*, used to exercise authority (Lundahl et al., 2017).

Reviews that examine the prevalence of assessment methods in PE in schools and teacher education (e.g., Moura et al., 2021) assert that while more authentic forms of assessment in PE have been seen over the past three decades, the extent to which alternative assessment methods have become standard practice in PE teaching is yet to be

fully determined. Moreover, Moura et al. (2021) conclude that PE teachers continue to use assessments solely as a grading tool. However, they lack the necessary skills for effectively applying formative assessments in PE. Such conclusions, which were drawn regardless of the pandemic, raise serious concerns about teacher education in general, particularly distance learning in particular.

The topic of adaptation to change during a global crisis within PE teacher training remains relatively underexplored in the academic literature. To the best of our knowledge, its presence is limited and has not been comprehensively analysis. This underscores the importance of the current study. First, it offers an opportunity to examine the nature of adaptation, identify key change agents, highlight areas of resistance, and recognise early indicators of transformation. Second, PE is inherently connected to broader teacher education processes. Shifts —or stagnation—in one area of teacher education inevitably affect developments in others. Therefore, any further research in this area enhances the overall understanding of teacher education systems. Third, the unique characteristics of PE as a practice-oriented discipline merit focused investigation, positioning it as a valuable case study.

Hence, based on this review of the literature, the aim of this study was threefold,: (1) examining how teacher educators adapted their teaching and student evaluation methods in light of the changes imposed by the pandemic; (2) analysing relationships between the perceptions and actions of teacher educators regarding student evaluations and grades; and (3) investigating what methods, practices, and insights these teacher educators have adopted, or recommend adopting in the future regarding changes to assessments, grading, and evaluations, following lessons learned from the pandemic. Student perspectives were not included in this study; future research should consider them.

Methodology

A mixed-methods concurrent triangulation design was employed in this study, combining quantitative and qualitative data collection and analysis concurrently. This approach enables real-time integration, immediate cross-validation, and a more comprehensive understanding of the research question by comparing and integrating findings from both methods. The concurrent design enhances the depth and breadth of insights, as it allows different perspectives to inform one another during the research process (Almeida, 2018). In contrast to sequential designs, which may delay integration and limit analytical depth, the concurrent approach offers more robust and timely outcomes. This methodology aligns with the principles outlined by Bell et al. (2022), which emphasise the advantages and implications of concurrent mixed methods designs in research.

A mixed-methods design incorporating interviews, open-ended questionnaires, and structured questionnaires offers a robust research approach, providing a comprehensive understanding of complex phenomena. This triangulation of methods enables researchers to leverage the strengths of both qualitative and quantitative approaches while mitigating their respective limitations (Clark & Clark, 2022). Interviews provide rich, contextual data, allowing for in-depth exploration of participants' experiences and perspectives (Bryman, 2016). Open-ended questionnaires capture a broader range of responses, potentially revealing unexpected insights (Patton, 2023). Structured questionnaires facilitate efficient data collection from larger samples, enabling statistical analysis and enhancing generalisability (Young, 2015). This combination of methods enhances the

validity and reliability of findings through methodological triangulation (Noble & Heale, 2019). It allows for both the exploration of nuanced, subjective experiences and the identification of broader patterns and trends. In educational research, such comprehensive methodologies are particularly valuable for informing evidence-based practices and policies.

Quantitative Research

Participants

The quantitative survey was completed by 50 teacher educators (29 females, 21 males) from a teacher education college in Israel. The participants were aged 39–64 (M = 56; SD = 3.5) and included 17 who taught theoretical courses, 19 who taught sport courses, and 14 who served as pedagogical instructors. More than half of the respondents (n = 27) had been teaching at the college for over 15 years, and 40 were tenured faculty members. We employed a proportional stratified sampling approach, selecting faculty members from each lesson type in proportion to their representation within the college's permanent staff. The academic programme comprises four main types of courses, each characterised by distinct teaching approaches and instructional responsibilities. *Mandatory theoretical courses* are core academic classes taught by lecturers who typically work with large student cohorts. These courses focus on foundational theoretical knowledge, including subjects such as Introduction to Psychology, Introduction to Physiology, Anatomy, and Sociology.

In contrast, *elective theoretical courses* are also lecture-based but involve smaller groups of approximately 40 students. These courses enable students to select topics aligned with their interests and academic goals from a range of options offered by the programme. Another significant component of the curriculum comprises *sport courses*, which are both practical and experiential. In these courses, instructors teach the technical and pedagogical aspects of various sports through active student participation. Students both experience and learn how to teach specific sports, such as soccer, basketball, dance, gymnastics, and track and field. Finally, *pedagogical instructors*, who serve as field experience supervisors, play a critical role in guiding students during their teaching practicum in schools. These instructors mentor students, observe their classroom teaching, and support them in applying theoretical knowledge to practical teaching skills, thereby bridging the gap between academic study and professional practice.

Research Tool

The questionnaire (see Appendix 1) was created by the authors of the study (four experts in research methodology, an expert in sport pedagogy, and a statistician) and comprised the following seven sections: (1) *demographic background data*; (2) *changes to syllabi* (no changes were introduced / most changes were introduced during the distance learning / most changes were introduced during - on-campus learning after the pandemic); (3) *frequency of use of various teaching methods* (such as flipped classes and simulations) that the respondents were asked to rate on a 6-point Likert-like scale, from 0 (never) to 5 (very often); (4) *frequency of use of various evaluation methods* (such as assignments and reports) that the respondents were asked to rate on a 6-point Likert-like scale, from 0 (never) to 5 (very often); (5) *attitudes towards grading* that the respondents were asked to rate on a 5-point Likert-like scale, from 1 (stricter) to 5 (more lenient); (6) *perceptions of various teaching-learning characteristics* when comparing distance learning and on-campus (no differences between the two methods; one is more advantageous than the other); and (7) *post-pandemic teaching methods* (I teach on

campus as I did prior to the pandemic / I combine on-campus and distance learning / the entire course is taught via distance learning). The questionnaire underwent a content validity procedure, in which three pedagogical instructors and three lecturers affiliated with the managerial team reviewed and approved the clarity and relevance of the questionnaire items to the research purposes. In addition, Cronbach's alpha was assessed for each item in the questionnaire, with reliability coefficients ranging from .65 to .86.

Procedure

After receiving permission from the college's Institutional Review Board (no. 330), we handed out printed copies of the questionnaire to the academic staff of the college during staff meetings at the end of the academic school year and via e-mails as well (N = 67) (17 from 24 theoretical, 14 from 24 pedagogical, and 19 from sport). The return rate was 74%.

Ethical Considerations

Participants were fully informed about the purpose of the study, the procedures involved, and their rights as participants. This included assurances of confidentiality and the explicit right to withdraw from the study at any point. Informed consent was obtained from all participants, either in written or verbal form, depending on the context and participants' preference. For interviews, specific consent was also sought and recorded for both participation and the Zoom recording of sessions. To protect participants' data, all collected materials, including survey responses and interview recordings, were stored securely and confidentially. During analysis, all data was anonymised, and identifying information was removed to maintain participant privacy and confidentiality. Acknowledging potential power dynamics, particularly in settings where hierarchical relationships existed, deliberate steps were taken to create a neutral and respectful environment. Participants were reminded that their involvement was entirely voluntary, and they were reassured that non-participation or withdrawal would carry no adverse consequences. The interviewer did not hold a managerial position.

Data Analysis

The data were analysed using SPSS version 29. Chi-square tests were conducted to examine differences between respondents from the four-course clusters regarding all questionnaire sections. We used Chi-square tests because we measured two variables: a nominal variable consisting of four categories (e.g., type of lesson—theoretical, practical, etc.) and an ordinal variable evaluating dimensions such as the extent of change and the level of effectiveness.

Qualitative Research

Participants

For the interviews, purposive sampling was employed to select key stakeholders from each field. Preference was given to experienced faculty members with sufficient seniority to enable comparisons over time, who held a significant percentage of employment or considered the college their primary workplace. A total of 15 lecturers, comprising 10 females, representative of all four course clusters, participated in the interviews. All had tenure at the college and were considered members of the senior academic staff. They were approached individually due to their seniority. They all had an average teaching experience of 26 years (SD = 3.3), and their primary place of employment was at the college. Some or all of them have also answered the anonymous quantitative questionnaire.

Data Generation

Since we aimed to obtain a perspective that addresses processes of change, we selected experienced lecturers and pedagogical instructors rather than new faculty members. Moreover, the seasoned lecturers had experience teaching across all age groups in schools and possessed an in-depth knowledge of the college curriculum. These lecturers were interviewed on three occasions: during the questionnaire development phase, we leveraged their expertise to shape the relevant content domain; after the authors created the questionnaire, they were asked to assess the clarity of the language, the relevance, and the alignment of the items with the research objectives; and lastly, they were requested to contribute additions or refinements to the final version of the questionnaire. Several items were modified in response to the feedback received.

Individual semi-structured interviews were conducted with each participant by the first author of the study. The interview questions were designed to serve as a follow-up to the questionnaire, aiming to achieve a deeper understanding of the lecturers' perceptions regarding the study topic. First, the interviewees were asked the following five questions: (1) To what extent did your teaching methods change during the pandemic compared to the pre-pandemic period? (2) How have changes in your teaching methods affected your methods of assessment? (3) Has your attitude towards grading changed since the pandemic, compared to the pre-pandemic period? (4) To what extent did the assessment methods that you used truly reflect the students' learning processes in your courses, prior to and during the pandemic? (5) Has there been a change in your attitudes toward the importance of assessments, their methods, and the outcomes of your evaluations after the pandemic? If so, is this change related to changes in your course goals, if such changes were introduced?

The interviews were conducted with each participant individually via the Zoom platform at a time and date of their convenience. With the participants' approval provided in advance via email, the interviews were recorded and transcribed. Each interview lasted approximately 20 minutes. While the same questions were presented to all participants at the onset of the interview, free-flowing conversations were held to allow the interviewees to provide in-depth input.

Thematic Analysis

Following Saldana's recommendations for qualitative data analysis (2021), we began by meticulously transcribing the audio recordings from interviews and compiling responses from open-ended questionnaires. We read through the transcripts to gain a comprehensive understanding of the content. We employed iterative coding, a process that involves multiple rounds of analysis and refinement (Nowell et al., 2017). We began by conducting initial or open coding, where we assign descriptive labels to segments of raw data without imposing preconceived categories. As the analysis progressed, these codes were grouped into broader categories based on patterns, relationships, or shared meanings observed in the data. In subsequent coding rounds, we revisited and reorganised these codes, refining and merging them into more coherent and meaningful themes. This cyclical approach ensures that the final themes are both grounded in participants' experiences and relevant to the research objectives.

Results

Guided by the methodological framework outlined above, the data were subjected to both quantitative and qualitative analyses. The findings are presented in two stages:

first, the quantitative findings are reported, followed by the qualitative interpretations, which enrich and contextualise the statistical outcomes.

Quantitative Research

When examining the degree to which the participants had changed their teaching methods since the pandemic, no differences were seen between course clusters in all methods except two: simulation and peer teaching ($\chi^2(3) = 17.308$; $p = -.44$; Cramér's $V = .34$; ($\chi^2(3) = 18.789$; $p = -.27$; Cramér's $V = .35$, respectively).

In mandatory theoretical courses, simulation techniques remained essentially unchanged, with 85% of participants reporting no significant modifications to their approach. Conversely, elective theoretical courses showed more dynamic changes, with simulation methods increasing among 33% of participants. Peer teaching demonstrated a similar nuanced pattern of evolution. Approximately 70% of participants reported no change in their teaching methods when considering overall teaching experience. However, a more positive trend emerged in specific course categories. Mandatory theoretical courses and sport courses demonstrated notable increases in peer teaching methodologies. Figure 1 presents the distribution of responses to this question for all 50 participants.

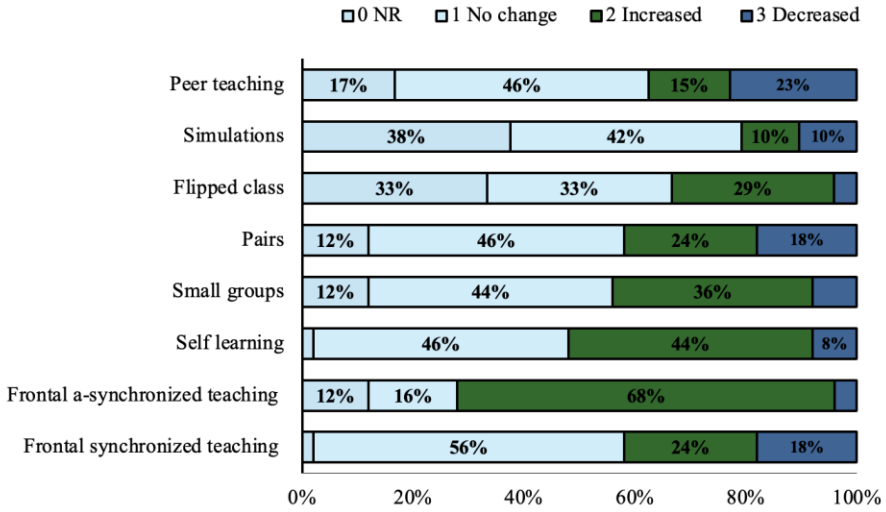

Figure 1. Levels of Change in Teaching Methods between Routine and COVID-19 Times

First, the participants were presented with a list of teaching methods, and for each one, they were asked to rate their degree of change in using that method on a 4-point Likert-like scale (1 = irrelevant, 2 = no change, 3 = increased, and 4 = decreased) following the pandemic. The findings indicate that 20–30% of the participants rated *flipped classes* and *simulations* as irrelevant (i.e., they do not use these methods in their lessons); approximately 10% stated that they found *working in pairs*, *asynchronous face-to-face lessons*, and *peer teaching to be irrelevant*. Moreover, most participants reported that they had not changed their teaching methods since the pandemic began. Finally, *synchronised face-to-face teaching*, *self-learning*, and *working in small groups* were found to be the most prevalent teaching methods, whereas *peer teaching*, *working in pairs*, and *synchronised face-to-face teaching*

decreased among approximately 10% of the participants.

The study also examined changes in evaluation methods across different course clusters since the pandemic. Statistical analysis revealed significant differences in two evaluation methods: multiple-choice question exams and Rapports ($\chi^2(3) = 18.127$; $p = 0.034$; Cramér's $V = .35$ and $\chi^2(3) = 20.528$; $p = .015$; Cramér's $V = .36$, respectively). In the teaching experience cluster, approximately one-third of participants decreased their use of multiple-choice exams, while other clusters maintained consistent usage. Regarding report-based evaluations, sport courses were the only cluster that increased the use of report-based evaluation methods. No significant differences were found in other evaluation methods across the course clusters. Regarding the level of change in *evaluation methods*, *students' self-evaluation* and *ongoing participation in the course digital forum* were deemed irrelevant by almost half of the participants, as shown in Figure 2.

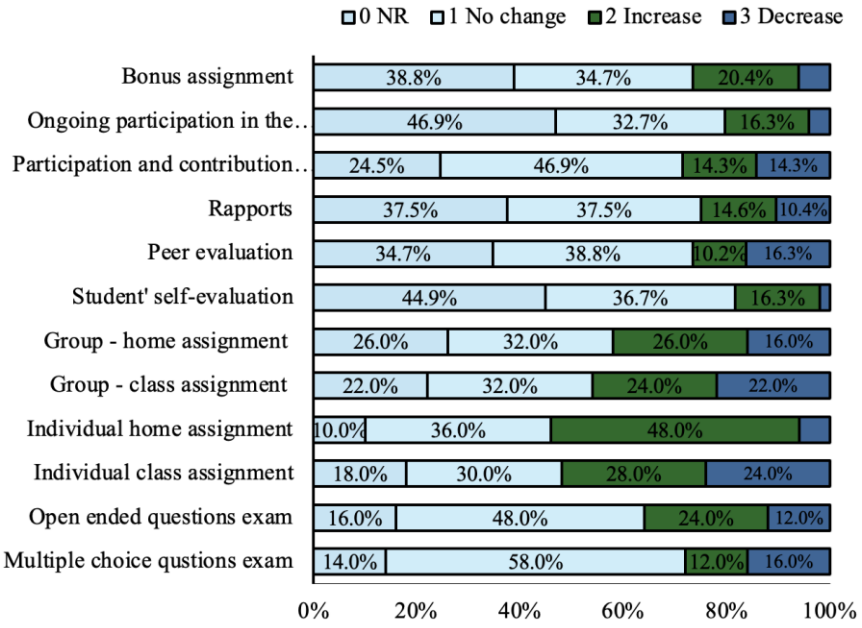

Figure 2. Level of Change in Evaluation Methods between Routine and COVID-19 Times

Similarly, *bonus assignments* and *reports* were considered irrelevant by approximately 40% of the participants, while *exams* and *class participation* remained unchanged for more than half of the participants. Moreover, *peer evaluation* and *reports* remained unchanged for almost 40% of the participants, and no changes were seen in *individual in-class and home assignments*, *group in-class and home assignments*, *reports*, *on-going participation during class*, or *bonus assignments*.

Interestingly, 48% of the participants reported an increase in their use of *individual home assignments*, indicating a greater increase in the use of this evaluation tool compared to all other evaluation methods. Additional evaluation methods that saw an increase in usage from the pre-pandemic to the post-pandemic period were *open-ended exams*, *individual in-class assignments*, *group in-class and home assignments*, and *bonus assignments*—each observed among approximately one-quarter of the

participants. Conversely, approximately one-quarter of the participants reported a decrease in the use of *individual and group in-class assignments*, indicating a decline in their perceived importance as evaluation methods.

Most participants perceived face-to-face learning as the most efficient teaching method for achieving various learning goals, as shown in Figure 3.

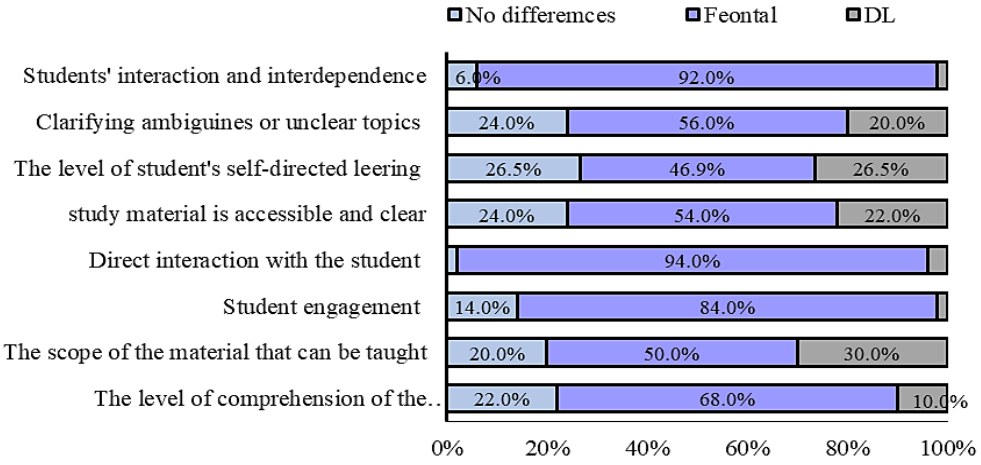

Figure 3. Which Method is More Efficient, Traditional Face-to-Face Instruction or Distance Learning?

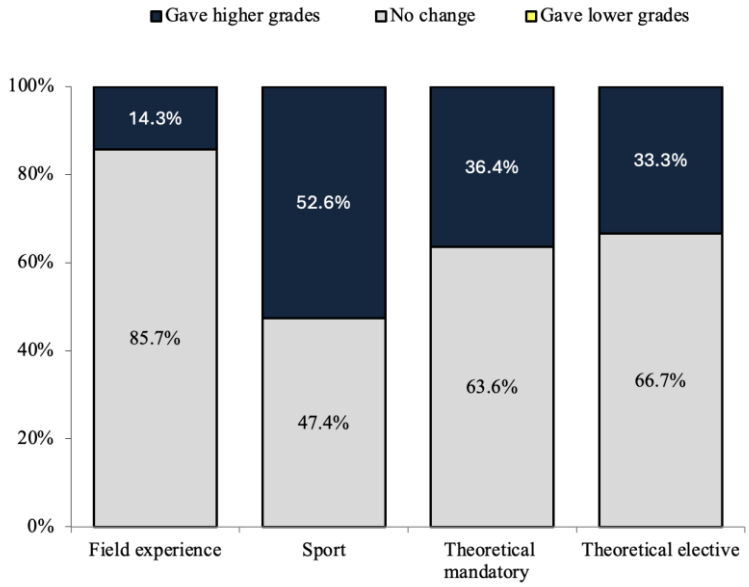

Figure 4. Attitudes Towards Evaluations During the COVID-19 Pandemic Compared to Routine Times

Regarding *attitudes toward grading*, significant differences ($\chi^2(6) = 3.62$; $p = .73$; Cramér's $V = 0.27$) were seen between the four-course clusters, as presented in Figure 4.

Most pedagogical instructors (85%) reported having made no changes to their grading, as did approximately 60% of lecturers from both types of mandatory theoretical courses. Interestingly, among those from the sports course cluster, more than half reported an increase in their grades in the post-pandemic era. No participants reported having lowered their grades during the pandemic compared to pre-pandemic periods. Regarding the question about teaching methods after the COVID-19 pandemic, as seen in Figure 5, most participants stated that they mainly teach in a face-to-face, synchronous manner.

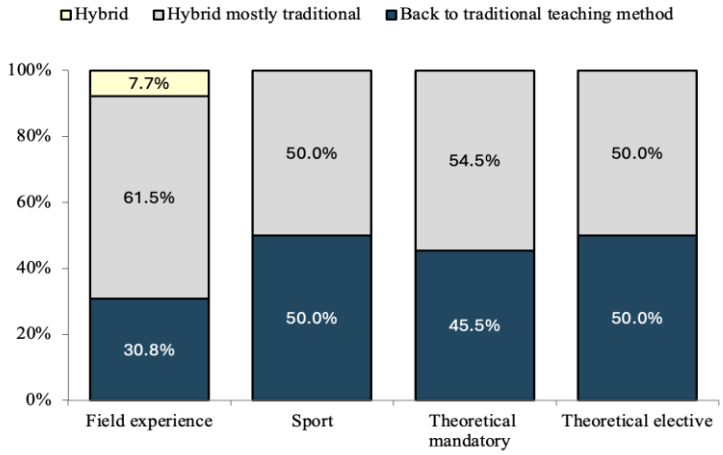

Figure 5. Teaching Methods After the COVID-19 Pandemic

Finally, as shown in Figure 6, while all participants from three of the four-course clusters—elective theoretical courses, sport courses, and field experience—reported a preference for face-to-face teaching over hybrid or distance learning, 72.7% of teachers from the mandatory theoretical course cluster preferred hybrid lessons. Moreover, only participants from the elective theoretical course cluster (16.7%) preferred distance learning classes.

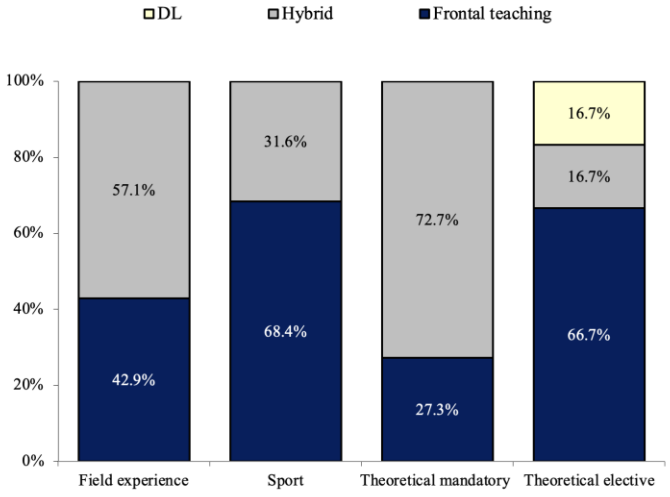

Figure 6. Preferred Teaching Method Among Each Course Cluster (in %)

Qualitative Research

A range of themes and sub-themes were generated from the qualitative interviews, as presented in Tables 1–5, organised in the order of the interview questions and by course cluster. It is noteworthy that this section presents three course clusters: theoretical course cluster, sports course cluster, and field experience course cluster.

The pandemic catalysed a rethinking of instructional strategies. Educators were compelled to abandon traditional, lecture-centred teaching in favour of more flexible, student-centred approaches. The following table presents the diverse teaching methods that emerged or gained traction during this period, revealing a shift towards collaboration, autonomy, and engagement.

As shown in Table 1, the majority of the teachers evaluated their performance during the shift to distance learning as good or very good, indicating a general sense of confidence and adaptability. This self-assessment suggests that, despite the abrupt transition, many educators felt they were able to maintain a reasonable standard of teaching. However, a small yet notable group rated their instruction as poor or very poor, reflecting a possible inequality in digital readiness or access to adequate support. This pattern reveals an overall positive adjustment, though not without individual struggles that could indicate disparities in training or infrastructure.

Table 1. Changes in Teaching Methods During the COVID-19 Pandemic Compared to the Previous Corresponding Period

Themes	Quotes
Theoretical courses	
1. Communication skills 2. More interactive presentations 3. Increased in-class tasks 4. No changes to teaching methods	"Changes were mainly manifested in communication skills. Reading assignments were not changed." "Course products remained the same, we even enriched the content, because of fewer interruptions during the lectures." "I changed all my presentations to allow the students to be more engaged in the learning." "I taught better, I was more focused." "I added tasks during the lectures, to increase the student's involvement. But not always".
Sport courses	
1. Lessons became more theoretical 2. Watching and analysing video recordings 3. Self-video-recordings, analysis, and reflection	"The entire course changed." "There was nothing left of the sport course, it shifted predominantly to theoretical content, with occasional tasks." "As peers, we offered and received support by sharing ideas about how to teach basketball online." "The students had to watch films, analyse movements, independently acquire knowledge about performing certain movements, check each other's performance while providing feedback. Everything except for the real experience. "
Field Experience (pedagogical instructors) 1. Lessons became theoretical 2. Peer teaching 3. Co-operation 4. Increased self-directed learning of student teachers	"At first, we just tried to survive… Schools were closed so we decided to teach more theoretical subjects." "Self-video filming was required and used in peer teaching." "We collaborated with cooperating teachers regarding how and which subjects should be taught." "The student teachers had to be creative in designing lesson units using non-conventional equipment." "We considered different ideas about what could be appropriate for adolescents and decided to serve as fitness coaches. Student teachers demonstrated their ideas and shared them with their pupils."

Table 1 illustrates a clear association between the adoption of collaborative and inquiry-based teaching approaches and shifts in assessment practices. As shown in Table 2, this pedagogical development is accompanied by a transition from conventional testing methods to more open-ended, discussion-focused evaluations. As teaching methods evolved, so too did the approaches to student assessment. With the disruption of conventional testing environments, educators sought more authentic and meaningful ways to evaluate student learning. The table below summarises these changes, highlighting the move away from standardised exams towards open-ended, reflective, and performance-based assessments.

Table 2. Relationships between Changes in Teaching Methods and Assessment Methods

Themes	Quotes
Theoretical courses	
1. No changes	"Since the content didn't change at the onset of the pandemic, I did not change my exams either."
2. More multiple-choice exams	"In the beginning, I gave more multiple-choice tests. But then I started giving more in-class tasks, and mini-projects, and the proportion of the exam from the total grade decreased. "
3. More tasks and projects, less exams	"After returning to campus, I reverted to the former pattern of multiple-choice exams. "
	"Before COVID-19, the only method of grading that I used was the final multiple-choice exam. But later I realised that it wasn't suitable anymore, so I added two assignments, both to be submitted in pairs."
Sports courses	
1. Movement analysis	"Sure, everything has changed."
2. Theoretical aspects, including lessons plans	"I placed a major emphasise on movement analysis, sport history, rule books… student teachers had to film themselves performing individual tasks."
3. Video recordings of individual task demonstrations	"I evaluated lessons that they planned for distance learning. "
Field experience	
1. Video recordings of tasks.	"I evaluated video recordings…"
2. Taught and evaluated teaching skills	"I shifted my focus to certain abilities that are not the focus of evaluation in routine times, like planning, explaining, and demonstrating and movement analysis."
3. Emphasize creating opportunities for social engagement	"Unlike routine times, I experienced the difficulty of my own two children being at home while I taught, so I asked my student teachers to create opportunities for social engagement. That was the major portion of the grade and my main concern. "

Table 2 presents data on the changes in teaching and assessment methods during the transition to distance learning. The most significant trend was a move towards greater flexibility and diversity in both instruction and evaluation. Many teachers reported shifting from traditional frontal teaching to more student-centred approaches, including individual work and asynchronous learning.

In terms of assessment, there was a notable shift away from standardised testing toward more formative, process-based evaluation, such as projects, open assignments, and oral assessments. This shift reflects a broader adaptation to the constraints and opportunities of the online format. However, the table also indicates inconsistency in implementation: not all teachers made these changes, and some maintained more traditional methods, suggesting varying degrees of adaptation. The overall pattern shows an effort to innovate under pressure, though systemic uniformity was lacking. The evolving assessment strategies outlined in Table 2 are reflected in the findings of Table 3, where instructors demonstrate growing discomfort with rigid grading and an increasing

openness to formative, narrative feedback. The transformation in assessment practices led many educators to reconsider their philosophies regarding grading. Questions emerged regarding the fairness, relevance, and psychological impact of traditional grading systems. The next table captures this introspection, offering insights into shifting attitudes toward evaluation and success metrics.

Table 3 presents how teachers perceived the validity and fairness of student grading in the distance learning format. A notable portion of teachers expressed concern about the accuracy of grades, with many indicating that the grades given during distance learning did not accurately reflect students' knowledge or performance. Some teachers believed that grades were inflated, while others felt they were inconsistent due to a lack of oversight or differences in student support at home.

Table 3. Changes in Attitudes Towards Grading During the Pandemic Compared to the Previous Non-Emergency Period

Themes	Quotes
Theoretical courses	
1. More considerate	"I became more considerate than I used to be."
2. Increased the number of assignments	"No change. I was always open-minded, encouraging my students to do their best, and I believe in their efforts."
3. Thoughts about the need for assessments	"I was very sceptical about their taking exams from home, so I increased the number of assignments instead."
	"I found myself asking, do we really need to assess learning?"
Sport courses	
1. More chance for improvement	"I gave the students more chances for improvements."
2. Easier to evaluate theoretical knowledge	"They could practice as much as they wanted, and they just had to send me their final performance. The one that they wanted to be graded for."
	"Since I evaluate the students on theoretical aspects, it was easier for me and them. "
Pedagogical instructors	
1. Greater tolerance and consideration	"I increased the class grade average by about.5 points (out of 10) on the final grade."
	"I extended the submission date of assignments."
2. Less emphasis on rules and regulations	"I encouraged my pupils to work in collaboration with their peers and ignored the freeloaders."
	"I minimised my demands and adjusted them to the fact that the student teachers hardly taught face to face. "

Table 4 compares teachers' views on the effectiveness of assessment methods in reflecting students' learning before and during the pandemic. The data revealed an evident decline in perceived effectiveness during the pandemic. Before the pandemic, most teachers believed that the assessment methods they used adequately reflected students' learning processes. However, during the pandemic, this confidence declined significantly. Despite these concerns, no single dominant viewpoint emerged, reflecting a range of diverse perspectives. Some educators still believed that grading remained fair and appropriate, especially when effort and participation were taken into account. This diversity of opinion highlights a key contradiction: The grading system persisted, yet its validity was increasingly questioned, revealing tensions between the need to assess students and the challenges of doing so fairly in a remote environment. The grading philosophies illustrated in Table 3 align with the findings in Table 4, which highlight instructors' attempts to ensure that assessment methods genuinely reflect course learning outcomes. With these shifts came a renewed focus on alignment—ensuring that teaching methods, assessment tools, and learning objectives were cohesively integrated. The following table examines how educators evaluated and

adapted their assessment strategies to better align with their pedagogical objectives and students' needs.

A higher percentage of teachers reported that the assessments used during distance learning were less reflective of actual learning. This shift underscores a key concern: while instructional formats have undergone rapid changes, assessment practices have struggled to keep pace, resulting in a perceived gap between learning and evaluation.

Table 4. The Extent to Which the Applied Assessment Methods Truly Reflected the Students' Learning Processes on the Course, Prior to and During the Pandemic

Themes	Quotes
Theoretical courses	
1. Exams on knowledge and understanding suit the course goals	"I perceive my course as one where students must acquire basic knowledge. So, I explicitly test their knowledge and understanding."
2. Implications as examples of testing on additional competencies, not merely on knowledge.	"I believe there is an inherent gap between the learning process and the need for grades. But I still follow the college requirements for exams."
	"I do not teach applied aspects, but to differentiate between good and excellent students, I ask about sport-related implications. But I did that before and during the pandemic, no difference."
Sport courses	
1. Exams on chosen aspects of the teaching-learning process	"I can't examine every single subject from the syllabus, so I test my students on two of them. This might frustrate them, and me, but I do not have the luxury of testing the entire class more than twice at most."
2. Exams are fair, relying only on what was taught	"I only test about what I teach. I never ask about tasks that I give them for self-studying. If I do, I ask them to evaluate themselves and then I consider their self-assessment as a bonus. "
Field experience	
1. Full congruency between what was taught and the exam	"I always examine the students on the material that I taught throughout the semester. There are no surprises."
2. Ongoing opportunity to improve by allowing assignment re-submission	"Students have the chances to practice again and again until they feel adequately competent or they excel, depending on their aspiration."
	"Students can improve their grades as long as the timeframe allows, as many times as they want. There is no difference between before the COVID-19 or after. "

The pattern in Table 4 reflects a decline in assessment validity as perceived by teachers, likely due to factors such as lack of direct observation, challenges in verifying student work, and reduced interaction. It highlights a systemic challenge in maintaining meaningful and reliable assessment practices under remote conditions. Table 5's reflections on post-pandemic pedagogical values offer insight into why alignment issues (Table 4) are being revisited; teachers are now more critically evaluating the purpose and function of their assessments, considering pandemic-driven adaptations. The experiences of teaching through a global crisis prompted educators to reflect deeply on their values, priorities, and practices. These reflections extended beyond technical adaptations, touching on the purpose of education itself. The final table presents key themes from these reflections, emphasising a vision for education that is more humane, flexible, and responsive.

Table 5 captures teachers' perspectives on the role and value of assessment in the wake of the COVID-19 pandemic. The data shows that a large majority of teachers emphasised the importance of continuing to measure and evaluate student learning, even in changing instructional environments. However, there was also a strong recognition that assessment methods must evolve.

Teachers expressed a clear preference for diverse and flexible evaluation strategies,

moving beyond traditional tests to include more holistic approaches, such as continuous assessment, portfolio work, and personalised feedback. Additionally, the table reflects that many teachers saw positive by-products emerging from the crisis: it encouraged innovation, deeper reflection on the meaning of evaluation, and a shift toward assessments that support learning rather than measure it.

Table 5. Attitudes Towards the Importance of Measurement, their Methods, and the Byproducts of Evaluation Following the COVID-19 Crisis

Themes	Quotes
Theoretical courses	
1. Refreshing old measurement routines	"I feel that after the COVID-19 crisis, we should refresh our attitudes towards measurements, evaluations, and grading. There is no reason why we should revert to our old routines."
2. Objectivity and equal opportunities for success	"In order to maintain integrity and equal opportunities for learning and improvements, objective measurements should be the focus of our efforts."
3. Course size matters	"Different methods of evaluation should be applied according to course size."
4. Course goals matter	"Different methods of evaluation should be applied according to the course goals. If we change our goals, we need to change our evaluation methods. "
Sport courses	
1. Self-directed learning	"In the future, I would refer more to self-directed learning and practice as an integral part of the requirements. We have seen that they the students can learn and practice alone."
2. More film analysis	"Film analysis increased students understanding of movement. It should be part of their overall competencies to be assessed"
Pedagogical instructors	
1. Technological skills	"We assimilated technology to our field experience, so technological skills should be part of their competencies that are assessed."
2. Social-emotional skills	"We must assimilate social-emotional aspects into our curriculum and decide what and how to measure it."
3. Collaborating with peers	"Collaborating with peers has been proved to be an efficient way to overcome a variety of obstacles. We should teach them how to do so effectively and assess this ability."

The overarching pattern in this table is a reaffirmation of the importance of assessment, accompanied by a desire to reform how it is conducted. Teachers were not dismissing evaluation; instead, they were advocating for more meaningful, supportive, and adaptive methods, recognising that old models no longer fully served the needs of post-pandemic education.

The findings presented across Tables 1 to 5 illustrate a dynamic and interrelated shift in educational practices during and after the COVID-19 pandemic. Table 1 highlights the emergence of more flexible and student-centred teaching methods, such as project-based and collaborative learning. This pedagogical transition is reflected in Table 2, where traditional assessments, such as multiple-choice exams, have given way to more authentic forms of evaluation, including portfolios, reflections, and performance tasks. These evolving practices align with changes in instructors' attitudes toward grading (Table 3), as educators increasingly questioned rigid grading schemes and moved toward more formative, descriptive, and individualised approaches.

This shift in grading attitudes corresponds with insights from Table 4, which emphasises the growing awareness among educators of the need to align assessment practices with intended learning outcomes. As educators re-evaluated what constitutes meaningful learning, they began to critically assess whether their evaluation methods truly supported their pedagogical goals.

Finally, Table 5 brings a reflective lens to these developments, revealing how experiences from the pandemic prompted

deeper philosophical shifts. Educators expressed a newfound appreciation for learner autonomy, well-being, and intrinsic motivation, factors that, in turn, validated the earlier pedagogical and assessment transformations. In this way, the tables do not stand in isolation but instead form a cohesive narrative: the pedagogical changes documented in Table 1 led to new forms of assessment (Table 2), which influenced grading philosophies (Table 3), brought attention to assessment alignment (Table 4), and ultimately catalysed broader reflections on the goals of education in the post-pandemic era (Table 5).

Discussion

This study examined how PE teacher educators adjusted their teaching and evaluation methods in response to the pandemic, the relationships between the attitudes and actions of these educators regarding student evaluations and grades, and the 'lessons learned' from their teaching experiences during the pandemic. First, the findings reveal that, despite the transition to distance learning and other imposed limitations, most participants did not modify their teaching methods; instead, they continued to employ synchronous face-to-face teaching, self-directed learning, and group work. It is worth noting that the rapid adaptation to the use of basic technology following the sudden transition to online teaching was impressive, as documented by others (e.g., Carrillo & Flores, 2020). However, others argue that since online teaching persisted as the only viable option during the pandemic, emergency distance teaching had to evolve into well-planned online teaching that leveraged the advantages of such learning (Barbour et al., 2020; Sutiah et al., 2020).

Nonetheless, educators from the theoretical course cluster who taught larger classes reported that online teaching allowed them to communicate more effectively, implement their lesson plans more efficiently, and cover the curriculum within the allocated time. They retained their traditional presentation styles by predominantly employing synchronous online teaching, exclusively via the Zoom platform. In contrast, educators from the sport course cluster faced greater challenges during the initial stages of the pandemic. Physical activity and movement courses involve intensive social interactions and physical contact, requiring motor learning, adequate space, suitable equipment, and suitable facilities (Foye & Grenier, 2022; O'Brien et al., 2020). Consequently, online teaching presented significant challenges: much of the practical content was lost in the transition, and for the content that could be taught remotely, educators expressed concerns regarding the lack of authenticity in learning and difficulties in captivating and engaging learners. This situation necessitated creative thinking and collaborative efforts to design meaningful lessons.

Moreover, while educators from the theoretical course cluster became more practical in their teaching methods and attitudes toward learning, those from the sport course cluster adopted a more theoretical approach. In other words, and in line with the literature, each cluster of teachers sought changes to their teaching routines that would increase their relevance and enhance student engagement (Lowenthal et al., 2020). However, the interviewees conveyed that their increased emphasis on student engagement, achieved mainly through tasks and assignments, led to a perceived issue of student overload, resulting in students complaining to the college. Consequently, top-down instruction was implemented as a means of alleviating academic demands and demonstrating greater consideration for the students and the unprecedented circumstances caused by the

pandemic. When examining the field experience course cluster, two sub-groups of pedagogical instructors emerged. First, those who worked with first-year student-teachers insisted on maintaining a 'business as usual' front, as if changes were a matter of choice. This may have served as a strategy for managing uncertainty, i.e., do not do anything of which you are not sure of the outcomes in advance (Riabacke, 2006); or as described by Anderson (2003), individuals tend to avoid making decisions by putting them off, not acting, or maintaining the current state for reasons such as analysing costs versus benefits, expecting regret, or facing challenges in making a choice or anticipating negative emotions. The second subgroup of pedagogical instructors, as reported in the findings, provided students with a substantial degree of autonomy, continuously implemented adaptations in response to changes imposed by the pandemic, and encouraged them to work in teams and apply creative thinking to resolve unexpected issues. According to the strengths-weaknesses-opportunities-and-threats (SWOT) model, introducing changes to teaching methods in PE teacher education institutions during COVID-19 served as a strength (O'Brien et al., 2020). These differences in approaches could stem from the degree of the students' practical experience (first or second year), their resources for coping with difficulties, and the decision-making dynamics and patterns within each subgroup.

The second aim of this study was to examine the relationships between attitudes and actions regarding student evaluations. Interestingly, no participants gave lower than usual grades during the pandemic. Educators from the sport course cluster increased their grades more than those from the theoretical course cluster, while pedagogical instructors hardly altered their grades at all. Kirk (2009) argues that PE student teachers experience difficulties in excelling due to the variety of competencies and skills required of them, including theoretical courses, sport courses, and teacher training in schools. Hence, these results could be related to the exams and assignments given in the sport courses, which became more theoretical, particularly as teachers chose to be more considerate under the circumstances.

The findings of the quantitative section of this study indicate that exams and class participation remained essentially unchanged. At the same time, an increase was observed in individual and group class assignments, as well as home assignments. The qualitative findings further clarified this issue, as the participants expressed concern about student engagement due to the distance learning, which allowed students to turn off their cameras and 'disappear' into passivity. From the teachers' perspective, individual and group assignments created more opportunities for providing students with feedback, thereby monitoring their progress and the quality of interactions, which is a 'great engine for learning' (Rapanta et al., 2020). Since teachers often seek student engagement during their lessons, students' workloads and expectations for self-learning have increased. However, as described above, this led to students' complaints, which resulted in a top-down demand from college management, requiring lecturers to be more considerate of the students during the crisis and to assign fewer assignments. Hence, it can be assumed that the reason for the small changes in evaluation methods stems from this decision, which was dictated from above, with teachers continuing to use multiple-choice or open-ended exams rather than individual or group assignments.

The third and final aim of the study was to examine what teacher educators adopted or recommended adopting in the future, in light of the lessons they learned from teaching during the COVID-19 pandemic. As the

pandemic persisted, distance learning and other adjustments remained in place for an extended period. As such, it could be expected that changes introduced by PE teacher educators would continue to be assimilated. However, our results indicate that the majority of the participants, both in the quantitative and qualitative research, perceived face-to-face teaching as the most efficient teaching method, and as such, reverted to this traditional manner of teaching after the pandemic. However, some participants did provide examples of teaching methods that they had created or applied during the pandemic and proposed that these methods should be adopted. For example, breaking large assignments into smaller ones that could be addressed from lesson to lesson, or allowing students to adapt for the general assignments' instructions, provided they offer a rationale and stay within the course goals. In line with Dague et al. (2021), the participants in this study spoke of the increased importance of self-learning compared to the past. Finally, the participants acknowledged the importance of student autonomy, self-pacing, and reflection, and encouraged peer collaboration.

To enhance the coherence and interpretive value of the study, we synthesised the findings under broader conceptual themes rather than being confined to teaching clusters. This approach allows for the identification of cross-cutting patterns that illuminate institutional and pedagogical dynamics. Seven key themes are particularly salient. (1) *Pedagogical adaptability* refers to how educators creatively and flexibly adapt their approaches in crisis conditions, often requiring them to redesign or adjust their course delivery in real time. It encompasses the various ways educators shifted from traditional, teacher-centred models to more flexible, student-centred approaches. This was especially visible in the use of collaborative tasks, self-directed learning, and peer engagement during remote instruction. (2) *Digital equity* addresses disparities in students' access to devices, internet connectivity, and digital literacy, highlighting persistent challenges in inclusive education. (3) *Technological adaptation* reflects the varying degrees of success in adopting tools such as learning management systems, video conferencing, and asynchronous platforms. (4) *Emotional labour and wellbeing* address the psychological toll on both staff and students, as emotional support has become a central, often invisible, aspect of teaching. (5) *Assessment reform* encompasses changes in grading practices, exam formats, and perceptions of academic integrity in online contexts. (6) *Institutional inertia versus innovation* captures tensions between the urgency for systemic transformation and the pull of traditional norms. Finally, (7) *student engagement and autonomy* examine how shifts in modality affected learners' motivation, participation, and ownership of their learning process. Grouping findings thematically in this way allows for richer analysis, broader applicability, and a more theoretically grounded discussion of the educational response to the pandemic (Braun & Clarke, 2006).

Concerning face-to-face teaching after the pandemic, despite the widespread adoption of novel digital tools and instructional strategies during emergency remote teaching, most educators in this study returned to traditional in-person modalities as soon as conditions permitted. This reversion suggests not only a preference for conventional practices but also reflects underlying issues such as limited institutional support for sustained innovation, low digital self-efficacy among faculty, and a cultural valorisation of physical presence as central to "authentic" teaching (Bozkurt et al., 2022). Moreover, temporary digital tools were often treated as crisis responses rather than

strategic enhancements, resulting in their rapid abandonment. These trends mirror broader international patterns in higher education and underscore the need for leadership that fosters the long-term integration of effective remote and hybrid strategies.

The grading patterns identified in this study also warrant more critical scrutiny. The apparent increases in student grades in some clusters, particularly in sport courses, could reflect either intentional pedagogical choices or unconscious bias. Instructors may have adopted more lenient approaches to account for students' difficult circumstances, as observed in other post-COVID studies (Chen et al., 2022). However, without clear institutional guidelines or calibration across course clusters, these grading shifts risk inconsistency and may obscure the validity of student achievement metrics. It is essential to interrogate whether such changes were guided by a pedagogical rationale or emerged as emotional responses to the crisis. Clarifying the intentions behind grading trends would provide insight into institutional grading cultures and support the development of more transparent assessment frameworks.

The SWOT framework serves not merely as a descriptive tool but as an analytical structure for understanding institutional readiness and response in post-pandemic education. Strengths became evident in the rapid technological adaptation of many educational systems, where digital competencies among both educators and learners improved, as mentioned elsewhere (UNESCO, 2021). This unexpected acceleration facilitated the normalisation of blended learning approaches and the integration of educational technologies into everyday instruction. Weaknesses, however, included pronounced disparities in digital access and the pedagogical challenges faced by educators who lacked prior experience with online platforms. These vulnerabilities revealed systemic gaps, particularly in areas where infrastructure and training were inadequate.

At the same time, the crisis unveiled numerous opportunities. The global disruption acted as a catalyst for policy reform, curriculum innovation, and cross-sector collaboration. Initiatives that had previously been slow to gain traction, such as competency-based education and the incorporation of socio-emotional learning, gained momentum and institutional legitimacy (Reimers & Schleicher, 2020). Furthermore, the crisis emphasised the need to redesign educational spaces to support personalised and flexible learning, thus promoting more inclusive and resilient systems. Threats, however, loom in the form of long-term learning loss, growing inequality, and the potential for superficial adoption of technological solutions without sufficient pedagogical depth (Zhao, 2022). These risks highlight the importance of sustainable planning that prioritises equity and quality.

To navigate these elements strategically, educational leaders must rely on decision-making theories that account for complexity and adaptability. The bounded rationality model, as described by Simon (1997) and applied in recent educational management studies, emphasises the need for decision-makers to operate within the constraints of limited information and time. In a pandemic-affected context, this model aligns with the iterative, 'good enough' decisions schools often had to make. More contemporary models, such as adaptive leadership and distributed decision-making, have also gained relevance. These frameworks advocate for collective sense-making, responsiveness to evolving needs, and shared responsibility among stakeholders (Bryk et al., 2021; Fullan, 2021). By incorporating these theoretical insights into strategic

planning, institutions can transform reactive measures into proactive reforms.

Some limitations should be addressed. First, the sample size for the quantitative survey was relatively small, involving only 50 participants, which limits the generalisability of the findings. However, the proportional stratified sampling approach ensured diverse representation across different lesson types, providing a broad perspective within the specific context of the study. Second, self-reported data from both the quantitative and qualitative components may be subject to social desirability bias, where participants respond in a manner they believe is more socially acceptable. Despite this, employing both quantitative and qualitative methods helps cross-validate the findings, thereby reducing the potential impact of this bias. Third, in the qualitative aspect of the study, purposive sampling was employed to focus on experienced faculty members, which may have excluded the perspectives of newer staff. However, this approach allowed for rich, in-depth insights from senior faculty, whose experiences are particularly relevant to understanding the changes in teaching over time. Fourth, the study was also limited to a single institution, which restricts its external validity. Nonetheless, the thorough analysis of a single teacher education college provides detailed insights that can inform similar educational settings.

Finally, although a detailed analysis of teaching methods and assessment changes is provided, this is not explicitly linked to measures of student engagement, academic performance, or skill acquisition. Due to the focus of the current study, we have not included student learning outcomes in this analysis. However, we measured them, and the results are published elsewhere, along with indicators such as grade distributions and course completion rates (Fox et al., 2023).

Conclusions and Practical Implementations

Despite the global disruption caused by the COVID-19 pandemic and the resulting shift to distance learning, the current study found that few long-term changes were made to teaching and evaluation methods in PE teacher education. Instructors of both theoretical and practical courses largely reverted to traditional, face-to-face teaching after the crisis. However, on a more optimistic note, while individuals are often resistant to change and its potential benefits (Kegan & Lahey, 2009), the pandemic laid important groundwork: the soil has been prepared, and the seeds of transformation have been sown.

This study identified creativity and teamwork as the primary resources leveraged to navigate the challenges of the pandemic. Participants emphasised the creative expansion of pedagogical approaches that enhance student engagement. One such approach could be the “Own it, Learn it, Share it” (OLSit) model (Lee & Hannafin, 2016), which encourages self-directed learning and active participation. Cultivating creativity among PE teacher educators should therefore be viewed not only as a strategy for coping with crises but as an essential professional competency for fostering long-term adaptability and innovation.

Teamwork also played a crucial role during the pandemic, enabling educators to share ideas, co-develop new teaching methods, and support each other in facing unforeseen challenges. Strengthening collaborative practices within teacher education programmes can serve as a sustainable mechanism for continuous improvement and knowledge exchange.

Given these findings, policy and decision-makers in teacher education institutions, particularly in PE, should provide educators with increased autonomy, practical tools, and professional development

opportunities. Simulations of diverse teaching and assessment methods could enhance readiness for innovation and foster openness to change. Although many educators have returned to traditional practices, ongoing reflection on lessons learned during the pandemic is crucial for implementing meaningful and lasting improvements. Ultimately, the study encourages a re-evaluation of grading practices in teacher education, advocating for a more thoughtful alignment between assessment strategies and evolving educational values. While many of the adaptations described in this study were implemented at the individual educator level, the findings have broader implications for institutional policy, curriculum development, and faculty professional learning.

Institutional policy: To foster long-term educational resilience, teacher education institutions should consider formally integrating hybrid teaching models into their instructional frameworks. Such models, which combine face-to-face and online modalities, offer flexibility and continuity in times of disruption. Institutional support structures—including technological infrastructure, instructional design units, and leadership commitment—are essential to ensure sustainable implementation and scalability.

Curriculum reform in PE teacher education: The pandemic underscored the importance of embedding digital literacy, pedagogical adaptability, and assessment innovation into the formal curriculum of PE teacher education programmes. Institutions should revise their curricula to include structured training in digital pedagogies, the use of multimedia and asynchronous tools, and the design of authentic assessments tailored to both in-person and remote contexts. This will better prepare future PE teachers to respond to evolving educational environments and learner needs.

Faculty development in digital pedagogy: The professional development of academic staff must extend beyond emergency upskilling and towards continuous, reflective learning. Institutions should invest in long-term faculty development programmes that focus on integrating digital tools with pedagogical intent. This includes training in hybrid course design, student engagement strategies in online and blended settings, and evidence-based approaches to digital assessment. Building such capacities among faculty members will not only enhance instructional quality but also cultivate a culture of pedagogical innovation within teacher education institutions.

In sum, while the immediate pedagogical shifts prompted by the COVID-19 pandemic were often reactive, the lessons learned present a strategic opportunity for systemic transformation. Aligning policy, curriculum, and faculty development efforts is crucial to embedding the adaptive capacities demonstrated during the crisis into the fabric of PE teacher education. To ensure resilience in the face of future disruptions, PE teacher education must move beyond emergency adaptation toward structural innovation grounded in equity, flexibility, and pedagogical depth.

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Ethics Approval
Ethical approval for this research was granted by the Institutional Review Board (IRB)at the Levinsky-Wingate Academic College (330).

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Supplementary Material 1: Lecturers' Questionnaire

To: _____

Hello,
We are conducting a study to learn about measurement and evaluation methods at the college before and during the COVID-19 period.

If you agree to participate in the study, please circle the appropriate statement and answer the questionnaire.

☐ I agree to participate in the study / ☐ I do not agree to participate in the study

Mark - I am a lecturer in: ☐ Theoretical courses ☐ Practical courses ☐ Teaching practicum ☐ Seminar

The study examines four periods:

1. Semester A, 2019-2020 (Pre-COVID) — Normal teaching
2. Semester B, 2019-2020 (Start of COVID) — Exams conducted via Zoom
3. Semester A, 2020-2021 (Second COVID semester) — Exams conducted via Tomax system
4. Semester B, 2020-2021 (Third COVID semester) — On-campus frontal exams

Thank you in advance.

The Research Team

If you teach more than one type of course, please complete a separate questionnaire for each course cluster.

Supplementary Material 2: Evaluation Before and During COVID-19

Please rate the extent to which the following statements describe your work regarding the grading components in the syllabus (1 = Not at all; 5 = Very much):

Statement	1 (Not at all)	2	3	4	5 (Very much)
Before COVID (Period A): Adhered to syllabus grading components					
Start of COVID (Period B): Changes to syllabus grading components					
COVID Semester A (Period C): Changes to syllabus grading components					
COVID Semester B (Period D): Changes to syllabus grading components					

Specify the grading components and any changes for each period:

Supplementary Material 3: Teaching Methods Frequency

Mark X under the number indicating how often you used each teaching method (1 = Not at all; 5 = Regularly):

Teaching Method	Period A (Pre-COVID)	Period B (Start of COVID)	Period C (COVID Semester A)	Period D (COVID Semester B)
1. Full synchronous frontal teaching				
2. Asynchronous frontal teaching				
3. Students' self-learning with lecturer guidance				
4. Work in small groups				
5. Work in pairs				
6. Flipped classroom				
7. Simulations				
8. Peer teaching				
9. Other (specify): _____				

Supplementary Material 4: Grading Components Usage

Mark X under the number indicating how often each grading component was used (1 = Not at all; 5 = Very much):

Grading Component	Period A	Period B	Period C	Period D
1. Multiple choice exam				
2. Open-ended questions exam				
3. Individual in-class assignment				
4. Individual homework assignment				
5. Group in-class assignment				
6. Group homework assignment				
7. Student's self-assessment				
8. Peer assessment				
9. Reports				
10. Participation in class				
11. Weekly forum participation				
12. Bonus assignment				
13. Other (specify): _____				

Circle the number that best represents your grading approach during COVID compared to normal times:
1 - Graded more strictly
2 - Maintained similar average and distribution
3 - Graded more leniently

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ORIGINAL RESEARCH

Breaking the Sedentary Cycle: Exploring the Link between Physical Activity and Academic Performance among Female College Students in Bangladesh

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Abstract

Most adults in Bangladesh do not meet the recommended levels of moderate to vigorous physical activity (PA). This is exacerbated by the increasing prevalence of sedentary lifestyles, particularly among female students in a socio-culturally restrictive context. During the transition period, when young adults adopt independent lifestyle choices, reduced PA can impact their health and academic outcomes. This study investigated the relationship between physical activity (PA) and academic achievement among female students at a government college in Bangladesh. To understand the correspondence, the gendering and spatialising of Dhaka's urban landscape have been described using Tonkiss' (2005) 'Geography of Gender.' A cross-sectional design was employed, using the Global Physical Activity Questionnaire (GPAQ) endorsed by the World Health Organization to assess total PA in terms of metabolic equivalents (METs). A random sample of 300 female students participated in this study. A basic random sampling technique and a random number generator in MS Excel were utilised to carry out the procedure from the previously acquired student list. Work, travel, and recreational activities are assessed in accordance with WHO recommendations (2020a), resulting in a high compliance rate (93.7%) with WHO physical activity (PA) recommendations among female students, which is a noteworthy finding given the restrictive setting or context of PA for girls and women in Bangladesh. Spearman correlation analysis revealed a significant positive relationship between METs and academic achievement. Findings suggest that regular PA has a positive impact on the physical, mental, emotional, and academic development of students in Bangladesh. This study's significant positive correlation between PA and academic achievement emphasises the importance of educational institutions promoting PA through structured educational opportunities and inclusive initiatives such as non-credit courses, designated spaces for PA, and extracurricular sports programs.

Keywords:
Academic performance, education opportunities, good health, physical activity, sport, well-being

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Introduction

Colleges and universities serve multiple purposes, with two primary functions often emphasised: fostering academic achievement and supporting students' holistic development, including their physical and mental well-being (MOE, 2010; Moscardini et al., 2020; UNESCO, 2015). These priorities are incorporated in curriculum design in Physical Education (PE) and other co-curricular activities involving sports and various types of Physical Activity (PA) to support cognitive, emotional, and social development (Bailey, 2017). However, these activities have traditionally been given a low status in academic settings, oftentimes perceived as secondary or even a distraction from the "true" purpose of education, namely, academic performance (Bleazby, 2015).

In recent years, declining levels of global PA have prompted international agencies and national health institutions to issue warnings about rising rates of non-communicable diseases such as diabetes, heart disease, musculoskeletal problems, and obesity (González et al., 2017). These concerns are particularly alarming among the youth, as insufficient PA during adolescence is strongly correlated with long-term health risks (Babaeer et al., 2022). Obese young people are around five times more likely to remain obese into adulthood (Simmonds et al., 2016). Over 50% of school-aged youth fail to meet the internationally recommended target of 60 minutes of moderate-to-vigorous physical activity (MVPA) per day—a figure that rises to 80% in high-income countries (Breda et al., 2018; Guthold et al., 2020; Tremblay et al., 2016).

Many young people seek to enrol in higher education courses each year, with the number of students entering tertiary education doubling over the last two decades (UNESCO Institute of Statistics, 2020). Consequently, this has led to calls for increased attention to the health behaviours of college students, a demographic particularly vulnerable to sedentary lifestyles. The transition to university typically brings new forms of independence characterised by reduced parental supervision and pressure-packed academic requirements. While the benefits of PA have been well-established in enhancing cognitive and brain functioning (Stillman et al., 2020), modernisation and automation have contributed to increased sedentary behaviours among young people (Thivel et al., 2018).

In Bangladesh, this global trend is reinforced by specific socio-cultural dynamics, with young people often considering PA unnecessary and favouring sedentary pastimes such as watching television, playing digital games, and engaging in social media. Additionally, the emphasis on academic achievement and curriculum completion over PE resulted in limited opportunities for structured PA within schools and colleges. Negative perceptions about the value of PA and its presumed interference with academic achievement further diminish participation in PA among college students (Hasan et al., 2020).

In this context, this study aims to investigate whether physical activity (PA) is associated with academic performance among female students in a government college in Bangladesh. While international research confirms the positive association between physical activity (PA) and educational outcomes, similar investigations remain scarce in South Asian contexts, particularly in Bangladesh. By featuring an underrepresented population in a resource-constrained setting, this study aims to expand the discourse to inform educational and public health policies that promote student well-being alongside academic achievement

in diverse contexts. The study aims to test the following hypotheses:
Null hypothesis (H_0): There is no association between physical activities and academic performance.
Alternative hypothesis (H_1): There is a significant association between physical activities and academic performance.

Literature review

Physical activity is defined as any bodily movement generated by skeletal muscles that requires energy expenditure and encompasses activities such as work, play, domestic chores, travel, and leisure activities (WHO, 2020a). The WHO (2020a) recommends a daily MVPA of 60 minutes, five or more days per week. Müller et al. (2022) report encouraging levels of adherence to PA guidelines, with more than 90% of participants in their study meeting the WHO standards for aerobic PA. However, other studies reveal concerning trends in Bangladesh, with adolescents residing in metropolitan, non-slum areas showing alarmingly high prevalence of inactivity (girls: 77.7%; boys: 64.1%) (Hossain et al., 2021).

Despite evidence confirming the benefits of regular engagement in PA to mental health, cognitive development, and academic achievement, research in Bangladesh linking PA with such benefits remains sparse, especially among female students. Academic achievement tracks a student's high school, college, and university goals (Shahjahan et al., 2021). It is measured by grade point average (GPA). It has been linked to several socio-demographic, psychological, and intellectual factors — including motivation, self-efficacy, emotional intelligence, task-oriented coping strategies, sleep-related factors, and conscientiousness (Brambila-Tapia et al., 2022). However, the potential contribution of PA to academic success has not been explored within the context featured in this study.

Cognitive processes, including memory, attention, language, praxis functions (the ability to execute finalised movements to achieve a goal), and gnostic functions (the ability to perceive and recognise), are integral to learning (Caponnetto et al., 2021). These cognitive abilities are strongly associated with long-term outcomes, such as educational attainment, vocational development, economic advancement, health, longevity, and overall life satisfaction (Lövdén et al., 2020; Pastor et al., 2022). Physical activity has been shown to improve executive functions by supporting neural efficiency and activity in brain areas associated with attention and working memory (Singh et al., 2018). Moreover, Wilson et al. (2021) uncovered five motivational factors of student engagement in PA: mastery of skills and abilities, social approval, physical and mental well-being, and interpersonal connections. Notably, motivation varied by both socioeconomic status and level of PA.

Although many countries have made progress in integrating structured PA into their academic curricula to support academic performance, Bangladesh has yet to fully implement systemic reforms, with limited long-term studies to support its initiatives in this direction. While many steps have been taken in Bangladesh — such as reevaluating the curriculum, providing teachers with training, and introducing student-centred learning to accelerate academic achievement — initiatives to improve attention, memory, and academic performance remain limited.

Research has consistently shown the value of PA in enhancing academic success. Physical activity has been shown to improve academic performance in cross-sectional, randomised-controlled, and longitudinal trials (Singh, 2012). Norris et al. (2020) found that incorporating PA during lectures

enhances student learning and engagement. Additionally, Jylänki et al. (2021) noted that 71% of publications in their review confirmed positive effects of PA on cognitive or academic performance.

Bangladesh has not given enough attention to this crucial matter, particularly to PA among female college students—a demographic often restricted by cultural norms, academic pressure, and limited access to gender-inclusive PA spaces. This study addresses the research gap by examining the association between PA and academic performance among female students in a Bangladeshi government college. As such, it aims to contribute to the literature landscape on how PA can serve academic goals, particularly among girls and women in low- and middle-income countries.

In Bangladesh, females frequently engage in outdoor recreational and social activities, a trend that often begins during puberty. The socio-cultural practices within Bangladeshi society delineate two separate domains for males and females. While males are permitted to engage in outdoor pursuits such as cricket, football, or cycling and participate in social interactions, females are often relegated to domestic duties. They are usually restricted from freely exploring the outdoors. Societal conventions frequently inhibit women from participating in team sports and socialising with males outside their familial relationships. In Bangladesh, women's freedom to walk freely in public spaces is limited due to harassment from particular male residents and their protective negotiation of the area (Shamma, 2021). Tonkiss (2005) seeks to theorise gender and space in cities. She investigated how gender and sexuality influence the perception and use of urban settings; specifically, how urban spatial configurations promote gender and sexual disparities and how women's spatial behaviours are influenced by fear and violence. She, therefore, highlighted how urban space is used in a gendered manner. So, guardians impose restrictions on young females due to concerns about their safety. Parents often discourage or limit their daughters from participating in outdoor pursuits, such as leisurely walks or cycling (Uddin et al., 2017). The unique variance of safety concerns was 33.1%, with 42.3% of the variation attributable to fear of sexual assault. Consequently, there is a substantial correlation between elevated levels of dread of sexual assault and heightened safety concerns among female students in Bangladesh (Nigar et al., 2025). The evident gender disparity in the quantity and nature of activities prompted us to conduct the study to comprehend the situation and challenge the cycle of sedentary behaviour.

Over the past few decades, there has been a notable increase in the emphasis on the impact of PA on academic performance. Countries like Denmark have implemented national initiatives to promote daily PA among students (Koch et al., 2021). Nevertheless, Bangladesh is experiencing a delay in implementing curriculum modifications and research initiatives specifically designed to promote PA. In this study, we focused on identifying the correlation between academic performance and PA to address the disparity.

Although the study primarily focused on measuring total PA and GPA, its conceptualisation was guided by the framework presented in Figure 1. This framework suggested cognitive, psychosocial, and institutional pathways as potential mediators, though these were not directly measured. However, these mediators were admittedly not directly measured. Nonetheless, the framework was instrumental in shaping the discussion and interpreting our findings, especially regarding the role of PA in enhancing cognitive function, psychosocial well-being, and school engagement.

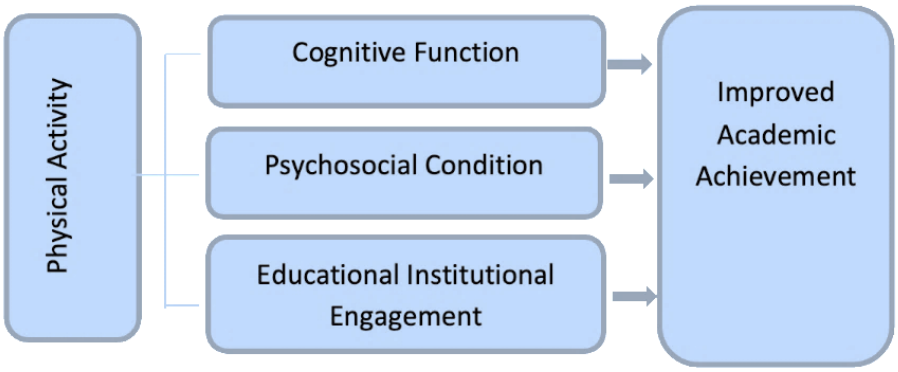


Figure 1. A Tentative Conceptual Framework of the Relationship between Physical Activity and Academic Achievement

Methodology

Study Design

This study employed a cross-sectional design to investigate the relationship between physical activity (PA) and academic achievement among female college students. Cross-sectional designs are particularly well-suited for examining associations among variables within a defined population over a specific time frame. They offer practical, efficient, and cost-effective approaches to such investigations (Levin, 2006). Although such designs do not allow causal inference, they contribute valuable insight into correlational configurations, particularly in under-researched contexts such as Bangladesh.

Study Context and Participants

This research was conducted at Lalmatia Government Mohila College, a prominent public women's college in Dhaka, Bangladesh, within the Sociology Department, which comprised approximately 700 students at the time. Based on Cochran's formula for computing sample size at a 95% confidence level, 300 participants were selected using a simple random sampling technique. We acquired the individual list from the department's office and then utilised the random number generator in MS Excel to execute the random sampling procedure. Consequently, the appointed individual was apprised to engage in the proceedings.

Ethical Considerations

Before data collection, participants received information sheets that detailed the study's purpose and explained the nature of their involvement. They were asked to consider this information before proceeding. Once potential participants had indicated their willingness to participate, they were provided with a consent form and asked to sign to show their understanding and willingness to engage in the study. Full ethical approval was granted by a central university ethics committee. Participants were assured that their personal information would be managed with strict confidentiality throughout the research process.

Instrumentation

Physical Activity Measurement: PA levels were assessed using the Global Physical Activity Questionnaire (GPAQ) version 2, developed by the WHO (2020b). The GPAQ examine PA across three domains: work-related activity, transportation, and recreational activity. It includes intensity categories of moderate to

vigorous. PA data were converted to Metabolic Equivalent of Task (MET) in minutes per week using the standard set by WHO (2020b). This instrument is considered a suitable tool for tracking PA, especially among Bangladeshi populations, including urban dwellers and women (Mumu et al., 2017).

Academic Achievement Measurement: Academic performance was operationalised as Grade Point Average (GPA) based on official examination results published by the National University of Bangladesh. GPA data were obtained with permission from the college administration and supported with information from the official university website to ensure accuracy.

Pilot Testing

The authors conducted a pilot study with 30 randomly selected students to check the clarity and reliability of the instrument. Cronbach's alpha indicates the internal consistency reliability of a factor's elements. It ranges from 0 (not at all reliable) to 1 (absolute reliability) (Arifin, 2018). Value level of reliability, Cronbach's Alpha Score and Level of Reliability: 0.0 – 0.20: Less Reliable; >0.20 – 0.40: Rather Reliable; >0.40 – 0.60: Quite Reliable; >0.60 – 0.80: Reliable; >0.80 – 1.00: Very Reliable (Ahdika, 2017). The Cronbach's alpha reliability coefficient was computed at 0.381, indicating "Rather Reliable" internal consistency. Despite the Cronbach's alpha reliability score of 0.381, we employed the instrument in our investigation because it has been verified in previous research, approved by the WHO, and validated in the Bangladeshi context by Mumu et al. in 2017. Again, it also covers the multidimensional nature of PA. Pilot data can be used in the final sample if the same sampling frame, procedures, and validated research instruments are used in both the pilot test and the main study (Thabane et al., 2010). The pilot sample was included in the final analysis because the instrument was validated in Bangladesh.

The instrument's established criterion and contemporaneous validity (based on prior research) influenced its selection in this study. The GPAQ has demonstrated validity in prior studies, including those comprising South Asian female populations (WHO, 2020). Given the standardisation of the GPAQ and its appropriate adaptation for Bangladeshi respondents (Mumu et al., 2017), the instrument was deemed valid for the objectives of this study.

Data Collection Procedure

Data were collected over four weeks. Researchers organised 10-20 group sessions, where participants were oriented and guided through the GPAQ survey using visual cards. Academic performance data were gathered simultaneously in coordination with the college records office. All surveys were administered in Bangla, the native language of the participants, to ensure understanding and accurate responses.

Data Analysis

Data were analysed using SPSS software (Version 28). Before analysis, data entries were screened for completeness, range validity, and the presence of outliers. When appropriate, frequency analyses presented data as a number (%), mean (SD), or median (IQR). WHO threshold values for GPAQ were calculated. Finally, Spearman's correlation coefficients were used to correlate overall GPAQ and domain-specific MET minutes per /day with academic achievement, as measured by Grade Point Averages. Intensity determines the time variable MET values (moderate or vigorous). MET values and activity levels determine PA. The GPAQ evaluated the values of the MET for overall energy expenditure across three domains: work, transportation, and recreation. The

MET values were determined as follows: moderate at 4.0, cycling and walking at 4.0 METs, and vigorous at 8.0 METs. Correlation coefficients were interpreted as follows: Poor: 0–0.20; Fair: 0.21–0.40; Moderate/Acceptable: 0.41–0.60; Strong: 0.61–0.80; Very Strong: 0.81–1.0. Statistical significance was set at $p < 0.05$ (two-tailed). Additional stratified analyses by domain-specific PA (work, transport, recreation) were also conducted.

Results

This study investigated the relationship between physical activity (PA) and academic performance among female students at a government college in Bangladesh. The Null Hypothesis (H_0) was "There is no association between physical activities and academic performance, while the Alternative Hypothesis (H_1) was "There is a significant association between physical activities and academic performance."

Table 1. Respondents Who Met the WHO Recommendation

		Frequency	Per cent	Valid Percent	Cumulative Percent
Valid	Recommended	281	93.7	93.7	93.7
	Not Recommended	19	6.3	6.3	100.0
	Total	300	100.0	100.0	

Table 1 shows that 93.7% of the study's respondents—female college students—met the WHO recommendations for PA, which define sufficient activity as achieving at least 600 MET-minutes per week. In contrast, WHO global data from 2020 reported that only 34% of adolescents aged 13 to 15 met these same guidelines. While this reference point pertains to a younger and more general global population, it underscores the relatively higher level of PA observed among the college-aged women in this study. This distinction helps contextualise the findings without conflating age groups or populations.

Figure 2. Distribution of Physical Activity Levels among Female College Students Based on WHO Recommendations

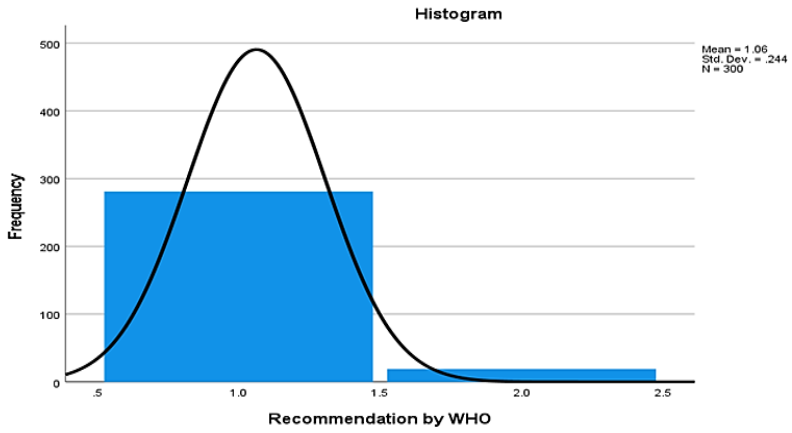


Figure 2 visually represents the distribution of PA levels among female college students in this study in relation to the WHO recommendations. The x-axis indicates adherence to WHO physical activity recommendations. A value of '1' (or values close to '1', such as '1.06') represents individuals who met the recommended guidelines, while higher numerical values indicate a deviation from meeting the recommendation. The histogram demonstrates a strong clustering of students around the 1.0 mark on the "Recommendation by WHO" axis, indicating that a substantial majority met or exceeded the WHO's recommended 600 MVPA per week. This visual representation supports the finding presented in the preceding paragraph, where Table 1 indicated that 93.7% of the respondents met these guidelines. The distribution, with a mean of 1.06 and a relatively small standard deviation of 0.244, further supports the high prevalence of sufficient PA within this specific cohort. The shape of the distribution, while skewed, still shows a strong peak at the recommended level, highlighting the contrast with broader global data on adolescent PA, as discussed in the text.

Table 2 presents the Spearman's rho correlation coefficients among different domains of PA (work-related METs, travel-related METs, and recreation-related METs), total METs, and academic performance. The table indicates several statistically significant positive correlations. Specifically, "Total METs" demonstrate strong positive correlations with "Work-related METs" ($r = 0.788$, $p < 0.001$), "Travel-related METs" ($r = 0.628$, $p < 0.001$), and "Recreation-related METs" ($r = 0.448$, $p < 0.001$). This suggests that overall PA levels are significantly associated with activity across all measured domains. More importantly, Table 2 reveals a statistically significant positive correlation between "Total METs" and "Academic Performance" ($r = 0.748$, $p < 0.001$). This strong association suggests that higher overall PA levels are associated with better academic performance in this population of female college students. Furthermore, individual domains of PA also show significant positive correlations with academic performance: "Work-related METs" ($r = 0.663$, $p < 0.001$), "Travel-related METs" ($r = 0.439$, $p < 0.001$), and "Recreation-related METs" ($r = 0.273$, $p < 0.001$). While the correlation with recreation-related METs is weaker than the others, it remains statistically significant.

These findings suggest a robust relationship between engagement in various forms of PA and academic success among the study's respondents. This evidence supports the notion that PA may play a beneficial role in academic outcomes for this specific cohort, aligning with the idea that promoting regular PA could be a valuable strategy for enhancing overall well-being and academic achievement among college students. However, as noted previously, the generalizability of these findings to broader or younger populations should be considered with caution.

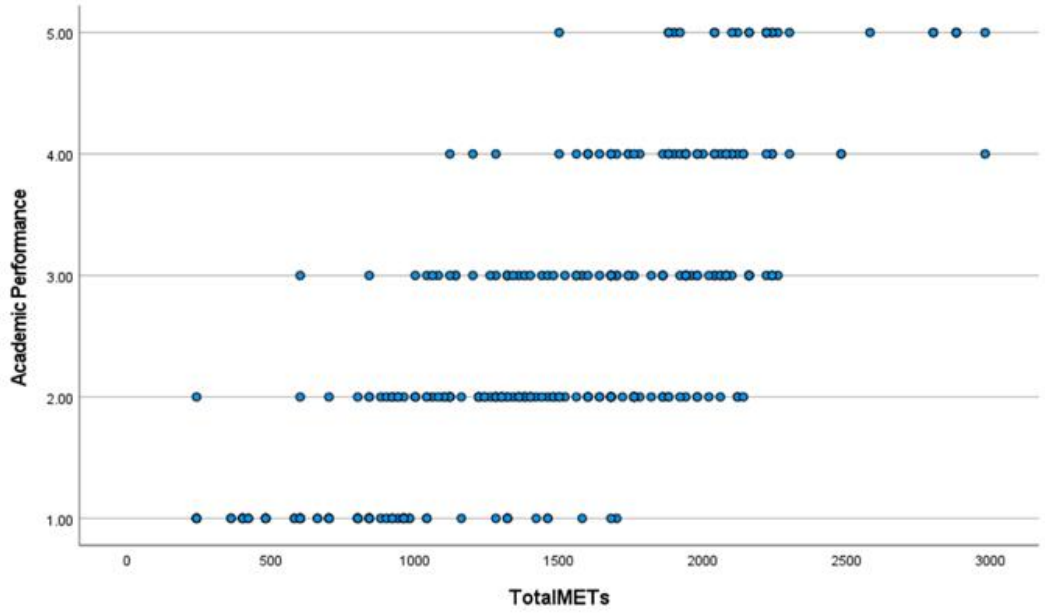
Table 2. Spearman Correlation Coefficients for All MVPA and GPA

			Work-related METs	Travel related METs	Recreation related METs	Total METs	Academic Performance
Spearman's rho	Work-related METs	Correlation Coefficient	1.000	.203**	-.004	.788**	.663**
		Sig. (2-tailed)	.	<.001	.942	<.001	<.001
		N	300	300	300	300	300
	Travel related METs	Correlation Coefficient	.203**	1.000	.233**	.628**	.439**
		Sig. (2-tailed)	<.001	.	<.001	<.001	<.001
		N	300	300	300	300	300
	Recreation related METs	Correlation Coefficient	-.004	.233**	1.000	.448**	.273**
		Sig. (2-tailed)	.942	<.001	.	<.001	<.001
		N	300	300	300	300	300
	Total METs	Correlation Coefficient	.788**	.628**	.448**	1.000	.748**
		Sig. (2-tailed)	<.001	<.001	<.001	.	<.001
		N	300	300	300	300	300
	Academic Performance	Correlation Coefficient	.663**	.439**	.273**	.748**	1.000
		Sig. (2-tailed)	<.001	<.001	<.001	<.001	.
		N	300	300	300	300	300

**. Correlation is significant at the 0.01 level (2-tailed).

In Table 3 (see Supplementary Material), the cross-tabulation illustrates a discernible trend indicating that academic performance tends to improve with increased levels of PA. A significant proportion of students exhibiting low MET scores are located in the lowest GPA band, with a corresponding increase in MET scores associated with a rise in GPA band scores. Students with low PA levels (total METs < 1000) tended to have the lowest GPA. For example, at 240 METs, four out of five students had GPAs below 2.75, with relatively few students in this MET range achieving GPAs higher than 3.00. In the intermediate MET range (1000-1600), students in this group began to show GPAs in categories as high as 3.25 and even 3.50 in some cases, although many remained in the lower ranges. A significant change was found in the high PA group (total METs ≥ 1600). This category comprised the majority of students with GPAs above 3.25, as well as all students who earned a perfect GPA of 4.00. For instance, learners with 2220 and 2880 METs had GPAs of 3.75 and 4.00, respectively. The cross-tabulation analysis revealed that positive levels of PA, as measured by metabolic equivalents (METs), were associated with improved academic achievement.

Figure 3. Scatter of Academic Performances and Total Mets



The scatter plot in Figure 3 provides visual confirmation of the strong positive correlation identified in Table 2 between PA (in terms of total METs) and academic success. While Table 2 provided the statistical measure (Spearman's rho), Figure 3 offers a direct visual representation of this association, making it easier to grasp the distribution and the general direction of the relationship. The plot graphically illustrates the phenomenon suggested by the data: that among these female college students, higher engagement in PA is broadly associated with better academic outcomes. This reinforces the argument that promoting PA could be a valuable strategy to support academic well-being in this specific population.

This study found a statistically significant link between PA and higher grades, supporting other research that suggests students who participate in organised activities perform better in college. Physical activity connects students to the college and its values, including academic success. It is also possible that college sports help people feel more connected to their colleges (Marsh & Kleitman, 2003). Furthermore, Galeano-Rojas et al. (2024) found that PA appears to be a possible coping mechanism for academic stress. This outcome may explain why college students in this study, who demonstrated a high rate (93.7%) of meeting WHO-recommended PA levels, showed a positive correlation between PA and a higher GPA, even after adjusting for MET values. The consistent adherence to PA recommendations observed in this population is notable, particularly within a context where cultural norms often restrict physical movement for girls and women in public spaces.

Discussion

This study aimed to investigate the relationship between PA and academic performance among female college students in Bangladesh. Our research also found a moderate correlation between PA and academic achievement. This outcome aligns

with moderate evidence from research employing randomised controlled trials, which suggests an association between moderate-to-vigorous-intensity PA and improvements in cognition, including academic achievement and performance on neuropsychological tests assessing processing speed, memory, and executive function (Erickson et al., 2019). While Barbosa et al. (2020) identified 41 systematic reviews and meta-analyses on the impact of PA on the academic performance of children and adolescents, reporting weak positive or negative correlations from systematic reviews and small to medium beneficial effects from meta-analyses, our findings are more consistent with those of more recent longitudinal studies. For instance, Teuber et al. (2024) conducted a daily longitudinal study and similarly concluded that universities should encourage PA to support student health and well-being, identifying a modestly positive correlation between PA and academic achievement.

The context of female college students in Bangladesh introduces unique considerations. Women's participation in public spaces, particularly where PA might occur, is often lower than that of men due to persistent patriarchal norms and social expectations. Phadke (2007, p. 1511) highlights the risks associated with women's presence in public spaces, including physical assault, reputational damage, and potential blame for being in a public space if assaulted, particularly sexual assault. Nahar et al. (2013) further support this view, arguing that patriarchy, gender norms, and the custom of purdah contribute to discrimination against girls in Bangladesh from birth, predisposing them to sexual harassment. Uddin et al. (2017) specifically found that Bangladeshi youth face gender-based environmental barriers to PA, with studies showing parents often encourage boys to exercise more than girls, which can impact educational aspirations (Moniruzzaman et al., 2017). Despite the significant cultural norms that restrict physical movement for girls and women in public spaces in Bangladesh, our study found that 93.7% of the female students met the WHO-recommended PA levels. This high compliance rate suggests that, even within a restrictive environment, female students are finding ways to engage in PA, which may contribute to their academic success. This is further supported by Hossain et al. (2021), who found that Bangladeshi university students who exercise frequently tend to perform better academically. However, it is important to consider that self-esteem and socioeconomic status may concurrently influence college performance. Hasan et al. (2020) note that students encounter environmental and social barriers that restrict their participation in PA, both on and off campus. Addressing these barriers is crucial for enhancing PA among students in Bangladesh, which could, in turn, help reduce overweight and obesity rates and improve overall health.

The primary strength of the present study lies in validating the GPAQ-2 without the use of accelerometers, which were used in some previous studies. This approach makes future research more feasible and accessible in similar contexts. Furthermore, the study meticulously followed the WHO's GPAQ recommendations, ensuring careful data collection and monitoring procedures to minimise measurement errors. While GPAQ has been shown to account for culturally relevant activities in Bangladesh (Mumu et al., 2017), the study also acknowledges findings by Moniruzzaman et al. (2017) that mechanisation, sedentary city living, better education, and higher socioeconomic status are associated with less PA among urban Bangladeshis. Unlike Babaeer et al. (2021), who found no significant relationships between university students' PA and active participation, our study observed a

significant correlation between MVPA hours and GPA. This suggests that active students may perform better academically, both in terms of classroom learning and test-taking. These positive changes, often stemming from young people's free, voluntary activities, can be challenging to quantify but are nonetheless impactful. Given the observed link, teachers and educational institutions should consider integrating physical exercise into academic planning and drills, recognising its potential to enhance overall student well-being and academic outcomes.

Limitations of the Study

Although this study provides valuable insights, several limitations must be considered when evaluating the results. First, cross-sectional designs may limit the ability to identify causal relationships between physical activity (PA) and academic attainment. Second, this study includes female college students attending a single government college in Bangladesh, which may affect the generalisability. Third, because PA was self-reported using the GPAQ, responses may be skewed due to recollection or social desirability bias, which could impair accuracy. Fourth, the conceptual framework shown in Figure 1 has a limited number of mediating elements. While these were chosen based on current literature and study feasibility, other potentially relevant mediators, such as mental health, sleep quality, or social support, were not considered and may have influenced the observed associations. Fifth, one constraint of the study is the low internal reliability of the GPAQ, as indicated by a low Cronbach's Alpha in the pilot test. This may impact the consistency of self-reported PA data and should be considered when evaluating the results. Sixth, this study did not account for potential confounding variables such as nutrition, sleep quality, mental health issues, academic pressure, and family support. These factors could have altered both PA levels and academic performance, thereby skewing the observed results. To improve external validity, future research should replicate and extend these findings to other spaces and student groups.

Conclusion and Recommendations

This study investigated the relationship between PA and academic performance among female college students in Bangladesh, a topic of significant promise given PA's documented benefits for intellectual, mental, and physical health (Stillman et al., 2020). Physical activity has been shown to enhance brain blood flow, mood, focus, and self-esteem, ultimately leading to increased academic success (Bailey, 2017). Utilising a cross-sectional design, we collected data on GPA and PA levels using the Global Physical Activity Questionnaire (GPAQ) from a random sample of 300 students out of a population of 700, following a pilot study that established reliability using Cronbach's alpha.

Overall, the study revealed a statistically significant positive correlation between academic achievement and PA, specifically demonstrating a linear relationship between MVPA hours and GPA. This alternative hypothesis was supported, indicating that increased PA is associated with higher academic performance among this demographic. The results align with the notion that PA can translate to improved performance in other learning tasks, such as vocabulary acquisition (Amico & Schaefer, 2020). Recognising that female adolescents may hold more negative attitudes towards PA

than males (Burton et al., 2019), unique engagement strategies are crucial. Promoting the 'feminine' benefits of PA, while potentially avoiding activities perceived as overly 'masculine,' could be a culturally sensitive approach to encourage participation among Bangladeshi females.

The intricate relationship between physical exercise and cognitive response is multifaceted. Stillman et al. (2020) state that three processes moderate the relationship between exercise and cognition. Their taxonomy explains cognitive benefits through (a) molecular and cellular adaptations (level 1), (b) brain structure and functional changes (level 2), and (c) behavioural and socioemotional changes (level 3). While much recent research has focused on the first two levels, this study contributes to supporting the behavioural implications, suggesting that PA enhances academic achievement and overall health. Therefore, educational institutions should actively promote PA, recognising its role in fostering students' physical, cognitive, and emotional development.

Based on these findings, we offer the following recommendations for educational institutions and future research. Firstly, it is recommended that educational institutions consider integrating non-credit PA opportunities into their curriculum to encourage regular engagement among students. Secondly, safeguarding and enhancing physical spaces where students, both males and females, can safely engage in PA is paramount. Looking ahead, future research initiatives should include more detailed assessments of students' academic behaviour to understand how PA influences study habits and engagement. Furthermore, it is essential to conduct research across various universities and demographics to determine how the link between PA and academic achievement may vary. Longer longitudinal studies are also needed to reveal how consistently physical activity (PA) affects scholastic achievement over extended periods. Finally, given the complexity of college success and PA, further research is required to determine how the academic culture of physically active students differs from that of their less active peers and how this difference influences their college performance.

While active play, recreation, sports, and safe active travel can all promote PA (WHO, 2020a), it is acknowledged that determining the optimal form, intensity, and timing of PA, as well as the potential impact of varying student ages, presents methodological constraints (Latino & Tafuri, 2023). Nevertheless, the successful implementation of PA initiatives among students could yield substantial benefits for the nation's current and future public health, overall well-being, and academic advancement.

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Ethical Clearance
This study was approved by the Research Ethics Committee of the University of Nottingham, Malaysia.

Disclosure
The authors declare no potential conflicts of interest.

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Supplementary Material

Table 3. Total Mets * Academic Performance Cross-Tabulation Analysis

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Per cent	N	Per cent	N	Per cent
Total METs * Academic Performance	300	100.0%	0	0.0%	300	100.0%

Total Mets * Academic Performance Cross Tabulation

		Academic Performance					
		<2.75	<3.00	<3.25	<3.50	<4.00	Total
Total METs	240	4	1	0	0	0	5
	360	2	0	0	0	0	2
	400	4	0	0	0	0	4
	420	2	0	0	0	0	2
	480	4	0	0	0	0	4
	580	2	0	0	0	0	2
	600	5	1	1	0	0	7
	660	2	0	0	0	0	2
	700	4	1	0	0	0	5
	800	5	1	0	0	0	6
	840	6	2	1	0	0	9
	880	1	1	0	0	0	2
	900	1	1	0	0	0	2
	920	2	2	0	0	0	4
	940	1	2	0	0	0	3
	960	5	1	0	0	0	6
	980	2	0	0	0	0	2
	1000	0	3	1	0	0	4
	1040	2	2	1	0	0	5
	1060	0	1	1	0	0	2
	1080	0	1	1	0	0	2
	1100	0	2	0	0	0	2
	1120	0	4	1	1	0	6
	1140	0	0	2	0	0	2

	1160	1	1	0	0	0	2
	1200	0	0	1	1	0	2
	1220	0	3	0	0	0	3
	1240	0	2	0	0	0	2
	1260	0	1	1	0	0	2
	1280	1	4	1	1	0	7
	1300	0	4	0	0	0	4
	1320	3	2	3	0	0	8
	1340	0	1	1	0	0	2
	1360	0	3	1	0	0	4
	1380	0	3	1	0	0	4
	1400	0	3	1	0	0	4
	1420	1	1	0	0	0	2
	1440	0	1	1	0	0	2
	1460	2	1	1	0	0	4
	1480	0	2	1	0	0	3
	1500	0	2	0	1	1	4
	1520	0	1	1	0	0	2
	1560	0	1	2	1	0	4
	1580	1	0	1	0	0	2
	1600	0	4	1	3	0	8
	1640	0	2	1	1	0	4
	1680	1	8	5	2	0	16
	1700	1	0	2	1	0	4
	1720	0	1	0	0	0	1
	1740	0	0	2	2	0	4
	1760	0	6	1	1	0	8
	1780	0	1	0	1	0	2
	1820	0	1	1	0	0	2
	1860	0	2	3	1	0	6
	1880	0	2	0	2	2	6
	1900	0	0	0	1	1	2
	1920	0	1	1	1	1	4
	1940	0	1	4	4	0	9
	1960	0	0	1	0	0	1
	1980	0	2	2	2	0	6
	2000	0	0	0	1	0	1
	2020	0	1	1	0	0	2

	2040	0	0	2	2	2	6
	2060	0	1	2	1	0	4
	2080	0	0	3	2	0	5
	2100	0	0	1	2	1	4
	2120	0	2	0	1	1	4
	2140	0	1	0	2	0	3
	2160	0	0	4	0	2	6
	2220	0	0	1	1	3	5
	2240	0	0	2	2	2	6
	2260	0	0	1	0	1	2
	2300	0	0	0	1	1	2
	2480	0	0	0	2	0	2
	2580	0	0	0	0	1	1
	2800	0	0	0	0	2	2
	2880	0	0	0	0	3	3
	2980	0	0	0	1	1	2
Total		65	98	67	45	25	300

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ORIGINAL RESEARCH

Moving to Belong: A Qualitative Study of Culturally Responsive Dance for Adolescent Motivation and Physical Activity using the COM-B Framework

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Abstract

Physical inactivity among adolescents remains a global public health concern, with long-term consequences for physical, psychological, and social well-being. This article explores the potential of dance as an intervention to increase motivation and participation in physical activity (PA) among adolescents. Through a qualitative study involving 89 adolescents aged 12–16 from three schools in the UK, the effectiveness of a culturally responsive dance programme on PA motivation, participation, and psychosocial outcomes was examined. Focus groups, reflective journals, and field notes were analysed thematically, with findings interpreted through the COM-B model. Results suggest that dance facilitated emotional expression, social connection, and physical confidence. Themes revealed dance as enjoyable, empowering, and inclusive, with students reporting increased motivation and a sense of connection and belonging. The dance programme enhanced capability through physical and emotional skill-building, provided opportunities through cultural relevance and accessibility, and motivated participants via intrinsic enjoyment and social affirmation. Findings support dance as an effective strategy for increasing motivation and participation among adolescents in PA. The study also highlights the need for inclusive pedagogical training in dance for Physical education teachers. The study offers a replicable model for global policymakers and educators seeking to enhance equity in health and education outcomes.

Keywords:
adolescent physical activity, culturally responsive pedagogy, dance education, COM-B model, gender-inclusive PE, health and well-being

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Introduction

Adolescent physical inactivity remains a pressing global health issue, with fewer than 20% of adolescents worldwide meeting the World Health Organization's recommended levels of physical activity (WHO, 2020). It has been suggested that 1 in 5 children in England is reportedly obese or overweight by the time they are five years old (Sivvas *et al*., 2015). Physical activity in adolescence may influence physical activity in adulthood, as people establish many of their lifestyle choices during this stage of development (Trost *et al.,* 2001). While physical activity (PA) in adolescence may influence activity patterns in adulthood (Trost et al., 2001), adult PA behaviour is also shaped by a complex constellation of socio-economic, environmental, personal, and behavioural factors (Trost et al., 2001). This raises questions about the extent to which adolescent activity alone determines lifelong habits.

The decline in physical activity (PA) in adolescence has been associated with

increased risks of poor mental health and reduced social connectedness (Biddle & Asare, 2011; Guthold *et al.,* 2020), as well as obesity, heart disease, type 2 diabetes, and hypertension in adulthood (e.g., Bauman, 2004), with potentially long-term consequences for physical, psychological, and social well-being. Despite broad agreement on these risks, interventions that successfully engage adolescents in sustainable PA remain limited, particularly among groups underserved and marginalised by gender, socio-economic status, or cultural background (Pearce *et al*., 2014; Slater & Tiggemann, 2010). The literature diverges on the strategies needed to support sustained adolescent PA engagement, suggesting a gap between evidence and practice.

Schools are often identified as critical settings for PA interventions due to their access, reach, and possible influence during key developmental years (Langford *et al*., 2015). Adolescence is a critical period for the development of lifelong PA behaviours. However, research is inconclusive regarding the effectiveness of school-based interventions in increasing adolescents' levels of PA (De Meester *et al.*, 2009; Parrish, 2020).

Motivation to engage in PA during adolescence is shaped by a complex interplay of intrinsic and extrinsic factors, which can significantly influence long-term behavioural outcomes. According to Deci and Ryan's Self-Determination Theory (2000), intrinsic motivation is driven by enjoyment, autonomy, and perceived competence and tends to be more sustainable, leading to greater psychological well-being. In contrast, extrinsic motivation, such as rewards or social approval, may foster short-term engagement but often lacks a lasting impact unless it supports internalised values. During adolescence, a period marked by identity exploration and heightened sensitivity to peer dynamics, motivational drivers become particularly salient. Studies by Azzarito (2009) and Jago *et al.* (2015) have found that personal relevance, social connection, and creative expression are powerful motivators for adolescents to engage in PA.

Traditional PE models, often structured around competitive sports, may fail to meet these needs, leading to disengagement, particularly among girls and minority groups (Dyson, 2014; Oliver & Kirk, 2015), who do not identify with such activities (e.g., Berger *et al.,* 2008). Innovative interventions that nurture intrinsic motivation through culturally student-centred approaches have demonstrated promise in reversing this trend by fostering enjoyment, autonomy, and a sense of belonging (Gard, 2006; Lubans *et a*l., 2016; McCarthy-Brown, 2027; Sango & Pickard, 2021).

Global policy frameworks have increasingly emphasised the importance of inclusive, relevant, and equitable physical education as a means of addressing the widespread decline in adolescent physical activity. UNESCO's *Quality Physical Education (QPE) Guidelines* (2015) advocate for pedagogies that are inclusive, culturally responsive, and learner-centred, aligning with calls to reform traditional PE models that fail to engage all young people, particularly those from underserved or marginalised communities.

These guidelines underscore the value of creative and expressive forms of movement, such as dance, as powerful tools for supporting student engagement, motivation, and psychosocial development. Similarly, the World Health Organization's *Global Action Plan on Physical Activity 2018–2030* (WHO, 2018) calls for multi-sectoral and innovative approaches to reverse global inactivity trends. The WHO advocates for culturally appropriate and community-embedded initiatives that offer equitable opportunities to participate in physical activity across the life course. This study responds to these calls by integrating a culturally responsive dance programme within school settings, aligning with global recommendations for accessible, inclusive,

and engaging physical activity interventions for youth.

There is growing interest in applying alternative, culturally relevant, and student-centred approaches to PA promotion (West et al., 2004). Culturally responsive pedagogy is an approach that recognises the importance of including students' interests and cultural references in all aspects of learning. This approach fosters relevance, engagement, and emotional safety, which are crucial for enhancing motivation and inclusive participation.

Dance has emerged as a promising strategy for delivering inclusive, engaging PA that meets these pedagogical and psychological needs. Dance can be defined as physical and expressive human movement with aesthetic and artistic value, often accompanied by sound or music, that can be both participatory and performative (Chappell et al., 2021). Dance involves, for example, moving to rhythms, repetitions, changes in direction, coordination and control, balance, and the development of movement memory (Tao et al., 2021). Dance, then, offers a holistic body-mind activity, as it encompasses physical, social, psychological, emotional, and cognitive aspects.

Evidence suggests that dance can improve cardiovascular fitness, flexibility, strength, and motor coordination (Burkhardt & Brennan, 2012; Hogg et al., 2012; Tao et al., 2021; Waugh et al., 2024; Zhang et al., 2008), while also fostering self-esteem, positive body image, mental well-being, social bonding, emotional expression, and identity development (Burgess et al., 2006; Jola et al., 2011; Oliver et al., 2017; Pickard, 2021; Quiroga Murcia et al., 2010; Samoray, 2005; Wright et al., 2016), which can be motivating, particularly for adolescents (Hackney et al., 2007).

Dance's expressive and non-verbal nature may enhance inclusion, social cohesion, and belonging (Sango & Pickard, 2024; Froggett & Little, 2012) and can bring diverse communities together. Its aesthetic and artistic value can deepen participants' emotional engagement (Sheppard & Broughton, 2020; Chappell et al., 2021).

In several countries, such as Finland and the Netherlands, dance- and movement-based initiatives have been integrated into broader educational and healthcare frameworks, yielding promising outcomes. In Finland, where holistic, arts-rich curricula are a key component of the national education system, movement and creativity are viewed as essential to student well-being and cognitive development (Kallio & Husu, 2020). Similarly, in the Netherlands, interdisciplinary programmes that combine music, movement/dance, and mental health education have been piloted as low-cost strategies to enhance adolescent mental health and combat physical inactivity (de Vries et al., 2019). These international models provide a compelling case for the scalability of inclusive, dance-based physical activity interventions, particularly in culturally diverse or under-resourced settings. They also reinforce the notion that motivation and sustained participation in PA are more likely when programmes resonate with young people's interests, identities, and emotional needs.

Nevertheless, while the literature on dance is largely positive, more critical reflection is needed on how such interventions are practically implemented within mainstream education systems. There is limited evidence on long-term sustainability and transferability, and further research should explore how school contexts, teacher training, and assessment frameworks can support or hinder innovative, inclusive PA models. Ultimately, bridging the gap between research and practice requires a critical interrogation of both structural barriers and pedagogical assumptions.

Sheppard and Broughton (2020) have explored the aesthetic, artistic, and creative aspects of dance, as well as its contribution to participants' health and well-being

through their work in active participation in music and dance. The aesthetic and artistic are experienced, perceived, and felt within dance as a combination of sensory and expressive qualities. Dance can offer a culturally relevant, expressive, and inclusive alternative to traditional PE, which can re-engage students in physical movement and foster psychosocial well-being.

This article discusses an innovative study that investigates the potential of a school-based dance intervention to increase motivation, participation, and social-emotional outcomes among adolescents in UK secondary schools, framed through the COM-B model (Capability, Opportunity, Motivation Behaviour). This study holds international significance as it addresses the global challenge of declining PA among adolescents by offering a culturally responsive and inclusive alternative to traditional PE.

With physical inactivity identified by the World Health Organization (2021) as a leading risk factor for non-communicable diseases worldwide, innovative interventions that promote sustained PA engagement are urgently needed. By situating dance within the COM-B framework, this research provides transferable insights into how motivation, opportunity, and capability can be fostered across diverse cultural and educational contexts.

Methods and Materials

The study evaluated the effectiveness of a school-based, culturally responsive dance programme designed to increase motivation and participation in PA among adolescents. At the start of the intervention, in consultation with participants at each school, the choice of dance styles and music was informed by the participants' lived experiences, preferences, and identities. This approach fosters relevance, engagement, and emotional safety, which are crucial for enhancing motivation and inclusive participation.

Drawing on the COM-B model (Michie *et al*., 2011), Figure 1 illustrates how the intervention aimed to impact PA behaviour by enhancing *capability* through skill development and emotional confidence, *opportunity* via accessible and inclusive environments, and *motivation* through enjoyment and social engagement

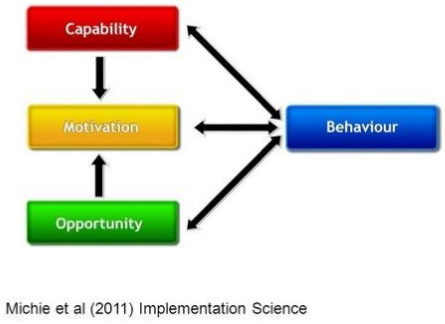

Figure 1. The COM-B Model of Behaviour

Methodology

Researcher reflexivity

Given the immersive and participatory nature of this intervention, researcher reflexivity was a key methodological consideration. The lead researcher was both a designer of the programme and a participant-observer during sessions, which positioned them in close proximity to the young people and facilitators. While this facilitated trust and deep insight into the dynamics of participation and motivation, it also carried risks of bias, particularly in the interpretation of engagement and emotional responses. To enhance rigour, reflective field notes were maintained after each session, triangulated with student reflective activities and journals, facilitator and PE teachers' debriefs, and observations. The researcher's background in dance education and commitment to culturally responsive pedagogy inevitably shaped interactions and interpretations. However, these were openly acknowledged and critically examined throughout the analytic process.

Approach

This study adopted a qualitative research design to explore adolescents' experiences of a culturally responsive, school-based dance programme/intervention. The study sought to understand how the programme influenced participants' motivation, participation, self-perception, and social engagement in PA. The COM-B model (Capability, Opportunity, Motivation = Behaviour) was used as an analytical framework to interpret how young people experienced behavioural change processes within the intervention context.

Settings and Participants

The study was conducted in three secondary schools located in urban, coastal, and rural areas of England, specifically in the South East, London, and Yorkshire.
Schools were selected based on their existing interest in integrating dance into their PE curriculum and their demographic diversity. Participation was voluntary, with informed consent obtained from parents or guardians, as well as from the school leadership teams, and assent from the students. Eighty-nine adolescents participated in the study, aged 12-16 years, across three secondary schools (South-east, n = 29; London, n = 31; Yorkshire, n = 29). Participants varied in their prior experience with dance, with 53 students reporting no formal dance training. Table 1 summarises the demographics of the 89 participants, including their gender, ethnicity, and age.

Intervention Design

The intervention was co-designed with students at each participating school to ensure that the dance styles, musical selections, and overall structure reflected participants' lived experiences, preferences, and cultural identities. This culturally responsive approach was operationalised through initial consultation workshops where students shared their musical tastes, cultural backgrounds, and prior experiences of physical activity. Facilitators then used this input to collaboratively develop session plans, with adaptations made over time in response to student feedback, thereby enhancing relevance, emotional safety, and sustained engagement (Gay, 2018; Ladson-Billings, 1995).

Table 1. Participant Demographics

Gender	n
Female	47
Male	38
Non-binary	4
Ethnicity	**n**
Black British	16
African Caribbean	10
White British	37
South Asian (Indian, Pakistani, Bangladeshi heritage)	13
Mixed heritage	7
East Asian, Middle Eastern, and other self-identified groups)	4
Prefer not to say	2
Age	**n**
12-13 years	50
14-16 years	39
Mean age=	13.8 years

The intervention consisted of an 8-week school-based dance programme**,** 70 minutes in duration, delivered during PE classes once a week. Professional dance artists and practitioners facilitated sessions in consultation with PE teachers. The intervention incorporated creative tasks featuring diverse and culturally responsive dance styles, including hip-hop, dance rooted in the Afro-Caribbean diaspora, Bharatanatyam, and contemporary dance, with a focus on inclusivity, enjoyment, self-expression, social connection, and student-led creativity**.**

To ensure transparency and rigour in implementation, the intervention followed a standardised but flexible session structure. Each school received an 8-week programme, comprising weekly 70-minute sessions. Sessions typically included: (1) a check-in circle, (2) a social warm-up/game,

sometimes chosen and/or led by a young person, and (3) mobilisation and pulse-raising activities, including 'people's choice of music. (4) a technique and skill-building component based on selected dance styles (e.g., hip hop, dance rooted in Afro-Caribbean diaspora, and/or contemporary); (5) creative tasks (6) cool-down, sometimes led by a young person from the group (7) group reflective activities and journals and dialogue.

Activities fostered peer interaction, creative expression, and iterative skill development. A summary of key activities and session objectives is presented in *Table 2*. Documentation of each session was maintained through facilitator logs, student reflection activities, and journals, which were analysed to support evaluation of participant outcomes and engagement levels.

Table 2. Example dance intervention session plan (week 4)

Session duration	Focus
70 minutes	Hip hop (foundational styles such as groove, top rock, bounce, isolations, basic footwork).
Check-in circle (10 mins)	Purpose: Build emotional safety and connection. Prompts: 'How tired are you feeling on a scale of 1-10?' 'Share one song that lifts your mood and brings you energy.' Brief reminder of the community agreements (respect, openness, everyone has a voice). Facilitator model inclusiveness. Young people stand in a circle and share briefly.
Social warm-up game (5 mins)	Choice dependent on tiredness/ energy levels: Pass the move or accumulation. Student choice/led as appropriate Encourage laughter, creativity, and connection. Optional: Music selected by students (rotating DJ of the day)
Mobilisa-tion and pulse-raiser (10 minutes)	Begin with joint mobility (wrists, shoulders, hips, knees), then isolation drills, light jogging. Groove-based warm-up to a student-selected hip hop track. Use follow-the-leader format: each person leads 8 counts of freestyle.
Tech-nique and skill building (15 mins)	Focus: Foundation movements—bounce, rock, top rock, and isolations. Central context shared. Break down each movement slowly, then build to tempo. Practise short combos with counts and then with music. Emphasis on rhythm, groundedness, musicality, and personal style.
Creative and sharing (15 mins)	Small groups choose 2–3 movements from what was taught. Add their own moves to create a short phrase. Facilitator supports with structure but encourages choreographic elements e.g., dynamics, transitions. Focus on students' cultural/music references where appropriate. Groups share if appropriate. Appreciation feedback including reference to achievements, community, and creativity and expression.
Cool down (5 minutes)	Student-led: Invite one volunteer to guide breath, stretch, or somatic (all experienced before). Relaxation to a slower, student-chosen track (instrumental hip hop or lo-fi). Include breathing and guided imagery.
Reflec-tion (10 mins)	Post-it notes on poster and/or journalling prompt: *How did today's session help you express who you are?* *What did you do to support each other?* Optional: Verbal sharing or art response (draw how the session felt). Closing circle: Appreciation shout-outs or one thing I'm taking away.

This design exemplifies how culturally responsive, student-centred approaches can be implemented systematically within a school-based PA intervention. It also illustrates how collaboration between specialist facilitators and school-based PE staff can enhance both the delivery and sustainability of such initiatives.

Professional dance artists and practitioners

Each programme was delivered by qualified dance artists and practitioners who held recognised certifications in dance, dance education, youth engagement, and safeguarding. Two of them had formal training in community or participatory arts, and all three had formal training in performance. All the facilitators had experience working with diverse and marginalised youth populations and were chosen for their ability to establish rapport and lead inclusive dance sessions. To support fidelity and relational consistency, all practitioners participated in pre-intervention training focused on cultural responsiveness, trauma-informed practice, and adolescent motivation, drawing on frameworks such as Self-Determination Theory (Deci & Ryan, 2000), COM-B, and culturally sustaining pedagogy.

PE teachers

Physical Education teachers based in each school played a key supporting role as participant observers during the intervention. Prior to the programme, PE staff received tailored training from the lead dance practitioners, which included guidance on facilitative observation, inclusive communication strategies, and recognising indicators of increased student motivation and engagement. Their presence during sessions helped bridge the intervention with the existing school context, supported continuity in physical education provision, and enabled reflective discussions around pedagogical practices that could enhance regular PE. Debriefing sessions were undertaken between the dance facilitator and the PE teacher after each intervention session.

Data Collection

Qualitative data were collected through multiple sources to allow for methodological triangulation:

- Focus groups (n = 12), organised post-intervention, stratified by gender, ethnicity, and school to encourage peer dialogue and group reflection.
- Semi-structured interviews (n = 18) with individual students, purposively sampled to represent a range of experiences and engagement levels.
- Artist/practitioner and teacher field notes, as well as researcher observations, were taken throughout the programme to capture student motivation, participation, and interactions.
- Reflective journals were completed weekly by a sub-sample of participants (n = 15), documenting personal responses, emotional engagement, and evolving motivation.

All interviews and focus groups were audio-recorded and transcribed verbatim. Ethical approval was secured, and all safeguarding and risk assessment procedures were followed. Ethical considerations are crucial to ensure the safety and well-being of adolescents. Informed consent was obtained at each session, where the purpose, procedures, and potential risks of the study were explained. Given the physical and emotional vulnerabilities associated with adolescence, special care was taken to avoid any form of pressure or harm, including issues related to body image, self-esteem, and performance anxiety. Privacy and confidentiality were strictly maintained.

Data Analysis

Data were analysed using reflexive thematic analysis and the six-phase framework (Braun & Clarke, 2006). Coding was both inductive and deductive, drawing on the COM-B model as an interpretive lens. This allowed for a rich and iterative interpretation of meaning across datasets. Initial codes were generated inductively, followed by thematic development in relation to the COM-B framework (Michie *et al*., 2011). The intervention examined *capability* through skill acquisition and confidence-building, *opportunity* by embedding the programme in the school curriculum, ensuring accessibility, and

motivation through engaging content, peer support, and self-directed creativity.

Coding was conducted in NVivo, with cross-coding and peer debriefing undertaken to ensure rigour and credibility. Member checking with a sample of participants helped verify the trustworthiness of emerging interpretations.

Materials

Materials utilised in the study included:

- Audio-recording devices for all interviews and focus groups.
- NVivo software for data coding and thematic analysis.
- Participant reflection templates and journals.
- Detailed session plans and curriculum materials co-designed with dance professionals.
- Observational checklists and field-note logs for researchers and teaching staff.

Results

Thematic analysis revealed three overarching themes that highlight adolescents' experiences of the dance intervention, connected to COM-B:

(1) Enjoyment and intrinsic motivation**;**

(2) Opportunity: Building social and cultural accessibility;

(3) Capability: Developing physical and emotional confidence;

Each theme is outlined below and supported by illustrative quotations from participants.

1. Enjoyment and intrinsic motivation

The most prominent outcome was an increase in intrinsic motivation, primarily driven by the programme's fun, creativity, and its resonance with the adolescent group. Engagement in dance with different types of music was consistently described as enjoyable and rewarding, where participants gained a sense of achievement and competence, which sustained voluntary participation.

"It didn't feel like exercise; it was just fun. I wanted to come back every week, and I have been practising at home." (Female, 15)

"Normally I hate PE, but this was actually something I looked forward to because I liked the music and learning different dance styles as well as creating." (Male, 14)

According to the COM-B model, motivation encompasses both reflective (intentions and plans) and automatic (emotions and impulses) processes. The sessions fostered positive affect and a sense of ownership over movement, stimulating both intrinsic and extrinsic motivation.

This aligns with previous literature, which shows that autonomy-supportive and culturally meaningful PA increases adolescents' motivation to be active. The emotional satisfaction derived from self-expression and achievement through dance supported a sustainable form of motivation.

Students described both reflective engagement (personal growth, self-worth) and automatic motivation (enjoyment, habit):

"We didn't even realise we were exercising, it just felt good." (Male, 12)

This response highlights intrinsic motivators and the emotional rewards that align with sustained behavioural change**.**

2. Opportunity: Building social and cultural accessibility

The dance intervention provided social and physical opportunities for participation. Culturally responsive content (e.g., music, movement styles) and the absence of traditional sport-based hierarchies made the programme more inclusive, particularly for students who were not motivated by sport.

"I liked using music from my culture. It made me feel seen." (Male, 15)

"We could show who we are through our moves." (Female, 16)

Socially, the dance intervention fostered positive peer relationships**,** built trust, and promoted collaboration through working in pairs, small groups, and as a large class. These are key aspects of the opportunity domain in the COM-B model. The safe and supportive environment encouraged interaction across usual social boundaries.

"I didn't really know anyone in my group before, but now we're like a team." (Non-binary, 16)

"Doing dance has made me feel closer to people. Playing games, creating duets and learning different dances has been fun." (Male, 14)

These findings underscore the significance of dance in fostering not only individual engagement but also broader social outcomes, including a sense of belonging**,** community**,** and inclusive participation**.**

"This was the first time PE actually felt fair. Everyone had a chance, and no one judged you." (Non-binary, 15).

"Doing dances from different cultures made me feel proud, like, this is part of me." (Male, 13).

These quotations reflect how dance, as both a physical opportunity (structured, supportive sessions) and a social opportunity (peer acceptance, cultural recognition), was crucial in fostering participation.

3. Capability: Developing physical and emotional confidence

Although the intervention did not aim to build or advance technical skill, many students reported increased confidence in their physical capabilities. In addition, some students demonstrated emotional resilience through problem-solving and creative tasks. These developments reflect the capability component of COM-B, which includes both physical and psychological factors.

"I didn't think I could dance, but now I feel more confident in myself." (Male, 13).

"When I'm stressed, dancing helped me focus and calm down." (Female, 12).

"I was a bit worried at first when we had to create something, as I have not done that before. But, it was good to work with someone. We worked it out together, and I felt that we both cared about it, so we got on with it. I noticed that usually there are a lot of people mucking about, but everyone seemed interested and improved in the dances." (Female, 12).

Participants reported some improvement in emotional regulation**,** suggesting that dance may also help develop coping strategies, body awareness, and confidence that extend beyond the sessions themselves.

"At the start I couldn't even do the warm-up without feeling awkward. Now I actually help lead it sometimes." (Male, 15).

"Learning the phrases of movement in the different styles made me realise I can *pick things up if I keep trying. It gave me more belief in myself."* (Female, 14).

The dance programme enabled the adolescents to experience increased physical capability and success. This contributes to building self-efficacy, potentially supporting long-term engagement in PA.

Discussion

Effectiveness of the Dance Intervention

Informed by the COM-B framework, the qualitative analysis and findings support

dance as an effective strategy for increasing motivation and participation among adolescents in PA. There was some evidence that the dance intervention enhanced intrinsic motivation through increased enjoyment and creativity. Additionally, dance provided accessible opportunities for engagement, particularly for individuals who were previously disengaged from traditional PE. Furthermore, the dance intervention developed specific capabilities by enhancing participants' confidence, self-expression, and emotional coping skills.

Importantly, the intervention may have contributed to positive psychosocial outcomes**,** including strengthened peer relationships, increased self-esteem, and a deeper sense of cultural and personal identity. These areas are suggested as foundational for sustained participation in PA. The findings support the integration of culturally responsive, expressive forms of PA, like dance, into school-based programmes, especially when aiming to reach diverse youth populations.

Dance and motivation: A pathway to sustained engagement

A key finding was the substantial increase in intrinsic motivation, which aligns with prior research indicating that enjoyment and self-expression are central to adolescent engagement in PA (Deci & Ryan, 2000; Lubans et al., 2016). Participants' reflections revealed that the non-competitive, expressive nature of dance offered emotional satisfaction and autonomy, both of which are essential for internalising the value of movement. Unlike performance-oriented sports, which may alienate some students, particularly girls and less confident youth (Jago *et al*., 2015), dance fosters a sense of ownership, enjoyment, and personal meaning.

Opportunity and belonging: Broadening access through cultural relevance

The dance intervention's design incorporated music and movement styles that reflected participants' interests, which was influential in increasing interest and engagement. Dance served as a vehicle for movement and a site of social cohesion, identity affirmation, and emotional expression. The creation of a safe and affirming space for young people to interact beyond their usual social groups fostered peer connections.

Building capability: Physical confidence and emotional literacy

Participants' development of physical confidence and emotional regulation during creative tasks enabled greater self-assurance in physical abilities for some students. The dance programme's emphasis on improvisation, group support, and skill development at a manageable pace facilitated psychological and physical growth. This supports prior work by Oliver & Kirk (2015), who emphasise the value of pedagogies that validate diverse bodies and competencies in PE.

Addressing challenges and resistance

While the findings highlight predominantly positive outcomes related to motivation, engagement, and psychosocial well-being, it is essential to critically acknowledge the challenges and moments of resistance that emerged throughout the intervention. Not all students engaged enthusiastically in every session; some initially expressed discomfort or scepticism toward dance, particularly if it did not align with their prior experiences or peer group norms. For a small number of participants, feelings of self-consciousness, performance anxiety, or cultural misalignment occasionally hindered full engagement. There were also examples where students experienced adolescent growth spurts and became more sensitive, self-conscious, and fatigued.

There were also instances where dance artists and practitioners, serving as facilitators, had to navigate tensions between individual expression and group cohesion, especially in co-creative components. Occasionally the school-based

PE teacher had to intervene to manage behaviour. These experiences underscore the complexity of delivering culturally responsive interventions in diverse school environments. Importantly, moments of resistance often offered valuable insight and became catalysts for adaptation and highlighted the need for ongoing dialogue, flexibility, and co-construction in programme delivery. Addressing these tensions not only strengthens the analysis but also adds credibility to the broader claim that culturally responsive dance interventions can be both impactful and contextually sensitive when thoughtfully implemented.

Implications for Practice and Policy

The findings of this study strongly align with global recommendations from both UNESCO and the WHO, suggesting that culturally responsive dance programmes are well-positioned to contribute to internationally endorsed strategies for improving adolescent physical activity. UNESCO's QPE framework promotes holistic, inclusive, and culturally grounded physical education that supports lifelong engagement in physical activity. This study echoes those principles by demonstrating how tailoring dance interventions to the cultural identities and preferences of young people can foster motivation, a sense of belonging, and sustained participation. Moreover, the WHO's Global Action Plan on Physical Activity emphasises the need for scalable, innovative approaches that reduce inequalities in physical activity engagement, particularly among young people. By demonstrating that school-based, student-centred dance interventions can engage ethnically diverse populations across varied settings, this research offers a practical, policy-aligned model that could be adapted internationally. Embedding such interventions within national curricula or youth-focused health strategies could play a key role in achieving global physical activity targets.

This study is original in its framing of the outcomes through the COM-B model, and it has demonstrated how dance enhanced all three components necessary for behaviour change: capability, opportunity, and motivation. These results suggest that dance can address common barriers to PA engagement, such as a lack of confidence or interest.

However, for such interventions to be scalable and sustainable, schools must be supported with appropriate training and resources. Teacher preparedness emerged as a key factor, underscoring the need for professional development in inclusive, dance-based pedagogy. Future research should examine long-term outcomes and explore how dance programmes can be adapted across diverse educational settings to promote equity in PA access.

To maximise the benefits of dance-based interventions, several implications arise from this study. PE teachers observed and supported the dance artists and practitioners during the intervention sessions, often managing behaviours or additional access needs. The teachers reported that they were gaining professional development from the intervention, which was an unexpected outcome. Physical educators need training in dance, inclusive and culturally responsive pedagogies, and their application to all areas of PE. This includes strategies for building psychological safety, facilitating creative tasks and expression, and tailoring content to reflect the diverse cultural contexts of students.

Further, although dance is part of the national curriculum in England until children are 14 years old, dance can also be offered as an extracurricular activity. This would provide more opportunities for adolescents to engage in PA, led by trained teachers, artists, and/or practitioners. Further, international education curricula policies could support flexible PE curricula that prioritise engagement, inclusion, and student well-being over traditional performance sports.

Implications for sustained behavioural change

An important consideration in evaluating the impact of the intervention is the extent to which it may contribute to long-term behavioural change in physical activity engagement beyond the programme's duration. While the 8-week structure provided an initial scaffold for increased motivation, self-efficacy, and enjoyment, sustainable change relies on more than short-term enthusiasm.

The intervention aimed to cultivate internalised motivation by prioritising autonomy, cultural relevance, and social connection, factors known to influence long-term PA behaviour (e.g., Deci & Ryan, 2000). Many participants reported continued interest in dance outside of the sessions, and two of the schools expressed intent to integrate similar approaches into their PE curricula.

However, structural support, such as access to facilities, continued opportunities for student-led activity, and sustained teacher engagement, is essential for lasting impact. The programme's focus on co-creation and skill-building, combined with peer leadership elements, may foster a sense of ownership that increases the likelihood of ongoing participation.

Nonetheless, future longitudinal research is necessary to assess whether and how these behaviours persist over time and what mechanisms and school structures may best support their maintenance across different educational and community contexts.

International relevance of dance as a public health strategy

Physical inactivity remains a critical global public health issue among adolescents, with long-term consequences for physical, psychological, and social well-being. As discussed in the introduction, according to the World Health Organization (2020), more than 80% of adolescents worldwide fail to meet the recommended daily levels of PA. This study provides evidence that culturally responsive dance programmes can serve as effective interventions to boost motivation and participation among young people, particularly those who may feel excluded from traditional sports. In several other countries, such as Finland, where arts-based approaches are embedded in holistic education models, and the Netherlands, which has explored the integration of movement and music to support youth mental health, dance is increasingly recognised as a viable, low-cost tool to address inactivity.

The findings from this UK-based study support the scalability of such programmes across different cultural contexts, with dance offering adolescents a non-competitive, expressive, and enjoyable alternative that promotes emotional expression, physical literacy, and social connectedness.

Policy and practice implications for global health and education systems

This study also contributes to a growing body of international evidence that dance can positively influence young people's PA behaviours and psychosocial well-being. By applying the COM-B model, a replicable framework is offered that can be adapted to diverse education systems and cultural settings. For example, in countries like Sweden and Germany, where youth mental health and sedentary lifestyles are rising concerns, dance interventions aligned with school curricula or community programming could help address both health and educational inequities. Additionally, Southern European contexts, such as Spain, Greece, and Italy, have rich dance and cultural traditions that can be leveraged within inclusive PE practices.

The recommendation for inclusive pedagogical training in dance supports equity-oriented strategies in teacher education, resonating with the goals of the EU Physical Activity Strategy (2016–2020) and aligning with broader global policy frameworks such as UNESCO's Education

2030 agenda and the UN Sustainable Development Goals (SDGs), particularly SDG 3 (Good Health and Well-Being) and SDG 4 (Quality Education). This study, therefore, has both national and international implications, offering an innovative approach to increasing adolescent PA while supporting emotional and social development through the arts.

Limitations and Future Research

A critical reflection on the researcher's positionality highlights both the strengths and limitations of this study. The researcher's active involvement in programme development and delivery fostered trust, responsiveness, and depth of engagement with participants; these are key elements in culturally situated work. However, this proximity also introduced the potential for interpretive bias, particularly in evaluating motivation and emotional connection to dance. The researcher's own values around creative expression and equity in physical activity may have influenced the framing of success and the interpretation of student responses. Recognising this, the study adopted reflexive practices, such as documenting positional reflections and incorporating multiple perspectives into the analysis. These measures aimed to uphold integrity and transparency while acknowledging that knowledge produced in such settings is always co-constructed. Future studies may benefit from including more explicitly contrasting perspectives, such as those of non-participating students or external evaluators.

This study offers some evidence of the benefits of dance, but it is based on an 8-week single intervention within three specific secondary school contexts. Future research should investigate the COM-B impacts over time through a longitudinal study of PA habits and psychosocial well-being in dance. In addition, the scalability of the dance intervention programme across various educational and cultural settings should be considered. It would also be interesting to compare studies between dance and other non-traditional PE approaches (e.g., yoga, martial arts).

Although the study was based in the UK, its conceptual framework and pedagogical approach offer adaptable insights for international education and healthcare settings. The inclusion of culturally responsive content, participatory methods, and emphasis on psychosocial outcomes provides a foundation for scalable interventions globally. Future studies should explore how culturally tailored dance programmes might be adapted for different regions to support equitable PA participation and adolescent well-being worldwide.

Conclusion

This study provides evidence that a culturally responsive, school-based dance intervention can meaningfully increase adolescent motivation and participation in physical activity, while also supporting psychosocial well-being. A key strength of the programme was its grounding in culturally responsive pedagogy, which incorporated students' identities, interests, and cultural references into the design and delivery of the sessions, promoting emotional safety, autonomy, and relevance.

By applying the COM-B model, the intervention demonstrated how building emotional and physical capability, enhancing access and opportunity, and fostering intrinsic motivation can lead to more engaging and inclusive physical activity experiences. Notably, the study highlights an unmet need for investment in PE teacher training and professional development in dance, with educators frequently citing a lack of confidence and preparation in this area. The inclusion of diverse geographical and cultural school contexts further strengthens the generalisability of the findings, offering a model for international efforts to develop equitable and effective adolescent PA interventions. These findings support the

integration of culturally relevant dance programmes into school curricula as a scalable, low-cost strategy for promoting sustained physical activity engagement.

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Notes on the Contributor

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INTERNATIONAL SPORTS STUDIES

ORIGINAL RESEARCH

Unveiling Athletic Talents: Exploring the Selection Process for Young Wrestlers in Armenian Sports Schools

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Abstract

In contemporary wrestling, talent identification plays a pivotal role due to stringent criteria for athletes, encompassing physical, mental, and emotional attributes. However, limited research exists regarding the athlete selection process in the Republic of Armenia, representing a critical knowledge gap that this study aims to address. This research investigates the criteria used to admit young athletes into Armenian wrestling training schools by analysing responses from 24 wrestling coaches through a structured questionnaire. Using coding and participative ranking methodology to evaluate the data, the findings revealed a notable absence of formal athlete selection criteria in Armenian wrestling schools. This highlights the urgent need for a structured and transparent selection system within the Armenian wrestling community. Based on the results, the study recommends comprehensive improvements—incorporating psychological, physical, and emotional criteria—to enhance fairness and effectiveness in talent identification.

Introduction

Considering the ubiquity of contemporary high-achievement sport, the burgeoning participation rates, and the heightened performance expectations placed upon athletes, the success of individuals within this domain is increasingly contingent upon an amalgamation of innate physical and psychological attributes. Presently, athletes endowed with the requisite physiological and mental predispositions for their respective sports exhibit a heightened propensity for success. Notably, premier athletic competitions often feature rigorous contests characterised by near parity among competitors. The outcomes of such contests are frequently determined by minuscule temporal differentials, marginal spatial differentials, or, in certain instances, culminate in draws. This suggests that sport is a physical battle, as well as a mental and emotional one. Nowadays, sport is characterised by the deep integration of science into all stages of sporting activity, including selection, training, and participation in competitions (Abbott & Collins, 2004; MacNamara et al., 2010). Based on this, to achieve results in high-performance sport, it is essential to select the sport correctly from the outset. For this, it is essential to guide the child and assess their physical abilities and psychological characteristics (Hardy et al., 2018).

Educators within the fields of coaching and physical education possess

a nuanced understanding that not all attributes inherent in a student can be subject to cultivation. A longstanding recognition within the pedagogical domain stipulates that, irrespective of the specific sport considered, an optimal set of characteristics is deemed desirable for a proficient sport practitioner. These attributes encompass, but are not confined to, strong emotional stability, self-assurance, self-regulation, tenacity, conscientiousness, a proclivity for leadership, initiative, a propensity for calculated risk-taking, sociability, and a pronounced motivation to achieve success (Ilyin, 2016).

Social and genetic influences shape human development. Societal knowledge, built over generations, is passed down through education, forming the foundation for pedagogical guidance (Belenco, 2009; Ovechkina & Minchenkova, 2014). Within this educational perspective, certain sociological traits—such as industriousness and conscientiousness—are considered key targets of pedagogical influence. While these traits are not entirely malleable, they can be nurtured through sustained educational interventions.

In contrast, the psychophysiological domain is more conservative and less susceptible to change. The traits of the nervous system—such as the strength, mobility, and balance of neural processes—are stable individual characteristics that significantly influence physical performance, motor skill acquisition, and overall athletic potential. Psychophysiological characteristics encompass the interaction between psychological processes and physiological responses, including reaction time, attention regulation, and stress reactivity. These can be assessed through established measures such as the Stroop Test (for cognitive control and attention) and Goleman's Emotional Intelligence (EQ) framework (for understanding emotional regulation and social adaptability) (Goleman, 1995; MacLeod, 1991). Belenko (2009), along with Ovechkina and Minchenkova (2014), emphasise that careful assessment of these psychophysiological characteristics, particularly in athletes in football and basketball, enables coaches to better align athletes with sports that match their innate capabilities. Their findings suggest that athletes possessing specific neurological traits are more likely to achieve elite performance levels, highlighting the value of integrating psychophysiological evaluation into the talent selection process.

Genetic factors inherently underpin the developmental potential of an organism. Nevertheless, realising these latent possibilities necessitates direct engagement with the organism's environment. Therefore, all human characteristics manifest as a product of the intricate interplay between heredity and environmental influences. It is imperative to avoid underestimating the impact of environmental factors or the significance of genotype, as both play pivotal roles in shaping the multifaceted spectrum of human traits and characteristics (Epstein, 2013; Hossein et al., 2016). Morphological traits are highly heritable. Consequently, developing these traits proves challenging, which lends them substantial prognostic value in assessing athletic abilities (Franchini, 2021; Platonov, 2006, 2018).

While promoting a healthy lifestyle and cultivating mass sport participation hold significance in our republic, children's early initiation into sport is paramount for their subsequent specialisation. Early sport orientation facilitates the optimal realisation of a child's sporting potential and proves instrumental in resource optimisation for

both the athlete and the coach. This strategic approach aids in the judicious allocation of time and financial resources, thereby streamlining the developmental trajectory. It is noteworthy that a substantial proportion of sports schools in the Republic of Armenia (RA) operate under state auspices, resulting in significant per capita financial investment.

Some athletic disciplines demand an intensity of exertion that borders on the exceptional, and wrestling is one of them. Wrestlers often face gruelling competition schedules, engaging in three to five bouts daily, which impose substantial physical demands and considerable psychological pressures. This situation underscores the importance of psychological resilience and stability as essential factors in sustaining high performance under such conditions.

Among the psychological attributes essential for wrestling success, emotional intelligence and neuropsychological stability are particularly important. Emotional intelligence refers to the ability to perceive, understand, manage, and utilise emotions effectively in oneself and others (Goleman, 1995). In high-stakes combat sports such as wrestling, it allows athletes to cope with stress, make strategic decisions under pressure, and maintain emotional control during competition. Neuropsychological stability, often associated with traits of the nervous system such as emotional regulation, attention control, and behavioural consistency, underpins an athlete's ability to remain focused and adaptive in unpredictable and rapidly changing match environments. These traits can be evaluated using standardised tools such as Goleman's Emotional Intelligence framework for assessing interpersonal and intrapersonal emotional competence, and the Stroop Test for measuring cognitive control and selective attention (MacLeod, 1991). The inclusion of these attributes in our analysis is supported by previous research highlighting their predictive value in elite athletic performance (Ilyin, 2016), as well as their direct alignment with the cognitive and emotional demands of wrestling.

In the broader literature, neuropsychological stability is commonly assessed through tools such as the Stroop test, reaction time assessments, and stress tolerance evaluations. These tests quantify cognitive flexibility, impulse control, and overall mental resilience—key components for peak athletic performance. However, in the current study, standardised testing instruments were not employed directly, owing to logistical constraints and the exploratory nature of this initial investigation into Armenia's athlete selection system. Instead, psychological factors were indirectly assessed through coach-reported criteria and perceptions included in the questionnaire.

This approach, although limited in objectivity, offers foundational insights into how psychological readiness is informally assessed during athlete selection. Future studies should incorporate validated psychological assessments, such as structured emotional intelligence scales, executive function tests, and stress resilience measures, to enhance precision and comparability across athletes. By systematising the evaluation of these traits, wrestling development programmes can better prepare athletes for the sport's rigorous mental and emotional demands and enhance long-term performance outcomes.

Consequently, aligning the athlete with a sport that harmonises with their physical and psychological attributes can yield substantial cost savings and

facilitate the attainment of high-level accomplishments. To realise this synergy, implementing a sophisticated sport selection system becomes imperative. Such a system should be aimed to predict an athlete's potential success and achievements from the initial stages of selection. This situation necessitates a comprehensive evaluation encompassing not only morphological characteristics but also an in-depth consideration of psychological traits and genetic predispositions. Such a holistic approach to sport selection is integral for optimising resource allocation and enhancing the likelihood of an athlete's success in their chosen discipline (Chernenko et al., 2020; Maksum & Indahwati, 2023; Sidorenko & Nechuvilin, 2022).

Moreover, the absence of a robust sport selection system contributes to a notable attrition rate among trainees. While preparatory groups may initially accommodate thousands of children, the transition to advanced training and sport skill improvement groups typically witnesses a considerable reduction, with only a limited cohort, perhaps a dozen or two trainees, continuing. This phenomenon poses a significant challenge, particularly for countries with small populations, such as Armenia. Implementing an effective sport selection framework becomes imperative in mitigating this challenge, optimising resource utilisation, and fostering the sustained development of athletes.

A crucial facet in the preliminary selection process, essential for subsequent athletic development, involves determining the optimal age for prospective wrestlers. Although identifying future wrestling talents early is challenging, it is necessary to conduct fitness tests at the beginning of training. Conducting fitness assessments not only helps gauge the physical aptitude of aspiring wrestlers but also serves as a valuable metric for identifying latent potential. These tests make a substantial contribution to refining the selection process, enabling a more nuanced understanding of the athletes' baseline physical capabilities. Moreover, the incorporation of fitness assessments assists in crafting tailored training regimens, ensuring a holistic and individualised approach to athletic development. As such, the judicious integration of fitness testing into the early stages of wrestler selection fosters a more informed and strategic trajectory for the development of aspiring athletes' careers (Khodayari et al., 2014; Platonov, 2006; Platonov, 2018).

The considerations outlined above underscore the heightened relevance of the sport selection issue within the Republic of Armenia. Several developed nations have established long-standing, effective systems for athlete selection, which are integral components of their overall sport policies. Diverse methodologies and perspectives on athlete selection exist, with varying authors advocating distinct stages in the selection process. Nonetheless, a consensus prevails among experts that the selection process ought to be multilevel, encompassing distinct sets of indicators at each stage. This convergence of perspectives underscores the clear need for a comprehensive and nuanced approach to athlete selection, recognising the multifaceted nature of sporting potential.

There is a growing consensus that effective athlete selection must adopt a multilevel and multidimensional approach. This aligns with the Multidimensional Model of Talent Identification and Development (MMTID) proposed by Abbott, Button, Pepping, and Collins (2005), which posits that talent identification should

not rely on isolated traits or short-term performance outcomes. Instead, the model emphasises the importance of assessing a combination of physical, psychological, technical, and sociocultural factors that develop. The MMTID framework supports the implementation of multi-stage, longitudinal selection systems, which are currently absent in the Armenian wrestling context. Furthermore, it highlights the importance of incorporating coach perceptions as valuable insights into an athlete's potential, especially in the early stages of talent identification. By integrating this framework, the present study adopts a comprehensive perspective that acknowledges the complex and dynamic nature of sport talent development, thereby justifying the investigation into existing selection practices in Armenia.

Since gaining independence, Armenia has produced only two Olympic wrestling champions, a modest result for a nation where wrestling is considered a national sport and occupies a central role in the country's athletic identity. Although wrestling participation is high and state-supported, Armenia's limited international success suggests a lack of structured, evidence-based selection criteria for wrestlers. Most wrestling schools in Armenia are publicly funded; however, in the absence of clear guidelines for talent identification, resources are often invested in children who may lack the requisite attributes for elite performance.

This results in both human and financial inefficiencies: many children spend years training without progressing to the professional level, and valuable state resources are expended without a measurable return in terms of national or international sporting success. The absence of structured selection frameworks means that decisions about admitting children into wrestling programmes are often subjective, leading to inconsistencies and missed opportunities to support genuinely talented individuals. Therefore, the development and implementation of a data-driven sport selection system are not merely desirable—they are essential. By identifying athletic potential early and directing support toward those most likely to succeed, Armenia can increase its chances of producing world-class athletes while maximising the impact of its limited developmental resources. The purpose of this research is to comprehensively investigate the sport selection system within the Republic of Armenia, with a specific focus on individuals admitted to sports schools for wrestling training.

Methodology

Study Context and Rationale

Given the absence of explicit standards governing sport selection procedures in Armenia, this study aimed to investigate the current practices used by coaches to select young athletes. In the Republic of Armenia, most state schools operate with broadly inclusive admission processes; however, there is limited guidance on how children are identified and enrolled in specific sport disciplines. This research was designed to gather expert perspectives and gain a deeper understanding of the real-world factors that influence selection decisions, thereby informing the potential development of evidence-based frameworks.

Participants

The survey involved 24 wrestling coaches from the Institute of Physical Culture and Sports of Armenia and the sport schools named after Tork Angeg. These coaches represented disciplines including Greco-Roman wrestling,

freestyle wrestling, sambo, and judo. Although limited, the participants were purposively selected from a larger pool of approximately 100 eligible coaches due to their strategic value as key decision-makers within Armenia's national sport federations. They were selected based on criteria such as years of professional experience, past athletic achievements (all were members of the RA youth and adult national teams), involvement in decision-making processes, and roles within the governing bodies of wrestling federations. Many are directly engaged in the admission process, providing them with firsthand knowledge of existing selection practices. Additionally, their substantial experience as former athletes and coaches equips them to offer nuanced insights into the realities of athlete selection in Armenia.

While the small sample size may limit the study's ability to generalise findings at a national level, the targeted inclusion of these high-profile decision-makers provides depth and relevance to the analysis. Their collective expertise enables a focused understanding of the gaps and practices in Armenia's current approach to talent identification and development. Expanding the sample size to include a larger cross-section of coaches from diverse regions and disciplines is recommended to strengthen future research and allow for broader conclusions.

Research Design and Data Collection

The study employed a Participative Ranking Methodology (PRM), a mixed-methods approach that engages knowledgeable participants in generating and prioritising responses to a specific research question or set of questions. PRM integrates quantitative and qualitative methods to produce contextually rich data that is amenable to ranking, comparison, and analysis within or across participant groups. This methodology encourages active participant engagement, facilitating the identification of key insights while allowing for in-depth analysis where resources permit (Skinner et al., 2014).

This research utilised a specially designed questionnaire featuring both general and specific questions, with a strong emphasis on open-ended items to allow respondents to share their detailed professional insights. The questionnaire was developed based on the authors' expertise, grounded in extensive professional experience in sport psychology, physiology, and sport science, with a particular focus on long-term work with combat sport athletes, and supplemented by a thorough review of relevant literature in talent identification and athlete development.

To enhance its content validity, the instrument was evaluated for clarity, relevance, and comprehensiveness by a panel of experts, including a sport psychologist, a sport psychophysiologist, and two head coaches of Armenia's national youth and senior wrestling teams. Although the questionnaire was not formally piloted or subjected to statistical validation, this expert review process ensured that the questions were contextually appropriate and meaningful for the target population.

The study was conducted anonymously and voluntarily at the Armenian State Institute of Physical Culture and Sports and Tork Angeg Sports School during a professional training course in December 2023. The PRM was employed to capture firsthand perspectives on sport selection, leveraging coaches' extensive personal experiences. This approach was particularly suited for exploring the informal selection processes in Armenian sports schools. A structured

questionnaire enabled respondents to rank selection criteria based on their observations and preferences, facilitating a nuanced understanding of current practices within a reflective and open educational environment.

Data Analysis

During data analysis, a systematic qualitative content analysis was employed to identify and code recurring themes from the coaches' responses. Initial open coding was conducted to categorise key concepts and patterns, followed by axial coding to group related codes into broader thematic categories. To complement this qualitative approach, PRM was utilised, allowing respondents to rank the importance of various selection criteria quantitatively. This mixed-methods approach enabled the quantification of response frequencies and prioritisation of themes while maintaining the depth and richness of qualitative insights. Although the study's sample consisted of 24 coaches, the integration of rigorous coding procedures and ranking methods provided a comprehensive overview of current selection practices. Future research with larger samples and more advanced statistical analyses will further validate and refine these findings, supporting the development of standardised, evidence-based athlete selection frameworks within Armenian sports schools.

Results

This study involved 24 experienced trainer-educators who completed a structured questionnaire. The participants represent a cross-section of Armenia's wrestling coaching community, encompassing Greco-Roman wrestling, freestyle wrestling, sambo, and judo. Their backgrounds span both Soviet-era and modern training systems, offering a unique blend of traditional and contemporary coaching perspectives. At the time of the study, the coaches, on average, were 39 years old and had approximately 12 years of combined coaching and pedagogical experience. The group was predominantly male (87.5%), with a small proportion of female coaches (12.5%).

All participants had competitive or professional backgrounds in sport—50% were multiple-time winners or medallists in national championships, while others had achieved European or international recognition. Notably, 87.5% of the coaches worked primarily with athletes aged 6–18, reflecting a strong focus on youth development within Armenia's state-supported wrestling programmes. This diverse and extensive professional experience provides a valuable foundation for examining current athlete selection practices. While preliminary results indicate limited awareness of formal selection criteria and a predominant emphasis on physical traits over psychological characteristics, the sections that follow offer a more critical exploration of how individual coaching practices intersect with broader issues of system-level governance and evidence-based talent development.

All interviewed coaches were members of the RA youth and adult national teams. Twenty-one (87.5%) of the interviewed coaches work with athletes aged 6-18, and three (12.5%) work with adults. This data indicates a strong focus on youth development in Armenia's wrestling programmes. In the Republic of Armenia, there are state-run, free sport schools, where mainly preparatory and training groups are located, accepting children from 6 to 8 years old, depending on the sport. The first question in our questionnaire was about "how coaches select children for

their team." Nine of the interviewed coaches (37.5%) stated that they accept a sport school or group at the child's request, six (25%) with the doctor's permission, six (25%) taking into account physical fitness, two (8.3%) taking into account the hereditary characteristics of the child, and one of the coaches (4.2%) only stated that they take into account the reticular characteristics by applying special tests.

The coaches were asked, "Are there specific criteria for your sport?" Eight of the coaches (33.3%) indicated that there are no special criteria for practicing their sport, seven (29.2%) indicated that flexibility and agility are essential criteria, one (4.2%) indicated genetic data, one (4.2%) considered psychological characteristics as a special criterion, and seven (29.1%) considered the desire to do sport, strength, anthropometric data, health status, etc., as criteria.

The next question pertained to the standards for sport selection in RA. Sixteen respondents (66.6%) answered this question. Nine of the respondents (56%) indicated that they were not aware of the sport selection criteria, four (25%) indicated that there were no existing criteria, and the remaining three (19%) indicated that it does not work.

Most of the interviewed coaches consider the presence of basic motor abilities as an essential criterion for practising their sport: strength, agility, endurance, and coordination. However, some coaches gave special emphasis to stress resistance, willpower, self-control, persistence, and friendliness. It is notable that most coaches still emphasise the physical data, largely ignoring the psychological indicators.

Eighteen of the coaches answered the question of whether there are special criteria for admitting children to a sports school. Eight of the respondents (44%) stated that they value physical data, three (17%) answered that they accept taking into account the child's age, the other three (17%) value the child's health condition and the necessary consideration of the presence of a medical certificate, and four coaches gave different answers.

One of the coaches believes that the child's hereditary and psychophysiological data, as well as their ability to reason, are essential for admission to a sports school. Another coach believes honesty, hard work, will, and desire are crucial. Two other coaches state that there are no special criteria for admission to the sport school.

Our last question concerned the qualities an athlete should possess. Not all respondents answered this question; however, 18 (75%) did. Various answers were given to this question as well. However, eight coaches (44.4%) emphasised the will characteristics: the will to fight, the will to train, and the will to win. The other 10 (55.6%) provided different answers, including courage, honesty, respect, discipline, and others.

The interviews of 24 Armenian coaches revealed that 37.5% select athletes based on personal requests, 25% prioritise physical fitness, and 56% are unaware of or report no formal selection criteria, indicating a lack of standardised, evidence-based selection practices. Based on these analyses, the researchers concluded that it is imperative to establish a unified system for sport selection and orientation in the Republic of Armenia. Such a system would enable the scientifically validated implementation of the sport selection process, thereby optimising time and financial resources.

Table 1 presents key open-ended questions and the frequency of overlapping responses given by the 24 participating coaches. The terms

"common answers" and *"rare answers"* refer to the proportion of participants who provided similar responses to a given question. These were determined by grouping responses with comparable themes or wording through an inductive thematic analysis. No advanced coding software was used; instead, content was manually reviewed and categorised based on recurrence and semantic similarity.

The ranking shown in the table is based on the percentage of respondents who gave matching or thematically similar answers, listed in descending order under the "common answers" column. Conversely, the "rare answers" column shows how infrequently those same questions received consistent or recurring responses from the group. This dual presentation helps illustrate both consensus and variation in coach perceptions related to athlete selection.

Table 1. Frequency of Common and Rare Responses to Key Questions on Athlete Selection

Question Number	Question Topic	Common Answers (%)	Rare Answers (%)
N6	Are there special criteria for choosing children to play any sport in Armenia?	56	4
N9	What qualities do you think an athlete should have?	55.6	4
N8	What standards are you guided by when accepting children to your group?	44	17
N4	How do you select children to practice in your group/team?	37.5	19
N5	Are there any specific criteria for playing your sport?	29.2	44

(1)N6: Are there special criteria for choosing children to play any sport in Armenia? (2) N9: What qualities do you think an athlete should have?

To facilitate reference, each questionnaire item was labelled (e.g., *N6*, *N9*) and is explained in footnotes above. Responses were categorised based on frequency: "common" responses were those endorsed by more than 50% of participants, indicating shared views among the coaches, while "rare" responses were those supported by fewer than 30%**,** reflecting limited agreement or relevance. For example, N6[1], regarding the existence of formal selection criteria, was affirmed by 56% of respondents, suggesting a broadly held perception. Similarly, N9[2], which inquired about essential athletic qualities, was endorsed by 55.6%, indicating a consensus around key psychological traits. These classifications helped distinguish between dominant and peripheral perspectives within the coaching community.

Discussion

The findings of this study offer important insights into the current practices of athlete selection in Armenian sports schools, revealing key patterns, systemic gaps, and areas for improvement. While wrestling remains a culturally significant and widely practised sport in Armenia,

the mechanisms used to identify and nurture young talent are marked by inconsistency, informality, and a narrow focus on physical traits. In this section, we examine three major themes that emerged from the data: over-reliance on physical criteria, the lack of standardised selection frameworks and tools, and the underutilisation of psychological assessment in identifying athletic potential. Together, these themes highlight critical challenges and missed opportunities within the national talent development system.

1. Over-reliance on Physical Criteria.

The early identification and development of athletic talent require a nuanced balance between biological predispositions and contextual influences. However, our findings suggest that current selection processes in Armenian sports schools remain disproportionately reliant on observable physical characteristics. A significant proportion of coaches (56%) admitted to having no formal criteria for athlete selection, and only 4.2% reported using any structured or psychometric tools for this purpose. These results underscore a prevailing bias towards anthropometric features and physical capacity—such as strength and endurance—over holistic evaluation methods. This over-reliance neglects the complex, multi-dimensional nature of talent (Abbott et al., 2005) and risks excluding athletes whose primary strengths may lie in psychological resilience or cognitive agility.

2. Lack of Standardisation and Formal Tools.

The absence of a unified national framework for athlete selection in Armenia reflects a deeper systemic issue: the gap between theoretical best practices and their practical application. Coaches' responses revealed a lack of consistency in how children are recruited, with many admitting that selection decisions are often made informally or in response to competition needs, rather than through a long-term developmental lens. This reactive and unstandardised model compromises the reliability and fairness of talent identification processes (Abbott & Collins, 2004) and undermines efforts to develop sustainable athlete pipelines. The lack of structured assessment tools—particularly in the psychological and cognitive domains—further limits the validity of current practices.

3.Missed Opportunities in Psychological Assessment.

Despite growing recognition of the role that psychological attributes play in long-term athletic success (MacNamara, Button, & Collins, 2010), Armenian coaches continue to prioritise physical traits over mental or emotional qualities. While motivation, discipline, and adaptability are frequently cited in talent development literature as critical determinants of elite performance (Goleman, 1995; Epstein, 2013), these variables were rarely mentioned by coaches in our study. This oversight suggests a missed opportunity to integrate emotional intelligence, coping strategies, and intrinsic motivation into the selection process—factors that may be especially vital for success in high-pressure sports such as wrestling or judo. Without tools to assess these components, many psychologically gifted yet late-developing athletes may be overlooked.

Conclusion

This study, supported by both empirical findings and a synthesis of relevant scholarly literature, confirms the critical importance of early talent identification in sport, particularly in the context of Armenian wrestling. Notably, the research reveals significant shortcomings in the current selection system: 56% of coaches report being unaware of formal selection criteria, and talent identification remains predominantly reliant on physical attributes, often overlooking psychological and cognitive dimensions of performance. The minimal use of formal testing and psychometric tools highlights a missed opportunity for more objective and holistic talent evaluation. Together, these findings indicate that the system is fragmented and overly reliant on subjective judgement, hindering fair and effective athlete development.

To address these deficiencies, there is an urgent need to establish a structured, inclusive, and evidence-based selection framework for youth wrestling in Armenia. A more systematic approach will enhance the fairness and efficiency of talent identification and enable the development of a new generation of athletes equipped to compete at national and international levels. By transitioning from informal, locally driven practices to a standardised model grounded in scientific criteria, Armenia can strengthen its wrestling programme and more fully realise its athletic potential.

Limitations

This study has several limitations that should be acknowledged. First, the sample size was relatively small and limited to a specific cohort of wrestling coaches, which may restrict the generalisability of the findings beyond the Armenian context. Second, the study did not incorporate direct input from athletes, whose perspectives could provide valuable insights into the selection experience. Lastly, the questionnaire instrument used was not subjected to formal pilot testing or psychometric validation, which may affect the reliability and consistency of the responses. These limitations point to important directions for future research, including larger-scale, multi-perspective studies and the refinement of assessment tools.

Recommendations

Based on the findings of this study and its contribution to ongoing research on talent identification in wrestling, the following recommendations are proposed.

1. *Develop a national talent selection framework*. Establish a standardised, sport-specific selection protocol for wrestling schools that integrates physiological and physical criteria tailored to the developmental needs of young Armenian athletes.

2. *Integrate objective assessment tools.* Incorporate validated instruments, such as emotional intelligence assessments, age-appropriate psychometric tools (e.g., the adapted Kholle test), beep tests for endurance, and field dependence/independence measures, to ensure a comprehensive evaluation of athletic potential.

3. *Expand stakeholder involvement.* Engage a broader range of stakeholders, including sport psychologists, physiologists, educators, and policymakers, to refine and validate the proposed framework. This multidisciplinary approach will enhance the framework's relevance, applicability, and sustainability.

4. *Strengthen research through larger samples.* As this study forms part of a thesis project, future research should involve larger, more diverse samples to enable statistically robust analyses and generalisable findings.

5. *Train coaches in evidence-based practices.* Provide training and capacity-building opportunities for coaches on talent identification tools, interpreting test results, and integrating psychological assessment into athlete development.

6. *Policy support and implementation.* Collaborate with national sport authorities and education ministries to formally adopt and institutionalise the selection framework within Armenia's youth sport development programmes.

By adopting these recommendations, Armenia can move toward a more equitable, scientifically grounded, and effective system of talent identification, ensuring that all young athletes, regardless of background, can pursue excellence in sport.

Ethics

The study was approved by the Ethics Committee of the Armenian State Institute of Physical Culture and Sport (protocol code 2023-PT-4) and was conducted in accordance with the *Declaration of Helsinki*.

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PERSPECTIVE

Physical Activity's Impact on Anxiety Management: A Systematic Review

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Abstract

Anxiety is a prevalent mental health concern among adolescents, which has prompted an increase in research examining the potential benefits of physical activity (PA) interventions. While PA has been explored as a potentially efficacious approach, research findings remain fragmented. The findings from 12 studies, analysed using the PRISMA framework, highlight the significant role of PA in managing anxiety among adolescents. Notably, higher levels of PA were linked to lower anxiety levels and a lower prevalence of anxiety-related symptoms. Despite the fact that some studies revealed gender and age-dependent differences in anxiety outcomes, a consistent trend highlighted the overall beneficial effects of PA. Thus, these studies demonstrate that PA interventions may effectively reduce anxiety in adolescents. Encouragement of PA, particularly in school and community contexts, emerges as an effective and accessible strategy for promoting the mental health of adolescents. These results support incorporating PA initiatives into larger mental health promotion and management programmes for this vulnerable population, offering valuable insights for policymakers and educators.

Introduction

Mental health is fundamental for development and well-being [World Health Organization (WHO), 2021]. Approximately one billion individuals globally experience some kind of mental disorder, with anxiety and depressive disorders being the most common [United Nations (UN), 2022]. These figures increased by more than 25% during the COVID-19 pandemic (UN, 2022). It is further estimated that one out of every two people will develop a mental disorder in their lifetime (McGrath et al., 2023). Like most mental health problems, anxiety disorder typically originates during childhood or adolescence (Merikangas et al., 2009). There is evidence, however, that mental health disorders are prevalent during the adolescent phase, when young people enter a pivotal period during which they are especially vulnerable to adverse social influences and health consequences

(Castelpietra et al., 2022; WHO, 2017), and when fluctuations in health can establish health trajectories that will be felt for many years.

Anxiety disorders, which entail excessive perceptions of fear or threat, evident, for instance, in social and generalised anxiety disorders, are among the most common mental disorders among adolescents, often beginning during childhood and following a chronic course (Antony et al., 2009). The most recent Global Burden of Health project (Institute for Health Metrics and Evaluation 2019) estimates anxiety disorders to be the most prevalent mental health problem globally. There is, however, substantial variation, with reported figures for anxiety among adolescents ranging from 17.0% (Eastern Mediterranean Region) to 4.0% (European Region). Considering the prevalence of mental disorders, it is important to identify activities and interventions that support adolescent mental health.

Anxiety is a sensation that is characterised by stress, worry, tension, nervousness, and unease (Munir et al., 2022). It is a normal response to stress and a typical human emotion characterised by various responses (e.g., behavioural, affective, and cognitive) to perceived threats. The purpose of the physical symptoms of anxiety is primarily to prepare the body to cope with the threat (Steimer, 2002). Hence, the anxious sensation is one of our body's natural defence mechanisms, alerting us to threats and preparing our bodies to fight back or flee a dangerous situation, also known as the 'fight, flight, or freeze' response. However, it can be considered excessive or pathological when such responses cause significant distress or are out of proportion to the perceived source of stress (Bhatia & Goyal, 2018). In other words, when anxiety becomes unmanageable to the point where it affects one's quality of life, it may lead to anxiety disorder. Usually, the feeling of anxiousness is reduced as the stressor is removed (Chu et al., 2024). However, with anxiety disorders, eliminating the stressor or trigger does not necessarily reduce or remove the anxiousness (Schneiderman et al., 2005). The most common anxiety disorders include panic disorder (panic attacks), generalised anxiety disorder (excessive worry), social anxiety disorder (excessive fear in social situations), specific phobias (excessive fear of an object or situation), and separation anxiety disorder (excessive fear about separation from a certain individual) (Bandelow & Michaelis, 2015).

A growing evidence base supports the claim that sporting activities may help manage distress, including anxiety (D'Angelantonio et al., 2022; McMahon et al., 2017; Panza et al., 2020). In addition, adolescents who participate in the WHO-recommended 60 minutes or more of moderate-to-vigorous PA can significantly benefit from engaging in sporting activities (Bailey, 2018), as well as experiencing fewer anxiety and depression symptoms (Biddle et al., 2019; Hale et al., 2021; Rodriguez-Ayllon et al., 2019). For example, a meta-analysis investigating the association between PA and panic/anxiety demonstrated a small but significant effect of PA interventions in reducing panic disorder while also reducing anxiety (Wang & Liu, 2023). A systematic review and meta-analysis concluded that PA might be a useful approach to address anxiety symptoms in children and young people based on a moderate improvement in state anxiety, compared to no intervention or minimal intervention control conditions and significantly superior effects on state anxiety when compared to a time- and attention-controlled group (Carter et al., 2021). Physical activity (PA) (D'Angelantonio et al., 2022) and social connectivity (Eime et al., 2013) are two aspects that have been independently established to be protective against anxiety. It has been argued that organised sports and other types of PA offer a mix of these factors, which are potentially helpful and have been studied independently as

protective factors for anxiety. Furthermore, these activities are typically low-cost, easily adapted, and without significant side-effects or stigma (Vancampfort et al., 2017).

PA enhances the synthesis of anti-anxiety neurochemicals, including serotonin, gamma-aminobutyric acid, brain-derived neurotrophic factor, and endocannabinoids (Ratey, 2019). Moreover, PA stimulates the frontal lobe, which is linked to executive function, aiding in regulating the amygdala, the brain's mechanism for responding to perceived or actual dangers (Ratey, 2019). Physical activities can serve as a distraction, allowing individuals to break free from the cycle of negative thoughts that exacerbate anxiety. Participating in PA alleviates muscle tension, a prevalent sign of numerous anxiety disorders. Furthermore, regular PA fosters social connection and enhances self-esteem. Bartolomeo and Papa (2017) posited that participation in team sports enhances prosocial behaviours and fosters social identity and a sense of belonging among team members.

This review examines the relationship between sports participation and anxiety. Participation is understood here in terms used by the Council of Europe's European Sports Charter (CoE, 2001): "all forms of PA which, through casual or organised participation, aim at expressing or improving physical fitness and mental well-being, forming relationships, or obtaining results in competitions at all levels" (Bailey et al., 2023). In other words, sport is regarded as a communal and/or recreational pursuit accessible to many young individuals. Our usage excludes elite or sub-elite youth populations, which we propose should be considered a distinct sub-population. Athletes frequently encounter significant expectations, such as elevated training demands, competitive stress, and inadequate recovery (Küttel & Larsen, 2020; Nicholls et al., 2020). Several systematic reviews and meta-analyses have reported that playing top-level youth sports is associated with heightened symptoms of mental ill-health, including anxiety, depression, and eating disorders (Kegelaers et al., 2022; Rice et al., 2019; Walter et al., 2022).

Adolescent anxiety is a public health concern, with prevalence rates increasing globally (UN, 2022). Given the limited accessibility and stigma associated with pharmacological and psychological interventions, non-pharmacological approaches, such as PA, have gained attention. While previous reviews have explored this relationship, few have systematically examined the contextual factors mediating its effects, such as social interaction and resilience. This review contributes to the literature by synthesizing studies from 2018 to 2023 and offering a broader perspective, including various study designs and contexts.

Methods

This research methodology is based on rapid reviewing principles, integrating established systematic review strategies with modifications to provide faster and more varied insights (Tricco et al., 2015). This methodology is influenced by prior research conducted by Public Health England on PA assessments (Chalkley et al., 2015). It involves a deliberate search, thorough integration, and systematic translation of relevant literature on Active Schools. An advantage of this approach lies in its ability to maintain the rigour of established research procedures while affording the flexibility to prioritise our project's core question: 'What works?' This careful balance ensures both thorough data gathering and the pursuit of practical outcomes. It also provides timely evidence to inform policy and practice. Studies predating 2018 were excluded to ensure relevance to current adolescent experiences, particularly considering recent socio-environmental factors such as the COVID-19 pandemic.

Data Collection

Our data collection technique involved searching three specialised databases: Google Scholar, SPORTDiscus, and the Psychology & Behavioural Sciences Collection. We focused on peer-reviewed journal publications published between January 2018 and March 2023. To thoroughly address our subject, we employed the following search terms: sport* OR physical activity* AND adolescent* OR youth OR teenage* AND anxiety. The search phrases were optimised through several trials to ensure acquisition of the most pertinent results on anxiety management via physical activities.

Exclusion Criteria

Given the anticipated volume of documents, all records were meticulously organised using a specialised referencing system. Duplicates were eliminated by our research team. The ensuing list of documents underwent scrutiny based on the exclusion criteria: (a) not peer-reviewed journal articles; (b) languages other than English; (c) not related to sports and mental health; (d) not an intervention, trial, evaluation, or 'what works' study; (e) not related to adolescents (ages 10 to 19); (f) not involving adolescents diagnosed with severe mental disorders; (g) not policy-related articles; (h) not review/conceptual articles; (i) excluded articles with only formative research; and (j) excluded articles published before 2018.

The checking process unfolds as follows:

i. Documents are randomly allocated to team members
ii. Each document undergoes a blind and independent assessment (keep, reject, or unsure)
iii. A third member resolves discrepancies and reviews unsure' ratings

These studies were summarised based on their sample size, age, objectives, methods, key findings, and quality rating. In terms of quality assurance, research evidence was analysed in two ways. First, we applied the Active Living by Design (ALBD) Community Action Model (Bors et al., 2009), featuring five components: Preparation, Promotion, Programme, Policy, and Physical Projects. This framework helps categorise studies and identify research gaps. Additionally, studies were assessed for research quality according to the following rubric (Hill et al., 2018):

- Study design
- Longitudinal design
- Cross-sectional (adequately matched)
- Cross-sectional (limited information)
- Frequency of measurements
- Objective measures
- Previous validation/reliability noted

Quality was scored on a scale of 0 to 8, categorising studies as low (0-2), moderate (3-6), or high (7-8) quality. Inter-rater reliability is established using Cohen's kappa values. Our methodology aligns with the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) statement (Moher et al., 2009), and our research is registered with the PROSPERO international database for systematic reviews.

Results

Twelve studies were chosen from the databases (refer to Figure 1). A thorough examination of the complex interplay between PA and anxiety across various contexts and populations was conducted. This research examined PA and anxiety-related sleep disruptions, PA and premenstrual syndrome in adolescent females, as well as screen-related sedentary behaviours and anxiety in adolescents. Various studies examined the psychological aspects of anxiety, particularly competitive anxiety in young athletes, as well as the influence of resilience, coping mechanisms, and motivation on the complex link between PA and anxiety.

A study conducted in Spain indicated that PA-related anxiety exerted a minimal effect on sports commitment but worry positively influenced sports commitment among adolescent athletes (Pons et al., 2018). Similarly, a Spanish study indicated that anxiety negatively correlated with resilience in its accepting dimension among adolescent athletes (Hernandez et al., 2020). The findings revealed a positive correlation between sports experience and resilience while demonstrating a negative correlation with anxiety. Additionally, Navarro et al. (2021) created the Behavioural Regulation in Exercise Questionnaire-2. During the validation of the questionnaire, it was determined that intrinsic and identified behavioural regulation correlated with increased satisfaction in physical exercise and reduced social anxiety, as well as diminished social and bodily anxiety among Spanish adolescents.

An experimental study in Lithuania showed that an eight-month exercise intervention programme effectively enhanced PA and fitness while reducing anxiety in adolescents (Klizienė et al., 2018). An Indian experimental study similarly demonstrated that both PA and music therapy effectively reduced anxiety and tension in teenagers (George et al., 2020). This research investigated the impact of exercise and music therapy on stress and anxiety, offering pragmatic anxiety treatment techniques.

A Turkish study indicated that a nutritious diet and increased PA may mitigate obesity and social anxiety in teenagers (Muftuoglu & Bayram, 2020). Examining nutritional habits and PA revealed the significance of a balanced diet in reducing social anxiety. A further Turkish study demonstrated that PA significantly influenced hyper-focus and mood fluctuations in young adults (Celik et al., 2021). The postponement of personal social obligations and conflicts adversely affected anxiety, fatigue, hunger, and nausea. A Turkish study among young adults (Aktağ & Celebi, 2018) unexpectedly revealed no significant correlation between social appearance concern and leisure time exercise. Nevertheless, the latter study indicated that levels of concern for social appearance were elevated in males.

Indries et al. (2019) identified a positive correlation between sports-related anxiety and exam anxiety, alongside a negative correlation with the academic achievement of Romanian children. The degree of anxiety experienced during academic evaluations and examinations affects the anxiety levels in athletics and competitive sports. Consequently, inadequate academic achievement adversely affects sports anxiety. A Brazilian study indicated that elevated PA during physical education classes correlated with reduced anxiety-related sleep disturbances in both genders, whereas post-school PA was linked to diminished anxiety-related sleep disturbances, specifically in male adolescents (Werneck et al., 2020). PA facilitates quicker onset of sleep and enhances sleep quality due to the elevated synthesis of melatonin, a hormone that governs sleep-wake cycles. These studies illuminate the nuances of PA and anxiety relationships and their applicability across demographic groups and environments.

An Indonesian study investigating the correlation between physical activity and anxiety with premenstrual syndrome in adolescents found no significant association between physical activity and premenstrual syndrome but identified a strong relationship between anxiety and premenstrual syndrome (Armini et al., 2022). In summary, increased anxiety levels correlate with exacerbated PMS symptoms in female teenagers. The hormonal fluctuations during PMS might influence neurotransmitters in the brain, such as serotonin and dopamine, associated with mood control. A Chinese study indicated that elevated screen-related sedentary behaviours were associated with increased anxiety levels in teenagers (Wen et al., 2022).

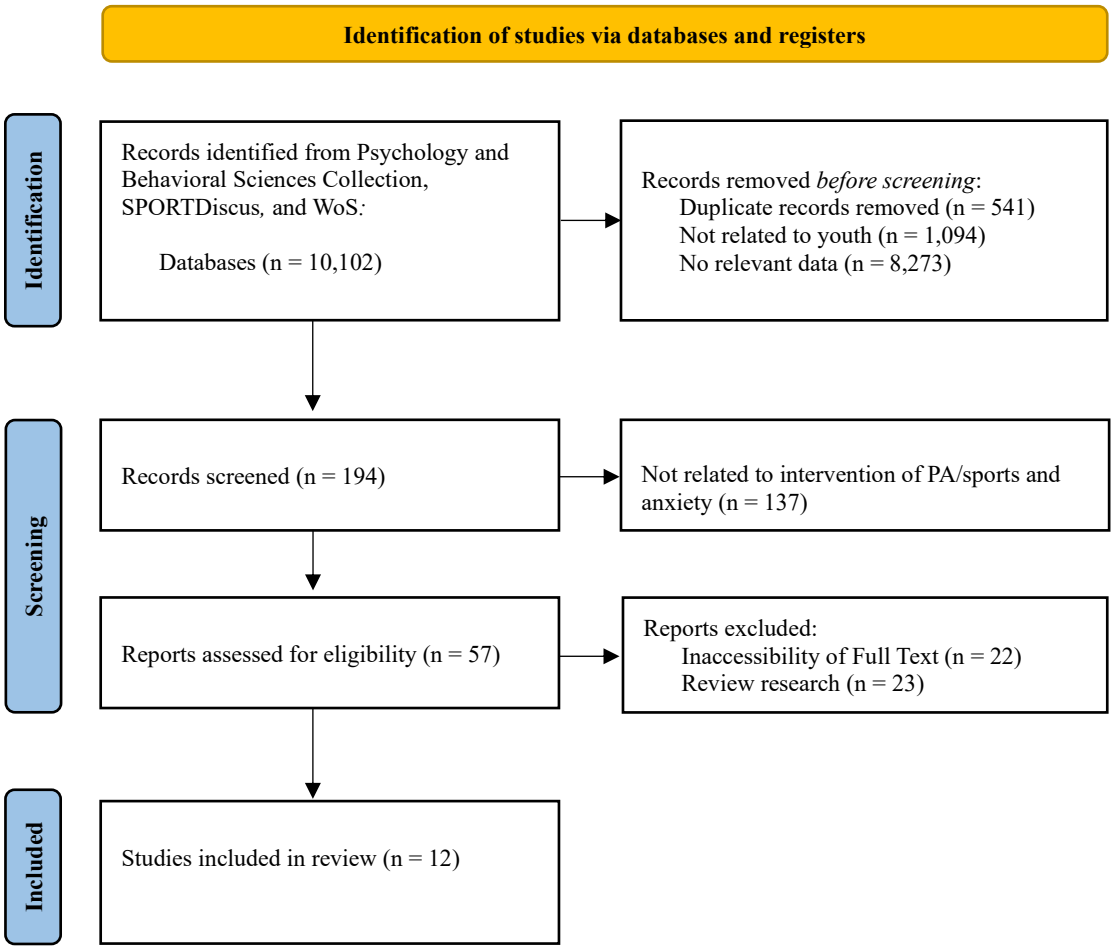

Figure 1. PRISMA output

The majority of the studies were conducted among adolescents. As a whole, these studies show that PA boosts resilience and reduces anxiety. Nevertheless, there is a dearth of research that looks into the influence of PA on anxiety or anxiety disorders. Perhaps the COVID-19 pandemic made engagement in physical activities more difficult, thus limiting the possibilities of researching this facet in the context of anxiety. Most of the effort in the past three years has been focused on the exacerbation of mental health during COVID-19. Consequently, examining the role of PA in reducing anxiety was made more complicated by the movement control order as a result of COVID-19.

Surprisingly, none of the studies used a qualitative or mixed-methods approach. Most used cross-sectional surveys, followed by experimental designs. Qualitative studies can provide a rich and nuanced understanding of individuals' perspectives, emotions, beliefs, and, most importantly, motivations when engaging in PA. Mixed-methods studies can provide a comprehensive understanding and enable corroboration of the findings from various sources, thus increasing the reliability and validity of the studies.

Table 1. Characteristics and quality assessment of eligible studies

Source / Country	Type of Study / Design	Objective / Sample	Methods / Measures	Key Findings	Rating Score
Aktağ, & Çelebi (2019) / Turkey	Survey / cross-sectional study	To analyse the relationship between leisure time exercise and social appearance. 247 students aged 18-30 years	The SAAS scale assessed social appearance and anxiety. A Turkish adaptation of LTEQ was found valid and a reliable instrument to determine leisure time PA levels.	- No significant correlations among social appearance anxiety, anxiety and leisure time exercise duration were found.	Low
Armini, Zahriya, Hidayati et al. (2022) / Indonesia	Survey / cross-sectional study	To analyse the relationship between PA and anxiety with PMS. 143 adolescent girls aged 13-14 years	PA was assessed using the PAQ-A questionnaire. Anxiety was measured using the Z-SAS questionnaire (anxiety characteristics, attitudes, and somatic symptoms).	- No significant association between PA and PMS was found. - A significant correlation between anxiety and PMS was discovered.	Moderate
Çelik, Demirel, & Şam (2021) / Turkey	Survey / cross-sectional study	To analyse the relationship between anxiety levels and exercise addiction during Covid-19 pandemic period. 184 students of sport science degree aged more than 18 years	To assess anxiety and exercise addiction levels of students, CAS and EAS scales were used.	- Regular exercise and active sports and their duration influenced hyper-focus and mood swings. - The postponement of individual social needs and conflict had negative impacts on the individuals' anxiety levels, drowsiness, loss of appetite, and nausea.	Low
George, Haritha, Jincy et al. (2020) / India	Intervention/ Pre-test-post-test experimental design	To assess the effect of aerobic exercise in reducing stress and anxiety. Experimental group and control group of 15 students each, aged 14-19 years	Experimental group received an exercise programme including 10 minutes of warm-up and cool-down exercise and 20 minutes of aerobic dance programme. Music therapy was given for 15 minutes. The control group was given only music therapy programme lasting 30 minutes.	- Both groups showed reductions in stress and anxiety. While comparing between the groups in case of stress and anxiety, there was significant stress reduction only. - Both aerobic exercise and music therapy are effective in reducing stress and anxiety	Moderate
González-Hernández, Gomariz-Gea, Valero-Valenzuela et al. (2021) / Spain	Survey / cross-sectional study	To examine the levels of resilience and competitive anxiety by sex and years of sports experience. To analyse the relationship between resilience resources	Differential and multivariate descriptive, correlation and multiple regression analyses were performed. The Spanish version of the RS-14 scale was used to assess the level of individual resilience.	- Anxiety was negatively related to resilience in its dimension of acceptance. - Girls showed higher levels of somatic anxiety, while boys had higher levels of acceptance. - Statistically significant differences were found in the acceptance resources in favour	Moderate

		and competitive anxiety, and the variables that predict resiliency resources and self-confidence. 241 handball and basketball players aged 14-17 years	An abbreviated version of the CSAI-2R questionnaire was employed to assess competitive state anxiety.	of boys, while significantly different indicators in somatic anxiety and self-confidence in favour of girls were found. - Sports experience was positively related to resilience and negatively to anxiety.	
Indrieș & **Bochiș** (2019) / Romania	Survey / descriptive cross-sectional study	To identify the levels of anxiety and test anxiety in sports. To investigate the influences of academic performances and test anxiety on anxiety in sports. 65 students aged 9-11 years	The 30-item CTAS scale assessed students' t*houghts* (e.g. I think I will get a lower score), *distracting behaviour* (e.g. I move my legs under the bench) and a*utomatic reactions.* Additionally, SAS-2 was used to measure anxiety in sports.	- The results showed an average level of anxiety in sports. The above-average levels for the whole group were obtained from the global score of the CTAS. - A direct or positive relationship between sports anxiety and test anxiety and a negative association with the academic performance of the students in the disciplines of Romanian language and literature and sport, but not mathematics, was found.	Moderate
Klizienėet al. (2022) / Lithuania	Survey/pre-test/post-test experimental design	To analyse the effects of an 8-month exercise intervention program on PA and decrease anxiety. Experimental group of 70 students aged 6-7 years control group of 68 students aged 6-7 years	8 months intervention: A pre-test/post-test experimental design was used to avoid interference with educational activities due to the random selection of children into the groups. Children's PA was assessed using the CPAQ scale. The RCMAS scale was used to measure anxiety and children's defensiveness.	- The exercise intervention program led to statistically significant changes in the dependent variables: increased PA and decreased anxiety for the experimental group.	Moderate
Muftuoglu & Bayram (2020) / Turkey	Survey / descriptive cross-sectional study	To analyse the relationship between nutritional habits, social anxiety and PA levels. 300 students aged 14-18 years	The KIDMED Index assessed the students' healthy eating habits. The IPAQ questionnaire collected PA levels. The SPAS inventory assessed social anxiety levels.	- No statistically significant differences between KIDMED, IPAQ, or SPAS were found by sex. - Students reporting a healthy diet showed higher KIDMED scores and lower SPAS scores than those with an unhealthy diet. - A positive correlation was found between KIDMED and IPAQ, and a negative correlation between KIDMED and SPAS and BMI for age.	Moderate

				- A negative but insignificant correlation was shown between IPAQ and SPAS scores.	
Navarro et al. (2023) / Spain	Survey / cross-sectional study	To validate the psychometric structure of the BREQ-2 scale to confirm the existence of five levels of motivation toward physical exercise. To examine the differences in motivation according to sex and age and the role of age and sex in the relationship between motivation and enjoyment. 666 students aged 10-16 years	BREQ-2 questionnaire was used to assess the different types of motivations. PASAS evaluated social anxiety in sports. PACES assessed enjoyment of PE. SPAS measures the degree of anxiety a person experiences when they perceive that others are or may be negatively evaluating their physical aspect.	- The CFA of the BREQ-2 showed a five-factor structure. A more parsimonious four-factor structure with a single intrinsic-identified regulation was identified through EFA. - The more self-determined types of motivation were positively associated with enjoyment and negatively associated with anxiety. - The type of physical exercise motivation fluctuated depending on age and sex, and age moderated the relationship between motivation and enjoyment.	Moderate
Pons, Viladrich, Ramis et al. (2020) / Spain	Survey / cross-sectional study	To examine how coping mediates the relationship between competitive anxiety and sports commitment. 500 team athletes aged 13-21 years (basketball, soccer , volleyball, handball, roller hockey and water polo)	The measurement model was defined using CFA and exploratory SEM, and two different mediation models (total and partial) were compared using SEM. The 15-item Spanish version of the SAS-2 scale assessed competitive anxiety. Coping was assessed through the 31-item Spanish version of ISCCS scale. Sport commitment was measured using the commitment subscale of the SCQ questionnaire.	- Cognitive anxiety factors predicted sports commitment. - Somatic anxiety had a weak influence on sports commitment. Worry showed a positive influence on sports commitment. - Concentration disruption negatively impacted sports commitment through mediating effects only, showing a negative path to task-oriented coping and a positive path to disengagement-oriented coping. - Task coping efforts undertaken by adolescent athletes were identified as a key element in the relationship between competitive anxiety and sports commitment.	High
Wen, Zhu, Yuan et al. (2019) / China	Survey / cross-sectional study	To investigate the association between PA, screen-related sedentary behaviours, and anxiety. 900 adolescents aged 12-16 years	LPA was employed to identify homogeneous subtypes of anxiety. The 100-item MHT scale was used to assess mental health (learning and interpersonal anxieties, loneliness and remorse tendencies, allergic tendencies, physical symptoms, terror, and impulsive tendencies).	- High screen-related sedentary behaviours were associated with higher odds of anxiety. - High prevalence of moderate and severe anxiety accounted for 56% and 24.78%, respectively.	Low

			The YRBSS questionnaire items assessed PA and screen-related sedentary behaviours.		
Werneck, Schuch, Ferrari, et al. (2020) / Brazil	Survey / multi-stage, stratified, clustered probability design	To analyse the association between different contexts of PA and anxiety-induced sleep disturbance. 100,648 students aged 11-18 years	Anxiety-induced sleep disturbance was assessed using the GSHS survey. An adaptation of GSHS was used to assess PA, including nine questions about PE classes, school transportation, and after school exercise/sports practice. A self-report questionnaire assessed the total time watching TV per day and the consumption of ultra-processed food over the previous 7 days.	- Higher PA during transportation was associated with higher AISD. - PA during PE classes showed lower odds for AISD. - Outside school, PA was associated with reduced AISD among boys. - The association between PA and AISD seems to be context dependent.	High

Note: PA = Physical Activity; PE = Physical Education; GSHS = Global School-Based Student Health; AISD = Anxiety-Induced Sleep Disturbance; PMS = Premenstrual syndrome; PAQ-A = Physical Activity Questionnaire for Adolescents; Z-SAS = Zung Self-Rating Anxiety Score Questionnaire; LPA = Latent Profile Analysis; MHT = Mental Health Test; YRBSS = Youth Risk Behavior Surveillance System; RS-14 = Resilience Scale; CSAI-2R = Competitive State Anxiety Inventory-2R; SAS-2 = Sport Anxiety Scale-2; ISCCS = Inventaire des Stratégies de Coping en Compétition Sportive [Coping Inventory for Competitive Sport]; SCQ = Sport Commitment Questionnaire; CFA = Confirmatory Factorial Analysis; SEM = Structural Equation Modeling; KIDMED = Mediterranean Diet Quality Index; IPAQ = International Physical Activity Questionnaire; SPAS = Social Physique Anxiety Inventory; BMI = Body Mass Index; CTAS = Child Test Anxiety Scale; BREQ-2 = Behavioral Regulation in Exercise Questionnaire; PASAS = Physical Activity and Sport Anxiety Scale; PACES = Physical Activity Enjoyment Scale-Short Version; RCMAS = Revised Children's Manifest Anxiety Scale; CPAQ = Children's Physical Activity Questionnaire; SAAS = Social Appearance Anxiety Scale; LTEQ = Leisure Time Exercise Questionnaire; CAS = Coronavirus Anxiety Scale; EAS = Exercise Addiction Scale.

Discussion

The identified studies in this rapid review were still somewhat heterogeneous, often examining anxiety in connection with other health concerns, such as premenstrual syndrome (Armini et al., 2022), sleep disturbance (Werneck et al., 2020), and appearance anxiety (Aktağ & Çelebí, 2018). The quality of the publications, as a whole, was relatively low, with the credibility of some articles somewhat questionable (e.g., Aktağ & Çelebí, 2018; George et al., 2021; Klizienė et al., 2018). Only one paper directly researched the relationship between PA and anxiety (as well as screen-related sedentary behaviours; Wen et al., 2022). PA was measured based on the days participants engaged in 60 minutes or per day over the past week. The result was somewhat ambiguous, with statistical significance reported among different subgroups of PA when the χ^2 statistic method was used, but no significance emerged following multivariate logistic regression. Perhaps shared variance between self-reports of sedentariness and PA might explain this finding, which was found to be the case in a Canadian study with adolescents' screen time anxiety (Kim et al., 2020), highlighting the limitations of self-report measures. It certainly stands in contrast with earlier studies, which have indicated a negative association between PA and anxiety (McMahon et al., 2017; Stubbs et al., 2017).

Two papers reported relatively simple quasi-experimental studies in which some form of physical intervention was tested against a control (George et al., 2021; Klizienė et al., 2018). One study based in India (George et al., 2021) examined the effectiveness of aerobic exercise in reducing stress and anxiety among high school students who attended a boarding (residential) school. The intervention group was given what was described as "aerobic exercise (dance)" (p. 1) (and also music therapy); the control group was given music therapy (listening to relaxing music). After 3 days per week for 4 weeks, stress and anxiety levels among the students in the intervention group reduced significantly compared with the control group. The authors of this study conclude that their results show the effectiveness of aerobic exercise in reducing stress and anxiety. This conclusion can be questioned on at least one issue. It is claimed that "The aerobic exercise included basic muscle stretching, walking, jogging and aerobic dance moves like hip roll, squatting, calf raises, side knee crunches, kickbacks, overhead reaches, body twists, bicycle crunches etc.".

However, most of these exercises are not aerobically good. In addition, it is not clear how most of them counter as "dance" either. Therefore, the authors' description of their intervention seems inaccurate. A more accurate label is 'a variety of exercises'. A more robust study came from Lithuania (Klizienė et al., 2018). It involved eight months of exercises (dynamic exercise, intense motor skill repetition, differentiation, and PA in the classroom) with elementary-aged students. PA was measured using validated questionnaires. Findings show that the students in the intervention group experienced statistically significant changes in the dependent variables: increased PA and decreased anxiety. Insofar as these studies add to a surprisingly limited evidence base for the effects of PA interventions to combat childhood and adolescent anxiety, they have some value. However, their methodological and quality limitations highlight the need for further research.

Moreover, appearance anxiety (fixation with one's appearance and fear that others will negatively evaluate one's appearance) is a potentially relevant topic for researchers of PA. On one hand, exercise is frequently proposed to enhance physical appearance (Corazza et al., 2019); on the other, appearance norms can exclude young people who fall outside of socially acceptable standards (Scotto di Luzio et al., 2023). A study in Turkey (Aktağ & Çelebí 2018) examined this phenomenon, finding that students' gender was not a significant variable, which is somewhat surprising in light of earlier research findings. However, differences between females and males did emerge when PA levels were considered, especially membership in sports clubs. Those students associated with sports clubs had both higher levels of PA and lower social appearance anxiety than those who were not. The fact that the participants in this study attended a physical education college is potentially relevant.

A second study from Turkey (Muftuoglu & Bayram, 2020) explored relationships between PA and social physique anxiety (as well as nutritional behaviour). Social physique anxiety (the anxiety experienced when a person believes they are being observed or judged on their appearance) is related to appearance anxiety (Aktağ & Çelebí, 2018) as they both refer to concerns about physical appearance and other body characteristics that are central to adolescents' sense of self-worth. Consistent with earlier studies (e.g., Deshmukh-Taskar et al., 2010), a negative correlation between PA and social physique anxiety was reported. In other words, when PA is performed in a social setting or with others, appearance anxiety tends to increase due to the individual's fear of negative peer evaluation.

Another anxiety-related condition included in the sample of publications discussed PA and anxiety-induced sleep disturbance (Werneck et al., 2020). This study drew on a substantial sample of more than 100,000 individuals aged 11–18 years and found that PA was associated with reduced anxiety among adolescents. Interestingly, the reported effects seemed to be context-dependent. There was a negative correlation between PA and anxiety when that activity took place during physical education lessons or PA practice outside school. However, there was a positive association between PA and anxiety during physically active transport. It might be the case that PA intensity levels are lower during active travel than in team sports (Bailey et al., 2023).

It is difficult to generalise such claims. The authors argue persuasively that a plausible explanation for these differences is that physical education lessons and out-of-school activities are more likely to take place in social groups rather than during transport and socially situated sporting activities are a protective factor for mental health indicators (Doré, Sylvester et al., 2020; Rastogi et al., 2023). Social activities are typically associated with social connectedness, competence, and autonomy, indicative of intrinsic motivation and associated with mental health (Stanley & Schutte, 2023). Social connectedness and support are often characteristic of sporting activities (Samsudin et al., 2024) and can act as buffers against the stresses and strains of adolescent lives (Singh et al., 2020).

The buffering function of social connectedness and support which is often characteristic of sporting activities is one of the most widely endorsed hypotheses for explaining why much of the empirical literature corroborates the claim that PA supports mental health

(Arat & Wong, 2017; Bang et al., 2020; Biddle et al., 2019). An alternative hypothesis is that PA develops psychological competencies that support mental health. One study in our collection tested this hypothesis, focusing on resilience (González-Hernández et al., 2020). The results showed that anxiety was negatively related to resilience, and participation in sports was positively related to resilience and negatively related to anxiety. There were statistically significant differences by gender, with girls reporting higher levels of somatic anxiety (the physiological activation that a person perceives when faced with a stressful situation) and boys reporting higher levels of acceptance.

These findings support the role of PA in anxiety management through multiple mechanisms, including neurochemical effects and social connectedness (Ratey, 2019). The observed context-dependent effects highlight the need for structured programmes that encourage social engagement. Theoretical frameworks, such as Self-Determination Theory (Deci & Ryan, 2000), may help explain these benefits. Practical implications include the need for integrating PA into school curricula and public health initiatives.

Conclusion

PA is associated with reduced anxiety symptoms among adolescents (D'Angelantonio et al., 2022). Extrapolating from studies with adults, we might hypothesise that the observed pattern might be related to the body's production and regulation of anti-anxiety neurochemicals during PA. However, a more plausible (but not mutually exclusive) explanation comes from findings suggesting that associations between PA and mental health are dependent on context and highlight social and contextual potential mechanisms. In other words, and with a due sense of caution that reflects the small number and relatively low quality of the identified studies in this review, our findings highlight the value of the inherently social nature of most sporting and physical activities. We do not rule out other mechanisms. Nevertheless, based on the available evidence, it seems reasonable to emphasise the social dimension of sport in any program aspiring to support young people's mental health.

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Conflicts of Interest
The authors declare no conflict of interest.

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ORIGINAL RESEARCH

Psychometric Properties of the 10-item Athletic Mental Energy (AME-10): Construct Validity, Reliabilities, and Gender Invariance

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Abstract

Current research uses the 6-factor model, which includes motivation (enthusiasm for sport), confidence (belief in performance), concentration (focused attention), vigour (perceived vitality), tirelessness (lack of vitality), and calmness (absence of anxiety), 18-item Athletic Mental Energy Scale (AMES, Lu et al., 2018) to examine its influence on athletes' cognition, behaviour, and emotion. However, two factors (i.e., vigour and tirelessness) in AMES are conceptually redundant and overlapping. We aimed to revise the AMES to improve its brevity. In Study 1, a 5-factor AMES (i.e., vigour, motivation, confidence, concentration, and calmness) was tested and analysed. In Study 2, we tested the gender invariance of the 5-factor AMES and examined nomological validity. In Study 3, we examined the test-retest reliability of the 5-factor AMES. Across these phases, the results showed that the 5-factor, 10-item AMES had an adequate factor structure, construct validity, reliability, and gender invariance. Future studies may utilise the 5-factor, 10-item AMES to examine its influence on athletes' psychological and physical responses in field or laboratory settings. We further recommend that sports psychologists adopt the 5-factor, 10-item AMES.

Introduction

In sport domains, researchers suggest that athletes' mental energy is linked to elite sport performance. For example, Loehr (2005) proposed a "pyramid model of athletic success" and contended that to achieve peak performance, athletes need four types of energy: namely, physical energy (fundamental level), emotional energy (second level), mental energy (third level), and spiritual energy (top level). Mental energy plays a central role in regulating physical and emotional energy, governing athletes' higher levels of functioning, including perception, abstract reasoning, creativity, memory, attention, motivation, self-awareness, and self-regulation.

Similarly, Sindik et al. (2015) suggested that mental energy is a core component of sports excellence. In developing a multi-dimensional inventory

of sporting excellence (MUSI), they recruited 248 male and female athletes and administered a battery of psychological tests, including measures of mental energy, attention skills, awareness of attention, internal and external attention during performance, internal speech, and narrow external attention. Results showed MUSI is a multi-dimensional measure with satisfactory validity and reliability, and mental energy correlated with all factors of MUSI. Sindik et al. (2015) concluded that mental energy has a significant contribution to all factors of sports excellence. In empirical studies, researchers have examined the influence of mental energy on athletes' cognition, affect, and performance (Chiou et al., 2020; Lu et al., 2018; Shieh et al., 2023). For example, in a study that examined how athletes' mental energy moderates athletes' life stress and burnout, Chiou et al. (2020) recruited two different samples engaging in diverse sports and administered the College Student-Athletes Life Stress Scale (CSALSS, Lu et al., 2012), the Athletes' Burnout Questionnaire (ABQ, Raedeke & Smith, 2001), and the athletic mental energy scale (AMES, Lu et al., 2018). Two separate hierarchical multiple regression analyses found that athletic mental energy moderated the relationship between athletes' life stress and burnout in both single-sport and multiple-sport samples. Chiou et al. (2020) concluded that athletic mental energy is a positive strength in buffering stress-burnout relationships.

Similarly, some research (e.g., Chuang et al., 2022; Novan et al., 2023; Shieh et al., 2023) found that athletes' mental energy plays a significant role in predicting competition performance. For example, Shieh et al. (2023) recruited 81 male volleyball players in a college volleyball tournament. Shieh et al. (2023) measured participants' mental energy the night before the competition and used six indices of the Volleyball Information System (VIS), developed by the International Volleyball Federation (FIVB), as criterion variables. They found that all mental energy factors—vigour, motivation, tirelessness, concentration, confidence, and calmness—were correlated with volleyball competition performance. A hierarchical regression analysis revealed that mental energy predicted the performance of volleyball receivers (R^2 = .23).

Notably, current research examining athletes' mental energy and their psychological and physical responses primarily utilises Lu et al.'s (2018) Athletic Mental Energy Scale (AMES). These studies include research examining the relationship between athletes' mental energy and personality (e.g., Singh, 2024; Yazici et al., 2023), imagery ability (Kaplan, 2022), psychological skills (İslam, 2023), mindfulness (Öner, 2022), eating behaviour (Ilhan, 2020; Yildiz, 2020), psychological well-being (Singh et al., 2024), and quality of sleep (Tan et al., 2023).

The AMES, developed by Lu et al. (2018), adopts the conceptual framework of mental energy from the International Life Science Institute and defines athletic mental energy as "an athlete's perceived existing state of energy, which is characterised by its intensity in motivation, confidence, concentration, and mood." Through six studies, Lu et al. (2018) found that the 6-factor, 18-item AMES had adequate content validity, factor structure, nomological validity, discriminant validity, predictive validity, measurement invariance, and reliability. The six factors of AMES include vigour, tirelessness, confidence, motivation, concentration, and calmness, with each factor of the 15-item AMES comprised three items. Recently, several studies (e.g., Singnoy et al., 2023; Yildiz et al., 2020) translated AMES into Thai (Singnoy et al., 2023) and Turkish (Yildiz et al., 2020) and found both Thai and Turkish versions had appropriate psychometric properties, including factorial structures, reliabilities, and content validities.

Despite these developments, the 6-factor, 18-item AMES needs further investigation. First, it is redundant with an overlap of vigour and tirelessness. Conceptually, tirelessness is derived from vigour. In Lu et al.'s (2018; p. 8) study, the confirmatory factor analysis (CFA) showed that vigour can be represented by two factors—vigour (direct statements of vigour; for example, "I feel there is an endless energy coming from my body") and tirelessness (indirect statements of vigour; for example, "Even the training is over, I still feel I have endless energy to use.") For succinctness, a single factor would be better for interpreting results. The inconsistent findings from empirical studies might also indirectly echo this proposition. For example, Shieh et al. (2023) found that all six dimensions of AMES positively predicted athletic performance. In contrast, Yang and Lu (2019) reported that only tirelessness resistance positively predicted performance. This inconsistency may stem from conceptual distinctions between tirelessness and the other five dimensions, as well as from differences in item wording and measurement orientation.

Practically, tiredness has frequently been used as a negative behavioural indicator of vigour. For example, in the vitality subscale of the Short-Form Health Survey (SF-36; Ware & Sherbourne, 1992), both positive indicators (e.g., "Do you have a lot of energy?") and negative indicators (e.g., "Do you feel tired?" and "Do you feel worn out?") are included to reflect overall vitality. However, incorporating both positively and negatively worded items to measure vitality may compromise the validity of the measurement. In the Subjective Vitality Scale (Ryan & Frederick, 1997), one item (i.e., I don't feel very energetic) was negatively worded. Bostic et al. (2000), using CFA, found that removing this negatively worded item improved the psychometric properties of the scale. These findings support the conceptual alignment between vigour and the absence of tirelessness (Lu et al., 2018) and highlight the importance of consistent item wording in scale construction.

In line with this approach, items with consistent design in each dimension are also warranted. The original version of AMES reveals several measurement design issues, including the presence of double-barrelled items, outcome- versus skill-referenced wording, ego- versus task-oriented motivation, and mixed positive and negative semantic valences, that might lead to target inconsistency (DeVellis & Thorpe, 2021), situational inconsistency (Tourangeau et al., 2000), response direction inconsistency (Zhang et al., 2016), and might impede the psychometric properties of AMES.

Thus, the objective of this study was to refine the existing 6-factor 18-item AMES. Specifically, we attempted to achieve the following purposes: (a) to examine the factorial structure and basic psychological properties of the 5-factor AMES by deleting tirelessness; (b) to examine nomological validity and gender invariance of the 5-factor AMES; (c) to examine test-retest reliability.

Methods

Study 1

Purpose

The objective of Study 1 was to examine the factorial structure and basic psychological properties of the 5-factor AMES by deleting the factor of tirelessness.

Participants

A total of 318 collegiate student-athletes (151 males and 167 females; M_{age} = 19.77 ± 1.75) were recruited from 17 universities in Taiwan. The participants participated in diverse sports, including individual sports (e.g., golf, weightlifting, archery, judo, swimming, gymnastics, taekwondo, table tennis, dance, martial arts, kendo, and badminton) and team sports (e.g., baseball, basketball, rugby, hockey, soft tennis, tug

of war, handball, and volleyball). On average, they had 7.72 ± 3.02 years of experience in sports and trained an average of 3.43 hours per day (*SD* = 1.53).

Measurements & Procedures

Ethical approval for the present study was obtained from the ethics committee of a local institute (Antai-Tian-Sheng Memorial Hospital Institutional Review Board, TSMH IRB No./Protocol No. 23-090-B) prior to the survey. The coaches were contacted via phone or email and were informed of the study's objectives, as well as the confidentiality and anonymity of participation. Upon receiving consent from the coaches, the first author and assistants visited the respective teams at a convenient time. Participants listened to a briefing on the study's purposes, ethical statements, and participation procedures. If they agreed, they completed informed consent forms and a survey package, which included a demographic questionnaire and a 15-item AMES. The survey took approximately 15 minutes to complete and was conducted either before or after each team's training session. The survey package included the following:

Demographic questionnaire

The demographic questionnaire was designed to collect participants' gender, age, types of sports, and years of athletic experience, including training hours per day and week.

The 15-item AMES. The 15-item AMES was revised from an early version of AMES (Lu et al., 2018) by deleting the factor of tirelessness. The 15-item AMES includes five factors - vigour, motivation, confidence, concentration, and calmness. Each factor in the 15-item AMES has three items. To respond to the 15-item AMES, participants read short instructions asking them to identify "how do you feel right now in sports training/competition." Then, participants read each item of the 15-item AMES and circle a number that reflects their level of agreement. Sample questions for each factor are as follows:

For vigour, the sample question is "Either in competition or training, I feel full of energy"; for motivation, the sample question is "I am full of passion for attending my sports"; for confidence, the sample question is "I can control all sports movements and skills"; for concentration, the sample question is "There's nothing distracting me in competition"; and for calmness, the sample question is "Facing upcoming competitions, I don't feel anxious." The AMES uses a six-point Likert scale to rate participants' responses, with "1" representing "not at all" and "6" representing "completely so."

Statistical Analyses

Before primary analyses, data screening was performed to assess means, standard deviations, skewness, kurtosis, the proportion of missing data, normal distribution, as well as the presence of univariate and multivariate outliers. Subsequently, CFA and reliability analysis were employed to produce a representative set of items (Marsh et al., 1998; Tabachnick & Fidell, 2018).

The statistical analyses were separated into two stages. The first stage examined the representative items of the 15-item AMES using CFA, while the second stage assessed the reliability of the 15-item AMES.

Results

Following the data screening process, Little's test indicated 13 instances of random missingness across 7 cases, $\chi^2(39) = 53.64$, $p = .071$. Additionally, 20 univariate outliers (with absolute Z-scores exceeding 2.58) and 35 multivariate outliers (identified by Mahalanobis distance greater than 25.26, all $p < .05$) were excluded from subsequent analysis. The primary variables exhibited a non-normal distribution, with skewness values ranging from 0.98 to 1.37, as confirmed by the Kolmogorov-Smirnov test (all $p < .01$).

To address the non-normal distribution in model estimation, Bollen-Stine bootstrapping (n = 2,000) CFA was employed (Bollen & Stine, 1992; Nevitt & Hancock, 2001). The Bollen-Stine method employs a non-parametric bootstrap resampling procedure to adjust the reference distribution of the chi-square statistic through multiple resampling iterations (typically over 1,000). Instead of relying on the theoretical chi-square distribution under normality assumptions, it constructs an empirical distribution of the test statistic under the null hypothesis of model fit. This results in a corrected *p*-value that better reflects the actual sampling distribution in ordinal Likert-type data or non-normal conditions (Bollen & Stine, 1992). As a result, a total of 55 cases were excluded during data screening, resulting in a valid sample size of 263 participants (124 males and 139 females; M_{age} = 19.69 ± 1.61). The statements, means (M), and standard deviations (SD) for each item are detailed in Table 1.

Table 1. Statements, Means, and Standard Deviations of each item in the revised 15-item AMES

Dimension	Item	Content	M	SD
Concentration	AME5	There's nothing distracting me in competition.	4.05	1.13
	AME6	There's nothing distracting me in training.	4.11	1.05
	AME10	There's nothing I have to care about in competition/training.	3.89	1.18
Motivation	AME4	I feel excited in future competitions.	4.44	1.10
	AME8	I am full of passion to attend my sports.	4.62	1.00
	AME16	I want to show my best to others in sports.	4.67	1.09
Calmness	AME14	When facing my opponents I am calm.	3.87	1.04
	AME17	Facing coming competitions, I don't feel anxious.	3.83	1.16
	AME18	Even facing a tough opponent, I don't feel anxious.	3.81	1.25
Confidence	AME3	I feel I can win all competitions in the future.	3.77	1.12
	AME9	I can smoothly perform all sport skills.	4.11	1.00
	AME13	I can control all sports movements and skills.	3.90	0.95
Vigour	AME1	I feel spiritual to do everything in sports.	4.07	0.90
	AME2	I feel there is an endless energy coming from my body.	3.92	0.89
	AME15	Either in competition or training, I feel full of energy.	3.94	1.02

Note. AME refers to athletic mental energy; the number after AME represents each item.

First round of CFA results

The first round of CFA showed the 15-item AMES has acceptable but not entirely sufficient fit indices. The Bollen-Stine bootstrapped results yielded χ^2/df = 4.83, GFI = .83, CFI = .89, RMSEA = .12, and SRMR = .08. The factor loadings derived from the CFA indicated that several items had not achieved sufficient loadings (ranging from .62 to .72.) They are item #10 for concentration, item #16 for motivation, item #14 for calmness, item #3 for confidence, and item #15 for vigour. To reduce the 15-item AMES into a more concise measure, we decided to delete specific items and create a 10-item AMES for subsequent CFA analyses (see Table 2).

Table 2. Factor loading of each item and the corrected Cronbach's α if item is removed

Dimension	Original Cronbach's α	Item	Factor loading	Cronbach's α if low factor loading items removed
Concentration	.81	AME5	.88	.79
		AME6	.85	.77
		AME10	.76	<u>.86</u>
Motivation	.78	AME4	.80	.74
		AME8	.89	.72
		AME16	.66	<u>.82</u>
Calmness	.79	AME14	.72	<u>.92</u>
		AME17	.92	.77
		AME18	.91	.77
Confidence	.78	AME3	.62	<u>.83</u>
		AME9	.86	.64
		AME13	.80	.65
Vigour	.81	AME1	.83	.77
		AME2	.83	.72
		AME15	.76	<u>.87</u>

Note. The underlined Cronbach's α in the 5th column represents the final results after removing low-factor-loading items.

Second round CFA and reliabilities

The new results of the CFA for the 10-item AMES demonstrated satisfactory model fit (shown as Figure 1), with Bollen-Stine bootstrapped indices indicating χ^2/df = 2.16, GFI = .96, CFI = .98, RMSEA = .07, and SRMR = .02. The factor loadings for this model ranged from .78 to .94 (all $p <$ .001). The CR and AVE for each subscale surpassed the established thresholds. Specifically, the CR for the subscales were as follows: vigour (.87), concentration (.86), motivation (.82), calmness (.92), and confidence (.83). The AVE for the subscales were .78 for vigour, .76 for concentration, .69 for motivation, .85 for calmness, and .72 for confidence. The Pearson correlation coefficients among these factors ranged from .45 to .73, and the square root of AVE ranged from .83 to .88 (presented in Table 3). Additionally, the chi-square difference test indicated that the 10-item AMES outperformed the 15-item AMES, with a significant difference of $\triangle\chi^2(55) = 332.52$, $p < .001$.

Table 3. Discriminant validity of the AMES-10

	Vigour	Concentration	Motivation	Calmness	Confidence
Vigour	**.88**				
Concentration	.62***	**.87**			
Motivation	.61***	.72***	**.83**		
Calmness	.45***	.60***	.60***	**.85**	
Confidence	.67***	.73***	.73***	.59***	**.85**

Note. The square root of AVES in bold is on the diagonals. Off-diagonal elements are Pearson correlations among the five factors of the AMES-10. ***p<.001.

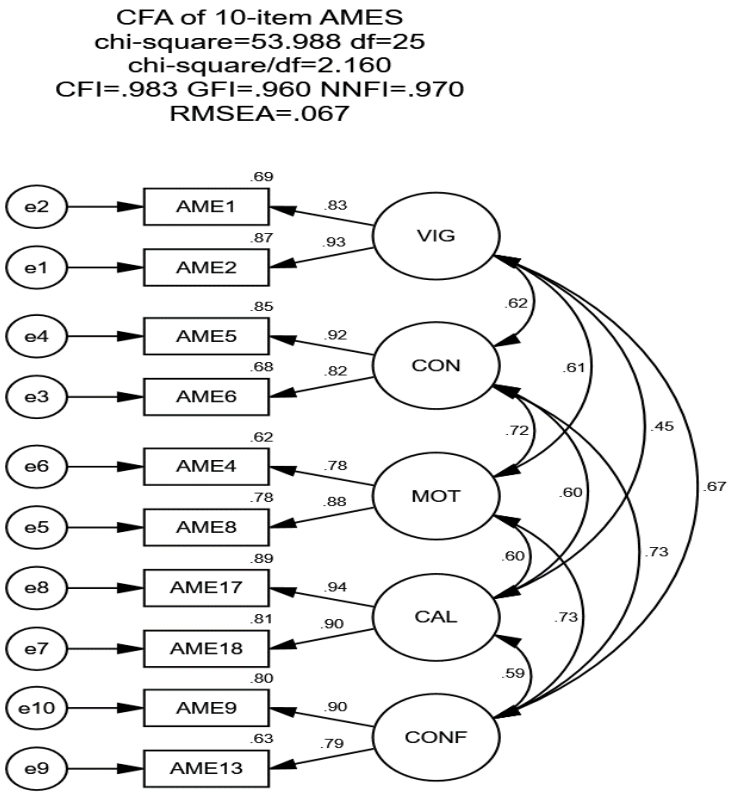

Figure 1. The measurement model of the AMES-10
Note. VIG=vigour, Con=concentration, MOT=motivation, CAL=calmness, CONF=confidence.

Study 2

Purpose

The purpose of Study 2 was to examine the gender invariance of the AMES-10 and to test its nomological validity by examining the relationships among AMES-10, athletic burnout, and athletes' life stress. To ensure the AMES-10 functions equally well across different athlete populations, it is important to test gender invariance. Prior studies suggest that males and females may differ in their psychological experiences in sport (Del Giudice, 2015). Without confirming measurement invariance, comparisons across genders may be misleading (Cheung & Rensvold, 2002; Putnick & Bornstein, 2016). Therefore, evaluating whether the AMES-10 is interpreted similarly by male and female athletes strengthens its validity and supports its broader application in both research and practice.

Participants

A total of 231 collegiate student-athletes (139 males and 92 females; M_{age} =20.11±1.09) who participated in various individual and team sports were recruited from northern China. On average, they had 8.15 ± 3.53 years of experience in their respective sports and trained for an average of 2.86 hours per day (*SD* = 1.79).

Measurements & Procedures

The procedures were identical to those in Study 1 and Study 2. The measures are as follows:

Demographic questionnaire

The demographic questionnaire was identical to that used in Study 1. The AMES-10. The AMES-10, derived from Study 2, was used in this study. The Cronbach's α of the five factors of the AMES-10 for the present sample were .82 for vigour, .83 for motivation, .76 for confidence, .80 for concentration, .84 for calmness, and .87 for total AMES.

The Athlete Burnout Questionnaire (ABQ; Raedeke & Smith, 2001). Athletes'

burnout experiences were assessed by the ABQ (Raedeke & Smith, 2001). The ABQ comprised 15 items and encompassed three dimensions: reduced sense of athletic accomplishment (e.g., "I am not performing up to my ability in sport."); perceived emotional and physical exhaustion (e.g., "I feel overly tired from my sports participation."); and devaluation of sports participation (e.g., "I don't care as much about my sports performance as I used to"). Participants rated items on a 6-point Likert scale ranging from 1 (never) to 6 (always). The Cronbach's α outcomes for the present sample were: 0.86 for reduced sense of accomplishment, 0.87 for emotional and physical exhaustion, and 0.75 for sport devaluation. The overall reliability for all items was .92.

The College Student-Athletes Life Stress Scale (CSALSS, Lu et al., 2012). The 24-item CSALSS (Lu et al., 2012) was used to assess the stressors that athletes encountered in their daily lives and sports. The CSALSS comprised eight factors, which included: (a) sports injury (e.g., "I worry about being frequently injured."), (b) performance demand (e.g., "I worry about dragging my team down."), (c) coach relationships (e.g., "I am annoyed by my coach's bias against me."), (d) training adaptation (e.g., "I am annoyed with the training program now."), (e) interpersonal relationships (e.g., "I am annoyed with being friendless."), (f) romantic relationships (e.g., "I am annoyed with not getting along with my romantic partner."), (g) family relationships (e.g., "I am bothered by difficult situations in my family."), and (h) academic requirements (e.g., "I am annoyed when preparing for exams."). Participants rated items on a 6-point Likert scale ranging from 1 (never) to 6 (always). The Cronbach's α values for each subscale were as follows: .79 for sports injury, .63 for performance demand, .73 for coach relationships, .63 for training adaptation, .74 for interpersonal relationships, .66 for romantic relationships, .56 for family relationships, and .74 for academic requirements. These eight factors could be categorised into two major components: general-life stress (e.g., factors e, f, g, h) and sport-specific stress (e.g., factors a, b, c, and d). The Cronbach's α values were: .80 for general life stress, .85 for sport-specific stress, and .88 for overall CSALSS.

Statistical Analyses

Pearson correlation analysis was performed to examine the relationships among the AMES-10, ABQ, and CSALSS. Additionally, model invariance was confirmed through the following procedures: (a) establishing acceptable results from the CFA for each group; (b) comparing a model that imposes equality constraints (i.e., the nested model) with a less-constrained model (i.e., the parent model), which includes configural invariance, metric invariance, factor variance/covariance invariance, and error variance invariance (Kline, 2023).

Results

Pearson correlation analyses indicated that all subscales, as well as the overall score of the AMES-10, displayed a negative correlation with both athlete burnout and athletes' life stress. These results provided evidence for the nomological validity of the AMES-10. The detailed *M*, *SD*, Cronbach's α of each dimension, and bivariate correlation coefficients are presented in Table 4.

Table 4

The bivariate correlations among AMES-10, ABQ, and CSALSS

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 AMES-10	.87												
2 ABQ	-.38**	.92											
3 CSALSS	-.22**	.39**	.88										
4 VIG	.65**	-.21**	-.06	.82									
5 CON	.80**	-.34**	-.19**	.40**	.80								
6 MOT	.83**	-.34**	-.16*	.55**	.58**	.83							
7 CAL	.66**	-.17*	-.24**	.16*	.44**	.40**	.84						
8 CONF	.75**	-.35**	-.12	.43**	.53**	.53**	.35**	.76					
9 GLS	-.18**	.29**	.89**	-.08	-.13	-.13	-.21**	-.12	.80				
10 SSS	-.20**	.39**	.89**	-.03	-.20**	-.16*	-.22**	-.09	.58**	.85			
11 RSA	-.07	.60**	.33**	.04	-.11	-.05	-.03	-.09	.28**	.30**	.86		
12 PEE	-.32**	.84**	.46**	-.19**	-.28**	-.30**	-.16*	-.27**	.35**	.46**	.43**	.87	
13 SDE	-.39**	.87**	.19**	-.23**	-.33**	-.35**	-.16*	-.37**	.13	.21**	.32**	.53**	.75
M	38.60	48.51	62.44	7.77	7.34	8.02	7.35	8.12	31.30	31.14	17.89	15.19	15.44
SD	8.93	13.47	18.33	1.95	2.53	2.69	2.64	2.19	10.21	10.41	3.14	5.91	7.61

Note. AMES-10 = total score of athletic mental energy; ABQ = total score of athlete burnout; CSALSS = total score of student-athlete's life stress; VIG = vigour; CON = concentration; MOT = motivation; CAL = calmness; CONF = confidence; GLS = general life stress; SSS= sport-specific life stress; RSA = reduced sense of accomplishment; PEE = physical/emotional exhaustion; SDE = sport devaluation. Cronbach's α of each measure is on the diagonals.

* $p < .05$; ** $p < .01$.

The results of CFA indicated good model fit indices for both male and female samples. The Bollen-Stine bootstrapped indices revealed $\chi^2/df = 1.18$ for males and 2.07 for females; GFI = .99 for males and .98 for females; CFI = .96 for males and .91 for females; RMSEA = .04 for males and .07 for females; and SRMR = .02 for males and .04 for females. The metric-restricted model demonstrated satisfactory model fit, with changes in χ^2, CFI, TLI, and RMSEA when comparing the metric-restricted model to the configural invariance model falling within acceptable ranges. When compared to the metric invariance model, the changes in χ^2, CFI, TLI, and RMSEA for the variance/covariance invariance model also demonstrated acceptable values. Similarly, the changes in χ^2, CFI, TLI, and RMSEA between the residual invariance model and the variance/covariance invariance model were within acceptable limits. Overall, the configural, metric, variance/covariance, and error variance invariance models exhibited equivalent performance in terms of changes in CFI, TLI, and RMSEA. The values of these indicators are presented in Table 5.

Conclusion

Results revealed that five factors of the AMES-10 were negatively correlated with sport-specific life stress, general life stress, physical and emotional exhaustion, sport devaluation, and a reduced sense of accomplishment. The negative correlations among overall scores of AMES-10, ABQ, and CSALSS support the nomological validity of the AMES-10.

Table 5. Gender invariance of the measurement model of the AMES-10

Model	$\triangle\chi^2$	*p*	△CFI	△RMSEA	△TLI
Configural	(81.266)	(.003)	(.966)	(.055)	(.940)
Metric	5.230	.389	<-.001	.002	-.005
Co/Variance	14.309	.502	<.001	.007	-.013
Residual	19.455	.035	-.010	-.003	.006

Note. The numbers in parentheses represent the values of the basement model.

The results of the CFA with group comparisons indicated that configural, metric, covariance and error variance invariance demonstrated equivalent performance across genders, thereby supporting strict model invariance (Kline, 2023). These findings confirmed that both males and females had a comparable understanding of the content of the AMES-10. Furthermore, the relationships among the five factors remained consistent between males and females. Also, the results supported the invariance of item reliability across genders.

Study 3

Purpose

The purpose of Study 3 was to examine the test-retest reliability of the AMES-10.

Participants

The sample consisted of 54 collegiate soccer players (36 males, 18 females; M_{age} = 20.77 ± 1.68).

Measurements & Procedures

The procedures were identical to those in Study 1 and Study 2. Participants in this study completed the AMES-10 twice, with a 14-day interval between the two surveys to examine test-retest reliability. The measures are as follows:

Demographic questionnaire

The demographic questionnaire was the same as Study 1 and the AMES-10.

Statistical Analyses

We used an inter-class correlation coefficient (ICC) to examine the test-retest reliability (Koo & Li, 2016; Qin et al., 2019). The ICC uses a two-way mixed-effect analysis of variance model with interaction to assess the absolute agreement between two scores.

Results

The ICC analysis indicated a moderate degree of correlation between the measurements at the two-time points. The ICC for the five dimensions were as follows: vigour (ICC = .59), concentration (ICC = .63), motivation (ICC = .61), calmness (ICC = .66), and confidence (ICC = .57). The overall score of the 5-factor, 10-item AMES demonstrates a high degree of consistency (ICC = .83).

Conclusion. The results of the ICC analyses showed that each factor demonstrated acceptable test-retest reliability (>.5), while the total score of the AMES-10 revealed excellent reliability (>.8).

General Discussion

Theoretical implications

The present study, utilising a standardised research procedure, compared the model fit between the original 15-item five-factor version of the AMES and a refined AMES-10. The findings supported the factorial structure and model fit of AMES-10. The only distinction between AMES-10 and the original AMES lies in the exclusion of the tirelessness dimension from the former; the remaining four dimensions are consistent across both versions. These results directly respond to Lu et al.'s (2018) theoretical distinction between vigour and tirelessness, which represent positive and negative conceptualisations of energy, respectively. However, the findings suggest that these two dimensions do not reflect conceptually distinct constructs. This aligns with prior research on measurement issues, indicating that mixing positively and negatively worded items can confuse respondents, introduce method effects, and ultimately compromise the reliability and structural stability of the scale (Roszkowski & Soven, 2010; Zhang et al., 2016).

In addition to enhancing the parsimony of AMES, Study 1 examined the appropriateness of items within each dimension using factor loadings and internal consistency indices. The analyses identified one item per dimension that had notably lower factor loadings than the others, and the deletion of these items either maintained or improved the internal consistency of the respective dimensions. These items exhibited methodological inconsistencies from different perspectives. For instance, in the vigour dimension, Item 1 was contextually inconsistent with the other two items, which may have contributed to its diminished suitability (Tourangeau et al., 2000; Schwarz, 1999). In the confidence dimension, Item 3 demonstrated target inconsistency relative to the other items (DeVellis & Thorpe, 2021), which may undermine its appropriateness. Similarly, in the concentration dimension, Item 10 displayed inconsistent response contexts with the other two items (Tourangeau et al., 2000; Schwarz, 1999), resulting in low factor loading and inter-item correlation. In the calmness dimension, Item 14 was inconsistent in its response direction compared to the other items, which may have compromised its measurement integrity. Finally, in the motivation dimension, the target inconsistency of Item 16 relative to the other items also appeared to reduce its appropriateness.

The five factors of the AMES-10 not only represent core components of athletic mental energy (Lu et al., 2018) but also align with the extant literature on sport excellence. The emotional factor of vigour in sport excellence can be traced to the early work of Morgan's (1979; 1980) iceberg

profile model, where he found successful athletes scored high on vigour but low on anxiety, fatigue, depression, anger, and confusion compared to unsuccessful athletes. Vigour is defined as an individual's subjective feeling with heightened arousal (Lane & Terry, 2000). Athletes with high vigour can engage in harsh sports training and competition. In contrast, when athletes are low in vigour, they would not be able to finish the required training schedule and sports skills practice. Thus, the role of vigour in sports' success is essential.

Similarly, the emotional factor of calmness also links to peak performance. Early works on the psychological characteristics of peak performance (Ravizza, 1977; Garfield & Benett, 1984; Loehr, 1984) indicated that when athletes achieve their best performance, they experience calmness and emotional stability and are physically and mentally relaxed. Similarly, Anderson et al. (2014) interviewed elite Australian athletes to investigate their psychological state during their best performance. Participants reported that during their best performance, they felt calm and relaxed.

The cognitive component of confidence is crucial for achieving peak performance. Self-confidence is defined as an athlete's belief in their ability to accomplish the required task (Vealey & Chase, 2008). High-confidence athletes exhibit better concentration, emotional control, and effective competition focus (Lane, 2016). A recent meta-analysis synthesised 41 studies involving 3711 athletes and found that the confidence-sports performance relationship ranges from 0.14 to 0.39 (Lochbaum et al., 2022). Thus, it can be concluded that confidence plays a pivotal role in sports success.

Motivation, another cognitive factor in athletic mental energy, is theoretically significant. Motivation is an inner drive for athletes to engage in sports training and competition (Gill et al., 2017). The gold medal profile for sport psychology (GMP-SP) asserts that motivation is crucial for achieving sport excellence (Durand-Bush et al., 2023). With high motivation, athletes sacrifice their leisure time and tolerate harsh training to pursue their goals. High athletic mental energy would promote athletes' investment in sports training and competition. In contrast, low athletic mental energy would reduce sport engagement (e.g., participation, persistence, effort, intensity, and willingness to accept a challenge).

Concentration is another vital component of athletic mental energy. To successfully achieve peak performance in sports, athletes need to block distractions from audiences, referees, media, competition officials, and many others. Specifically, when performing sports skills, individuals need to focus on what is most important for movement execution while ignoring distractions (Moran, 2012). Some elite athletes describe their experience when performing their best as "… feeling completely detached from the external environment and any potential distractions" (Williams et al., 2015). These experiences highlight the importance of concentration for outstanding performance.

The results of nomological validity provide several implications. Specifically, we found athletic mental energy negatively correlated with burnout and life stress. The negative athletic mental energy-burnout relationship can be explained in several ways. According to Smith's (1986) cognitive-affective model of athletic burnout, burnout is the consequence of cognitive appraisal of situational demands and personal abilities/coping resources. It leads to perceived low achievement, emotional and physical exhaustion, and is characterised by low athletic mental energy (i.e., low motivation and vigour). We suggest that future studies examine the influence of athletic mental energy on burnout.

The relationship between athletic mental energy and life stress is a unique aspect of athletic mental energy research

(e.g., Lu et al., 2018; Chiou et al., 2020). High levels of stress have been linked to an increased risk of injury (Chyi et al., 2023), depression (Risch et al., 2009), decreased performance (Humphrey et al., 2000), and burnout (Lin et al., 2021). Our results add to the research on athletes' stress. Despite this novel finding, whether high mental energy leads to low-life stress or low-life stress causes high mental energy needs to be examined in the future.

Moreover, gender invariance is theoretically meaningful. Despite males and females having differences in biological or psycho-social attributes (Del Giudice, 2015), our study found that there is gender invariance in the AMES-10. Gender invariance implies that both males and females similarly respond to the AMES-10.

Strengths of the Study

This study has several strengths. First, the measurement of psychological energy in sport settings has often relied on composite and multi-dimensional instruments, such as the Profile of Mood States (POMS; McNair et al., 1981), the State Sport Confidence Inventory (SSCI; Vealey, 1986), the Competitive State Anxiety Inventory-II (CSAI-2; Lane et al., 1999), the revised Sport Motivation Scale (SMS-II; Pelletier et al., 2013), and the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003). In contrast, the development of the AMES-10 offers a more integrated approach that simultaneously captures the cognitive, affective, and motivational components of competitive mental energy. Compared with the original AMES (Lu et al., 2018), the AMES-10 further considers critical concerns related to item construction within each dimension. Specifically, it addresses methodological issues that can impair the reliability and validity of measurement outcomes, such as the inclusion of both positively and negatively worded items, inconsistencies in response context, and discrepancies in target objects (DeVellis & Thorpe, 2021; Tourangeau et al., 2000; Roszkowski & Soven, 2010; Zhang et al., 2016). The AMES-10 not only demonstrates strong psychometric properties but also adopts concise and thematically consistent items, facilitating its application in both experimental and survey research while enhancing procedural rigour and research validity.

Second, from a practical standpoint, time efficiency is a key factor influencing individuals' willingness to engage in psychological consultation services. The use of brief instruments helps reduce the time burden, thereby increasing athletes' receptiveness to psychological support (Horvath & Röthlin, 2018). Likewise, in research settings, the duration of participant involvement may influence both psychological state and motivation to complete the study. Short-form instruments, such as the AMES-10, contribute to improved participant engagement and reduce the potential adverse effects of time burden on research validity (Koitsalu et al., 2018; Thomas et al., 2022). Therefore, researchers may employ the AMES-10 in both experimental and survey contexts to explore its impact on athletes' cognition, emotions, and behaviours. In applied practice, the AMES-10 also offers a valuable tool for professionals to assess athletes' psychological energy levels during periods of stress, performance decline, or fatigue. Additionally, it can serve as a monitoring index for sport scientists aiming to evaluate training load and psycho-physiological status in relation to mental energy.

Limitations

There are several limitations in our study. First, our participants were all college student-athletes; whether the AMES-10 applies to youth athletes or professional athletes needs to be examined. Further, the AMES-10 is a sport-specific measure developed in the sport context. Whether it can be used for exercisers or sports professionals, such as referees or coaches,

needs further validation. Moreover, we adopted Lu et al.'s (2018) definition and conceptualisation to refine the AMES-10, considering whether the core components of athletic mental energy extend beyond the five factors that need further examination.

Recommendations

It is recommended that researchers employ the AMES-10 in field or laboratory settings to examine its influence on athletes' cognition, emotion, and behaviour. We also suggest that sports scientists use the AMES-10 as a tool to monitor athletes' training loads and psycho-physiological responses, as past research indicates that excessive training loads can increase athletes' anger, anxiety, depression, and fatigue (Raglin et al., 1996). Additionally, sports psychology consultants may utilise the AMES-10 to evaluate athletes' mental energy state when they encounter stress, periods of underperformance, or fatigue. The appendix provides the content and scoring of the AMES-10. We estimate that athletes scoring above 45 on the AMES-10 exhibit high levels of mental energy. In contrast, athletes who score below 25 exhibited low levels of mental energy.

Conclusion

To obtain a concise measure of athletic mental energy, we conducted two studies and developed a 5-factor, 10-item AMES. This is a further refinement and development of the athletic mental energy. We hope that more researchers will use the AMES-10 to examine the influence of athletes' mental energy on cognition, emotion, and behaviour, and explore the relationship between mental energy and sport excellence.

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Statement of Research and Publication Ethics

The work fully complies with APA ethical publication standards and has been approved by the Antai-Tian-Sheng Memorial Hospital Institutional Review Board (TSMHIRB-23-090-B)

Data Availability Statement

Anyone who interested in this paper can obtain research data from correspondence author.

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Appendix

The AMES-10

	Directions: Below are 10 statements that describe **"how do you feel right now"** in sports training/competition. Please circle a number that mostly represents your feelings.	**Completely not**	**Hardly ever**	**A little bit**	**Much**	**Very much**	**Completely so**
1	I feel there is an endless energy coming from my body.	1	2	3	4	5	6
2	I feel excited about future competitions.	1	2	3	4	5	6
3	There's nothing distracting me in competition.	1	2	3	4	5	6
4	I am full of passion to attend my sports.	1	2	3	4	5	6
5	I can execute my sports movements and skills automatically in sports.	1	2	3	4	5	6
6	I am free of distraction during competition and training.	1	2	3	4	5	6
7	I can control all sports movements and skills.	1	2	3	4	5	6
8	Either in competition or training, I feel full of energy.	1	2	3	4	5	6
9	Facing upcoming competitions, I don't feel anxious.	1	2	3	4	5	6
10	Even facing a tough opponent, I don't feel anxious.	1	2	3	4	5	6

Note: (a)Vigour=1、8; (b) Confidence=5、7; (c) Motivation=2、4;

(d) Concentration=3、6; (e) Calmness=9、10

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INTERNATIONAL SPORTS STUDIES

ORIGINAL RESEARCH

Synthesising Les Mills' Five Key Elements: How Readiness-to-Hand is Developed Among Group Fitness Coaches

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Abstract

This paper examines the process by which Les Mills group fitness instructors in the Philippines develop a seemingly effortless coaching style. They simultaneously perform exercises alongside their participants, correcting and motivating them, while maintaining awareness of the music playing. Using ethnographic data from a local Philippine gym, pseudonymously referred to as The Fit Stop, it is argued that the apparent naturalness of their teaching develops through numerous stages of practice and feedback. Throughout the process, instructors gain mastery over what Les Mills calls the Five Key Elements of instruction: choreography, technique, coaching, connection, and performance. As they become more adept, the Elements become more ready-to-hand (Heidegger, 1962), allowing instructors to apply them intuitively and without conscious deliberation. By highlighting this form of embodied expertise, the paper contributes to the limited literature on group fitness instruction. It proposes readiness-to-hand as a valuable lens for analysing the embodied development of coaching competence among group exercise professionals.

Introduction

It is past 10 am on a Saturday, and Jeremy's BODYPUMP class at The Fit Stop has just completed their warmup. Squats, the second segment of the workout, are about to begin. Jeremy takes his place in the middle of the stage, lifts his barbell onto his upper back, and addresses the class, telling them, "Squats, 2-2." Music with a strong bass starts to play, and he brings his hips down in a squatting motion following the beat of the music. It takes him two beats of the music to go down, and two beats to go up. He reminds participants about the range of motion, saying, "Butt to knee height, no higher, no lower". He coaches participants in this way throughout the entire song, signposting changes in the tempo and encouraging them to keep moving through the challenging parts of the song.

BODYPUMP is a programme in which participants perform weightlifting movements while following a prescribed choreography that is set to music. In coaching his attendees for the squats segment of the class, Jeremy began by demonstrating where the barbell should be placed as they moved and telling the class that they would be following a "2-2 tempo." Using his words and bodily movements, Jeremy coached his participants through the workout. He demonstrated the proper range of motion, and at times when the workout got challenging, he encouraged them to keep going. Throughout the workout, he continued to move, performing the

exercises alongside his participants. As a weightlifting class, BODYPUMP is designed to "shape and tone the entire body, increase core strength, and improve bone health" (Les Mills, 2022). By demonstrating the proper range of motion, signposting changes in movement, and motivating his attendees, Jeremy helped them attain the benefits of the workout.

The uninitiated may not detect that Jeremy's teaching exemplifies the standard coaching model for all Les Mills instructors. He implements what are known as the "Five Key Elements." These are aspects of a teaching style that instructors become increasingly proficient in using during the early stages of their careers in group fitness. On their first day of training, prospective Les Mills coaches are informed that when the Five Elements are implemented effectively, they enable a practical and enjoyable workout experience. These Key Elements are choreography, technique, coaching, connection, and performance.

The first, choreography, refers to knowledge of the movements that correspond to the music. Technique is the second of the Elements. It pertains to the proper demonstration of movements that class participants follow. Coaching, the third Element, refers to what instructors say, including cueing movements properly so that participants know how to move and when to do so. It also refers to communicating clearly so that attendees do not get distracted or lost. The fourth is connection, which entails tapping into the environment, both in terms of the music and the participants. Instructors are expected to use eye contact, facial expressions, and body language to engage their attendees and highlight the feelings they evoke from the music. Finally, performance refers to the ways instructors bring their individuality into their classes, which is manifested in different ways, including the use of humour, improvised movements, or adopting a particular attitude during a class or song. Performance is the most abstract of the Key Elements and is also the one that varies most across individuals.

Returning to the vignette depicting Jeremy's BODYPUMP class, we find that the Five Elements were displayed in his teaching in some degree or manner. First, his placement of the barbell and his movement in a squatting motion demonstrated technique. Second, telling his participants about the 2-2 squat rhythm and signposting tempo changes exemplified his knowledge of the choreography. Jeremy's instruction for participants to bring their "Butt to knee height, no higher, no lower" represents coaching, but also reflects technique, since it showed his awareness of the safe and effective range of a squat. Finally, both coaching and performance were exemplified in the way in which he motivated his class to continue moving through the complex parts of the track. His Les Mills training does not strictly prescribe the words he should use or when he should say them. As such, the timing of his coaching interventions was deliberate and exemplified how he connects with and performs for his attendees.

Jeremy is one of thousands of Les Mills instructors found in gyms worldwide. All of them have been initiated into the use of the Five Key Elements, which they combine during the teaching of their classes. This model of coaching is standard for all programs licensed by Les Mills, a New Zealand-based company that has been described as doing for group exercise what McDonald's did for hamburgers (Andreasson & Johansson, 2016). They offer eighteen programs, namely:

1. BODYATTACK	10. BODYCOMBAT
2. GRIT	11. PILATES
3. STRENGTH DEVELOPMENT	12. FUNCTIONAL STRENGTH
4. BODYJAM	13. BODYPUMP
5. BODYSTEP	14. TONE
6. RPM	15. DANCE
7. CEREMONY	16. THRIVE
8. BODYBALANCE	17. CORE
9. SHAPES	18. TRIP

(Les Mills, 2025)

Each one has a distinct exercise focus and a unique set of movements. BODYPUMP, which was described above, is a weightlifting class. By contrast, BODYJAM is a dance-based cardio program, and RPM is an indoor cycling workout.

Les Mills classes are characterised by standardisation, such that the music, movements, and some aspects of the instructors' coaching are the same, regardless of where the programs are taught. Parviainen (2011) discussed how instructors present predetermined songs and choreography to their participants, making the classes forms of "imitation-based fitness" (p. 536) activities. Such interpretations have contributed to the perception that Les Mills programmes leave little room for instructor agency or improvisation. This paper, however, offers a corrective to these arguments by foregrounding the lived experiences and embodied expertise of instructors themselves. Data obtained from coaches suggest that they are more than just automata transmitting choreography.

This paper argues that the Les Mills coaching model allows instructors to express themselves individually, despite having to deliver standardised music and movements. The data presented in the following sections indicate that Les Mills trainers can motivate and connect with their classes in distinctive ways. They master the skill of combining music, movements, and coaching during specific milestones, such as their auditions, Initial Module Training (IMT), and mentorship. The concept of "readiness-to-hand" (Heidegger, 1962) is adopted to explore how instructors undergo a phenomenological process of transformation in experiencing their *being-there* in the Fit Stop and become increasingly competent with the Five Key Elements. Ultimately, they reach a point where they can apply them without being consciously aware of what they are doing or saying. As their coaching tools become more readily available, they then gain more mental bandwidth to observe their participants' movements, the class's emotional state, or memorise new sets of choreography whenever Les Mills releases them.

Readiness-to-Hand in the Academic Literature on Sport and Fitness

Les Mills instructors are not immediately adept at applying the Five Key Elements upon receiving their instructor licenses. Instead, they undergo preparatory stages in their careers during which they are trained to implement specific Elements and evaluated on their ability to apply what they have learned. As they progress, they are expected to become increasingly proficient in using the Elements until they can seamlessly integrate all five when leading their classes.

This study, with its focus on how group fitness instructors develop their teaching expertise, is underpinned by the established literature on skill acquisition. Two influential frameworks in this field are the three-stage model proposed by Fitts and Posner (1967) and the five-stage model developed by the Dreyfus brothers (Dreyfus & Dreyfus, 1986; Dreyfus, 2004). Fitts and Posner describe a progression that begins with the cognitive stage, where learners perform tasks deliberately and with effort. This is followed by the associative

stage, where practice leads to gradual improvement and a decrease in errors. Finally, in the autonomous stage, performance becomes smooth and requires little conscious attention. The Dreyfus model outlines a similar shift from novice to expert but emphasises a decreasing reliance on formal rules and an increasing capacity to respond intuitively to situations. At the expert level, individuals act fluidly within context and no longer need to deliberate over each decision consciously (Dreyfus & Dreyfus, 2005).

While both models emphasise a shift from rule-based behaviour to intuitive action, Heidegger's concept of readiness-to-hand provides a more phenomenologically grounded account of this transformation. Whereas the Dreyfus' model describes observable stages of expertise, Heidegger is concerned with the deeper nature of how tools and actions become integrated into our way of being. Rather than depicting expertise as a technical process of efficiency or automaticity, it focuses on how tools and actions recede from conscious awareness and become integrated into a person's embodied engagement with the world. Dreyfus (1991, 2008) interprets this as a transition from deliberate skill execution to skilled coping, in which individuals respond directly and fluidly to their environment without reflective thought. In Heideggerian terms, a tool is ready-to-hand when it is used fluently within a meaningful activity and does not stand out as an object of reflection. The performer is not merely unconsciously competent but is absorbed through action in a pre-reflective and embodied way (Wisniewski, 2012).

This distinction is especially relevant for understanding group fitness instruction. Although the Five Key Elements are not literal tools, they function as operational components in the instructor's practice. As trainers become more skilled, they cease to consciously consider the Elements and instead use them fluidly while simultaneously cueing movement, monitoring form, motivating participants, and managing new choreography. This form of embodied absorption reflects not only a high level of competence but also the readiness-to-hand of a practice deeply integrated into the instructor's body and professional identity.

While the concept of readiness-to-hand is rarely discussed in sport or fitness research, some notable exceptions exist. Martínková and Parry (2016, 2018) have examined how Heideggerian philosophy informs the understanding of athletic experiences, while Breivik (2007, 2008, 2010) has applied it to specific domains of movement, such as skiing, skilful coping, and skydiving. These works suggest that athletic expertise is often characterised by a kind of non-reflective engagement that is central to Heidegger's phenomenology. This paper builds on those contributions, extending the application of Heideggerian concepts to the domain of group fitness instruction.

In addition to technical skill and embodied fluency, group exercise instructors, like other professionals in the fitness industry, perform a considerable amount of affective and aesthetic labour. Harvey, Vachhani, and Williams (2013) highlighted how fitness professionals trade on physical capital and emotional engagement to present themselves as both aspirational and approachable. Similarly, Maguire (2001) examined how personal trainers manage emotions as part of service work, blending motivation, coaching, and consumer engagement. Ryu and Kim (2016) and

Sacha (2015) illustrated how emotional labour plays a significant role in instructional settings, often accompanied by emotional exhaustion or identity negotiation.

More recent studies have added further nuance to these discussions. Harvey and Griffin (2021), for instance, explored how instructors working with older adults draw on "age capital" to empathise with ageing bodies and balance affective energy with inclusive pedagogical strategies. Adamson et al. (2023) demonstrated the additional emotional and communicative demands faced by instructors teaching exercisers with disabilities, while Andersson (2024) examined how group fitness coaches negotiate tensions between fun and discipline in relation to health norms and gendered expectations. Gui et al. (2022) showed that in online fitness environments, instructors must manage expanded social dynamics and heightened emotional responsibilities, particularly when engaging participants remotely. Finally, Rowe and Slater (2021) found that instructors' identity leadership and their ability to foster in-group affect were significant predictors of continued class participation. These insights underscore that developing expertise in fitness work involves not only technical and embodied capacities but also the ability to manage affect, relationships, and self-presentation in highly performative environments.

By examining the development of coaching competence among Les Mills instructors, this paper integrates theoretical and empirical perspectives from the literature on skill acquisition, phenomenology, and the fitness industry. Drawing on ethnographic observation and interviews, it shows how technical competence, embodied fluency, and emotional performance are developed in tandem. In doing so, it offers a situated account of expertise that foregrounds not only what fitness instructors do, but also how they come to be the kind of professionals their roles require.

Methodology

The approach employed in this study is ethnographic, in the sense that it entailed examining the *in situ* "events, language, rituals, institutions, behaviours, artefacts, and interactions" (Cunliffe, 2010: p. 227) of Les Mills trainers at The Fit Stop. After obtaining permission from both the gym and its employees to gather data, I observed group fitness classes and conducted interviews with the coaches. By the end of the data-gathering process, I had observed or conducted interviews with most of The Fit Stop's Les Mills trainers. They represented a range of teaching experience, with one participant having just begun their instructor journey, while others had been coaching for over a decade. Participants also taught a variety of Les Mills programs and shared their experiences teaching each one.

As a Les Mills instructor myself, I had some knowledge of the world in which my participants operated. Dedicated positivists may argue that the "objectivity" of this study was compromised due to my insider knowledge. On the contrary, though, I have found my background information beneficial in helping me understand instructor experiences. Like any cultural group, Les Mills instructors have shared meanings, practices, ways of speaking, and significant objects that are not readily understood by non-instructors. I was aware of the equipment they used, how Les Mills programs are structured, and the training methods used for instructors. Furthermore, I could easily understand the terms that participants used when they employed group fitness jargon during our interviews.

My positionality as an insider enhanced access to participants, as many were more willing to speak with someone they already knew or recognised from the Les Mills community. This existing rapport helped make recruitment smoother and interviews more open. At the same time, participants often assumed that they could reference shared experiences or use abbreviated terms in interviews with them without needing to elaborate further. While we shared many mutual reference points, I remained aware that my role as a researcher was to unpack the meaning behind them. Consequently, I frequently asked follow-up questions to prompt participants to provide details and clarify their experiences. This process was crucial to avoid collapsing individual variation into a generalised insider perspective.

During the process of collecting and analysing data, this study adhered to the standards for ethical social science research. Ethics approval for the study was granted by the Institutional Review Board of the University of Leicester. Although the research being conducted did not pose risks of psychological or reputational harm to participants, their names have been pseudonymised to maintain their anonymity. The Fit Stop is not the name of the gym where participants work. It was changed as an additional layer of identity protection.

Ultimately, the goal of the ethnographic approach was to combine the observational and interview data to present an account of participants' experiences that reflected their perspectives (c.f. Dewan, 2018; Hammersley & Atkinson, 2019; Marcus, 2007). This entailed asking instructors about their careers, including how they started and what skills they had developed. When this topic was explored during interviews, participants consistently emphasised how they became increasingly adept at using Les Mills' Five Key Elements. Excerpts from some of their accounts are presented in the succeeding section.

Figure 1. Developmental Trajectory of Les Mills Instructors

Findings

Evidence from interviews indicates that the Five Key Elements' readiness-to-hand develops gradually, and increased competence is expected as instructors go through: (1) auditions; (2) Initial Module Training (IMT); (3) mentorship; and (4) Quarterly Workshops. A visual timeline of the different stages is depicted in the Figure 1.

During the audition stage, aspiring instructors are evaluated on their technical skills. Once they begin their official training, they are required to memorise choreography and learn how to coach segments of a class. When they move to their mentorship, trainee instructors practise using all Five Elements in front of actual participants. Throughout the process, individual Elements become more ready-to-hand, allowing instructors to focus on new aspects of their teaching. Once they are capable of handling full classes and all five are easily applied, instructors enter a continuous cycle of studying newly

released choreography every three months during mandatory Quarterly Workshops. These may be likened to fast-tracked versions of their original training, where they must learn to apply the Key Elements to new sets of movements. However, they can do this because they no longer have to be overly conscious about how to use the Elements and can instead focus on just memorising the new choreography. Each of these milestones is discussed in the succeeding subsections.

Standardised Technique and Instructor Auditions

At the Fit Stop, aspiring instructors must undergo an audition process before participating in their IMT. The gym can enforce this because anyone signing up to train for a Les Mills program needs the endorsement of a licensed company for their registration to be valid. Auditions are an added ritualised layer of gatekeeping that allows The Fit Stop to assess prospective instructors' fitness levels and evaluate how closely their technique aligns with Les Mills standards. In doing so, the company enhances the chances that the trainees they endorse will achieve a passing mark in the IMT.

The format for auditions is similar to a regular Les Mills class, with one of The Fit Stop's instructors on stage, leading the group of auditionees through a class. Unlike a typical exercise session, however, auditions last for over an hour, and aspiring trainees' movements are scrutinised by veteran instructors who evaluate whether their technique meets the standards set by Les Mills. The focus on movements alone is explained by the fact that prospective instructors are usually unaware of the Five Key Elements when they audition for a position. They are not expected to know choreography, coaching, connection, or performance since they are not given any training on these in advance. As such, the basis of passing the audition is solely technique.

Two of the participants interviewed in this research project have served as assessors during their program's auditions. Noah, an RPM instructor, explained that they focus primarily on a prospective instructor's technique. In terms of RPM specifically, he remarked, "It means do they show the right 'P-R-P: position, resistance, and pace." The program is a cycling class in which participants ride stationary bikes equipped with a dial that adjusts the amount of resistance they need to push against the pedals. During the audition, assessors primarily check that aspiring instructors are "on the beat". That is, they are pedalling with the rhythm of the music. They also check that auditionees are "not bouncy," referring to the inability to keep one's hips stable on the bike seat. This occurs when a rider has too little resistance.

When asked to elaborate on why technique is so important, Noah explained, "If your students see that (wrong form) in class, they won't find you a credible instructor". His remark establishes a connection between an instructor's credibility and their ability to demonstrate technique correctly. Such statements emphasise the high level of standardisation associated with that Key Element.

Valerie, who served as an assessor during several BODYCOMBAT auditions, echoed Noah's statements about what is sought among prospective instructors. She said, "During auditions, we basically check to see if…technique is correct. If the instructor in front says 'hook', does their punch look like a hook? If it's a roundhouse kick, does it look like a roundhouse kick?" BODYCOMBAT, a martial arts-based

program, utilises movements from disciplines such as boxing, Taekwondo, Karate, and Muay Thai. For Valerie, the assessors' job is to check that the auditionees' technique resembles the martial arts movements used in the Les Mills program.

The nature of Fit Stop's audition system suggests a preference for candidates whose bodies already exhibit a form of readiness-to-hand. That is, these individuals can perform the correct movements fluidly and instinctively. Prospective instructors whose cadence and martial arts form are already aligned with Les Mills standards can execute techniques without needing much deliberate thought. From a Heideggerian perspective, such movements are not merely superficially correct. They are intuitive and readily available for use. These candidates do not require further guidance on how to move their bodies and can instead concentrate on learning choreography or coaching once training begins.

Initial Module Training: Assessing Choreography and Technique

All participants in this study will, at some point, have undertaken the mandatory IMT to teach their programs. During their initial modules, they are guided by a trainer through a standardised course that is provided to all trainees of Les Mills programs worldwide. During the IMT, prospective instructors are introduced to the Five Key Elements, guided through technical instruction for specific movements, and given a foundational model for coaching. Before completing the module, trainees would have taught a short segment of a class and been evaluated on choreography, technique, and basic coaching cues.

Jason, who teaches BODYBALANCE and RPM, recalled an especially intense part of his IMT called the "Race of Truth," where trainees cycled for over ninety minutes while alternating between heavy climbs and fast sprints. This exceeded the duration of a typical RPM class and required sustained technical precision despite fatigue. Jason remarked that the experience helped him "get a feel for what RPM was," suggesting that the physical challenge allowed him to grasp the essence of the program through direct bodily experience.

There are two ways to unpack what he meant by this. First, the Race of Truth allowed him to experience how challenging RPM could be as a workout when done beyond its prescribed time limit. Second, the physical challenge gave him an appreciation for the physical training effect that riding with proper technique could have. Combining both interpretations, the Race of Truth serves as a way for aspiring RPM instructors to familiarise their bodies with the workout they will be teaching and as a means to reinforce proper technique that is already second nature to them, having passed the audition process.

Jason's experience appears to reflect more than physical exertion. It exemplifies how embodied familiarity is cultivated. Through repeated physical drills, he moved beyond cognitive awareness of proper form and entered a space where technique became second nature. He did not just know how to ride correctly; he also knew how to ride correctly. He could do so automatically. His technique had become second nature, allowing him to pedal correctly despite his fatigue. This is a hallmark of expert embodiment, where bodily movement no longer requires conscious direction but is instead carried out through absorbed practical engagement.

Anthony, a BODYATTACK instructor, shared a similar experience.

His IMT included propulsive drills such as jumping jacks, plyometric lunges, and tuck jumps. He emphasised that choreography must be executed precisely, and that mistakes in movement could lead participants in the class to follow suit. Like Jason, he argued that an instructor's body serves as the model, and their movements must be both correct and consistent. For BODYATTACK, which includes many high-impact exercises, incorrect form could result in injury, making technical precision even more essential.

The constant repetition of complex movements during the training can be viewed as a method for deepening readiness-to-hand. Trainees may have already started the IMT with their technique as second nature. However, the activities they performed during the module pushed them to maintain those standardised movements even at the point of physical exhaustion. In doing so, it reinforced their ability to perform reliably under physical stress. If they could demonstrate proper technique at their limits, they would be more than capable of doing so during regular instruction.

The IMT also introduces trainees to choreography memorisation, though participants mentioned this less frequently during their interviews. Nevertheless, the module requires them to deliver choreography flawlessly during their final assessment, and they receive feedback after multiple presentations. Trainees are reminded that choreography is the foundation on which all other Key Elements rest. Without accurate sequences, even excellent coaching and technique cannot compensate for the lack of precision. To paraphrase my own IMT trainer, an instructor with excellent technique and coaching is useless if their choreography is wrong. The participants in this study likely heard similar articulations during their training modules.

The IMT, thus, plays a dual role. It serves as a site of evaluation and a tool for standardisation. Trainees learn to embody choreography and technique as forms of patterned familiarity. Repetition and fatigue-based drills are not incidental. They are core to the process of building somatic fluency. In the language of Heidegger, the body becomes attuned to these movements not as isolated tasks, but as a mode of practical being. Instructors become able to move through routines without deliberate reflection because the knowledge is ingrained in their physical comportment.

Coaching, connection, and performance are relatively de-emphasised during the IMT, as trainers focus on the two highly structured Key Elements that will be scrutinised during the module assessment. This is not to infer that instructors are left entirely on their own to experiment with how to coach, connect, and perform after their training. Instead, newly trained instructors are guided on how to implement the three less structured Elements during their mentorships, which are the topic of the succeeding section.

Mentorship: Practising the Five Key Elements and Developing Responsibility

Following the IMT, instructors can be employed by gyms that are accredited to offer Les Mills classes. However, prior to handling a class in The Fit Stop, the participants of this study underwent a mandatory mentorship process. Each was partnered with a veteran instructor from their program, who guided them in applying all five of the Key Elements during actual classes. Valerie, who described her experience as an assessor in a previous section, has also served as

a mentor to newly trained BODYCOMBAT instructors. In describing her view of the mentorship process, she says,

> "It will develop you so will get to a stage where you can handle your own class. In the beginning, you just shadow with the mentor to get a feel for what it is like to be on stage. After two or three sessions, you'll be asked to teach, starting with one track [or segment], then two, then half the class. After a few weeks, you'll be teaching the whole class… Every time, you're being given feedback about how to fix your technique or coaching."

Valerie's description frames mentorship in terms often associated with apprenticeship. Prospective instructors learn from more experienced peers by gradually taking on greater responsibility. The process begins with shadowing, which means being on stage without speaking. Shadows demonstrate movements alongside the mentor but do not coach. After a few sessions, they are invited to lead one track, then two, eventually building up to half and then a whole class. Through this gradual process, aspiring instructors gain experience in both demonstrating movements and coaching participants.

Natalie, a BODYPUMP trainer, recalled her experience being mentored by a veteran instructor as follows:

> "Mentorship is totally different from your IMT because it's actual…IMT is like you're playing, because you're still learning, and you only present in front of your Trainer or fellow instructors, but in [the] mentorship, you are teaching to actual students. They will do what you do. If you say the wrong thing, they will do the wrong thing…I got feedback from Steven (her mentor) that I was too monotone, and…I seemed really boring. I was always thinking what I planned to say what's next so I would blab and blab, and nobody would actually be listening. His feedback helped me to focus on getting people to react, because that's how you know they're with you…So it's like you practice more and more, and you start to be more natural."

Natalie described the mentorship experience as "actual", as opposed to IMT, which she described as like "playing". It is during this stage that newly trained instructors first interact with class participants, which we may consider a factor in perceiving the actuality of this occasion. As such, she emphasised the sense of accountability that came with it, remarking that, "If you say the wrong thing, they will do the wrong thing". She thus became accountable for other people's workouts, and it became vital that her technique and coaching were consistent.

Her account also illustrates how mentorship transformed her stage presence. She described herself as "boring", failing to engage her participants. Over time, however, her mentor's feedback prompted a shift. Rather than simply delivering rehearsed lines, she learned to draw reactions from participants and to be more natural in her delivery. Though she did not use the terms directly, she was describing the development of two Key Elements: connection and performance.

Natalie's ability to connect with participants was evidenced in one BODYPUMP class observed for this study. It was a weekday evening, and Natalie was leading her participants through a barbell track focused on doing

bicep curls. The song playing was upbeat and popular, with lyrics that many participants appeared to recognise. As the tempo increased, she faced the class while curling her barbell to the rhythm of the beat. Rather than remaining silent or withdrawn, she scanned the room as she moved, making deliberate eye contact with participants along the front and sides. She called out names of attendees mid-track, saying phrases like "Come on" or "Let's go." At a particularly energetic moment in the song, she altered the lyrics, changing the line "Do you love me" to "Do you love lifts," prompting stifled laughter from several participants. As the repetitions built intensity, her voice rose over the music. "How's everyone doing?" she shouted. The class responded with scattered yells and audible grunts of effort, to which she replied with loud encouragement, saying, "Yes, stay with it." The track ended with a dramatic bass drop, and instead of simply lowering her barbell, Natalie struck a playful pose, which drew cheers and laughter from the room despite the group's visible fatigue.

In that moment, connection and performance became tangible. Her eye contact, vocal expression, and humour reflected a deep attunement to the class. These gestures no longer seemed rehearsed or deliberate. They emerged fluidly, shaped by the energy of the room. Natalie did not add these Elements on top of her instruction. They arose from a body and voice already immersed in the practice. Her lyrical changes and theatrical gestures were not novelties, but natural expressions of a presence shaped through repetition and feedback.

This version of Natalie contrasted sharply with the trainee who once failed to hold attention. Through mentorship, she developed not only technical consistency and choreographic fluency but also the capacity to read the room and respond in real-time. She had moved from self-conscious delivery to a style grounded in responsiveness and ease. Her attention was no longer divided between memorised lines and bodily execution. Those Elements had become ingrained in her demeanour. Her focus now extended outward, toward motivating and energising the class.

Natalie's story, alongside Valerie's description of mentoring, reveals how mentorship serves as a bridge between mechanical repetition and embodied fluency. Trainees begin with a narrow focus, often restricted to choreography and technique. As shadows, they mirror movement without speech. Through repeated exposure to live environments, constructive feedback, and guided practice, they begin to internalise the Five Key Elements. Over time, their delivery becomes fluid and responsive, drawing energy from the music, the room, and the participants themselves.

In Natalie's case, this shift was evident in how she used her voice, read the room, and incorporated moments of humour. These gestures did not exist apart from the workout. They arose within it, having developed comfort with her movements, cues, and presence. Mentorship, then, is not just a period of observation or supervision. It is the phase in which instruction begins to feel lived. The Five Key Elements are not something that can be simply learned. They become integrated into the instructor's way of being, shaping how they move, speak, and connect on stage.

Workshops: The Continuous Cycle of Applying the Five Key Elements

Although instructors are no longer formally assessed after their mentorships, they continuously renew the readiness-to-hand of the Five Key Elements through their engagement with new "releases" in class. Four times a

year, Les Mills produces new combinations of music and choreography for all its programmes. These are called releases and are distributed globally through a structured chain of transmission. The company uploads materials online for its licensed instructors worldwide (Parviainen, 2011). Instructors receive music tracks, training videos, and detailed choreography notes. They are then responsible for memorising, rehearsing, and eventually presenting the new content to their participants.

While instructors can study these materials independently, The Fit Stop requires all instructors to attend Quarterly Workshops, which are held in Manila. During these events, Les Mills brings in designated trainers known as Presenters to lead masterclasses. These classes mirror a typical group fitness session in format, but they are led by instructors who already embody the Five Key Elements in their practice. The purpose of attendance is not to receive a workout, but to experience the new release in preparation for teaching it to their participants in the following weeks.

Jasmine, a BODYCOMBAT and DANCE coach, reflected on this process, saying, "During Workshops, I don't really pay attention to how easy or hard the release is. I'm checking to see how hard the release is to memorise and listen to how the Presenters coach." Her statement reveals that her cognitive attention is not focused on performing the movements but on assimilating their structure and delivery. By evaluating how difficult a release is to memorise, she assesses how it will integrate into her bodily routine. By observing the Presenters' coaching, she is exploring how language and gesture can be adapted to her teaching style. This indicates that she has already developed the capacity to think beyond execution, attending instead to the subtleties of communication and expression.

At times, masterclasses are followed by Education Sessions. In these segments, Presenters explain how to perform and teach movements that are unfamiliar or potentially confusing. Jasmine remarked, "Education sessions are useful for learning the technique and getting more ideas for coaching." These sessions further support instructors in refining their delivery and extending their coaching vocabulary. Instructors are expected not only to master the movements themselves but also to determine how the Five Key Elements can be used to create an engaging and effective experience for participants.

The release cycle acts as an accelerator for embodied fluency. While it involves less scrutiny than the Initial Module or mentorship, it still requires instructors to work toward integrating choreography, technique, and communication within a short period. Within three to four weeks of the Workshop, instructors must memorise the new choreography, internalised the movement patterns, and prepared ways to apply coaching, connection, and performance in real-time. By the official launch date, all instructors at The Fit Stop are required to use the new release in their classes.

These repeated cycles of learning and application create a rhythm that sustains the instructor's growth. Every new release presents an opportunity to re-engage with the Five Key Elements. Each quarter becomes not only a deadline but also a ritual of return, through which readiness-to-hand is reinforced. What may have once required conscious effort is now renewed through structured immersion, ensuring that technique, connection, and performance do not settle into routine but

remain alive to the evolving demands of the practice.

Discussion and Conclusion

This paper has examined how Les Mills instructors develop and sustain their teaching through the application of the Five Key Elements: choreography, technique, coaching, connection, and performance. Through the IMT and mentorship processes, instructors learn to use these Elements in an intuitive, embodied manner that reflects Heidegger's concept of readiness-to-hand. From the perspective of participants attending a Les Mills class at The Fit Stop, instructors' movements and cues may appear spontaneous. These are the outcomes of structured training and repeated rehearsal.

The same oversight is apparent in the academic studies of Parviainen (2011) and Andreasson and Johansson (2016), who characterised Les Mills programs as wholly homogenised and imitation-based, leaving little space for instructor creativity or expression. Parviainen (2011) argued that since instructors present predetermined music and choreography to their participants, the classes are forms of "imitation-based fitness" (p. 536) activities. As the author notes, the movements of both instructors and attendees are regulated, with minimal opportunities for "kinesthetic creativity" (p. 537).

In the established literature, Les Mills programs have been likened to factories that follow the principles of Frederick Taylor's (1911) scientific management. The assembly line was choreographed such that workers' movements were standardised, and they had no opportunities to deviate from the process. Parviainen's (2011) conclusions emphasised the constraining nature of Les Mills classes, compelling instructors and participants to perform specific movements in a particular way. Despite this, she recognised that teaching a group fitness class is not a typical "McJob" (p. 536), as instructors need to possess "performing skills" (p. 536), which they use to demonstrate their creativity. Unfortunately, the study in question did not elaborate further on this point.

Andreasson and Johansson (2016) described Les Mills as doing for group exercise what McDonald's did for hamburgers. By producing programmes with standardised music, choreography, and technique, there is a homogenisation in the delivery of classes worldwide. This standardisation in group fitness, they argued, is a manifestation of McDonaldization, a term coined by Ritzer (1996), who posited that the logic and processes used by the popular fast-food chain have been internalised into other aspects of social life. McDonaldization is characterised by four key characteristics: efficiency, calculability, predictability, and control (Chen & Ritzer, 2015).

According to Andreasson and Johansson (2016), Les Mills programs are efficient since they have been designed to achieve specific fitness goals in the shortest amount of time. However, the authors also remarked that despite the demonstrable McDonaldization of group fitness programs, there remain significant differences between exercise routines and hamburgers; as they put it, "It is easier to calculate…how long it takes to satisfy hunger than how much time is needed to complete exercises or 'sculpt' the perfect body" (p.162). Differences among individual exercisers and instructors undermine the homogenisation of group fitness. Despite recognising the differences, the authors failed to consider the potential for spaces, moments, or opportunities for adaptation within Les Mills programs.

Both the works of Parviainen (2011) and Andreasson and Johansson (2016) emphasised the standardised aspects of Les Mills programmes, albeit with token recognition of space for creative expression. However, neither publication was able to elaborate on what that entails. Their lack of detail may be attributed to the approach the authors took to studying Les Mills programmes, which lacked access to insider knowledge about instructors' thoughts and experiences. Having undergone the classes as participants or observers, it is unsurprising that choreography and technique drew their attention more than the other Key Elements, since they are the most easily observable to the uninitiated. It is only the instructors themselves who could potentially explain how and why they applied coaching, connection, and performance, but their perspectives were not presented.

This paper presents a phenomenologically informed account of how the Five Key Elements become embodied through training and experience. Instructors at The Fit Stop demonstrated not only technical proficiency but also a strong sense of affective and moral responsibility towards their participants. Their coaching involved not just delivering routines but also responding to real-time shifts in energy, mood, and engagement. This attentiveness depends on having the Five Key Elements ready-to-hand. Only then can instructors allocate their cognitive and emotional resources to connecting with participants and adjusting their performance accordingly. These insights have important implications for instructor education. They suggest that training programmes should extend beyond technical drills and scripted routines, providing opportunities for reflective feedback, real-time experimentation, and embodied practice. Continuing education can also foreground affective skills such as attunement, presence, and improvisation, which are central to sustaining meaningful participant engagement. Rather than viewing standardisation and responsiveness as a trade-off, instructor development initiatives can be designed to integrate both, encouraging instructors to adapt shared templates fluidly within live class environments.

These findings complicate the assumption that standardisation eliminates the possibility of individualised or responsive instruction. Instead, the study suggests that standardisation and improvisation may coexist. The Five Key Elements serve as a shared framework that enables consistency across Les Mills programmes, while also allowing instructors to exercise discretion in their application.

Although the data in this study are based on a single gym in the Philippines, the findings are likely relevant to the broader Les Mills community. The Five Key Elements are a universal standard across all Les Mills programmes, and instructors worldwide are expected to develop fluency in their application. While the specific methods of training may vary, and some instructors may not have undergone auditions or mentorships like the participants in this study, the goal of embodied mastery remains constant.

This research opens several potential avenues for future inquiry. First, it may inform coaching education by demonstrating how instructors can internalise structured models in ways that still preserve room for adaptation and individual expression. Second, the findings contribute to broader discussions on standardisation and

personalisation in sports and fitness instruction. Rather than treating these as mutually exclusive, this study shows that both can be achieved through embodied fluency. Third, there is a need for further research into how local conditions shape instructor development. Comparative case studies across gyms, cities, or national contexts could reveal how global standards are adapted to fit different institutional cultures and resource environments.

Ultimately, this study underscores the significance of the concept of readiness-to-hand in comprehending the embodied labour of sport and fitness professionals. Although the present research focused on Les Mills instructors, the theoretical insights apply to other domains. Athletes, performers, and recreational exercisers all cultivate skills that eventually become pre-reflective and immediately available for action. Future phenomenological studies would benefit from applying the concept of readiness-to-hand to explore how such embodied responsiveness is achieved in various fields of practice.

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The author reports no potential competing interests.

Statement of Research and Publication Ethics
This study was approved by the institutional research ethics committee of the University of Leicester.

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The Official Journal of the International Society for
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IN MEMORIAM

A Legacy of Vision, Scholarship, and Humanity in Comparative Physical Education and Sport Science

Prof. em. Dr. phil. Dr. h.c. Herbert Haag, M.S.

The International Society for Comparative Physical Education and Sport (ISCPES) mourns the passing of one of its most esteemed founding figures and lifelong torchbearers, **Professor Emeritus Herbert Haag, M.Sc.** With his departure, we have lost a visionary academic, a mentor to many, a global advocate for peace and education through sport, and a beloved friend whose legacy will continue to shape our field for generations to come.

A former President of ISCPES (1986–1988) and Professor Emeritus at the University of Kiel, Germany, Professor Haag was internationally renowned for his commitment to integrating sport, education, and human development through a comparative lens. His life's work was underpinned by a deep belief in four core dimensions of human behaviour: movement, cognition, affection, and belief (spirituality)—a framework that formed the foundation of his educational philosophy.

A man of action and intellect, Professor Haag received numerous accolades, including an honorary doctorate from the University of Leipzig (2002) and an honorary professorship from Tshwane University of Technology, South Africa (2011). He established the *Herbert Haag Sport Information Centre* in Pretoria and donated over 2,700 books to support global sport education. His scholarly contributions—published in German, English, Spanish, and Chinese—enriched international discourse on sport methodology, research, and comparative education.

His theoretical lens—articulated through the Kiel Model of Research Methodology (KMRM)—continues to inform academic rigour in sport science research, seamlessly integrating qualitative and quantitative paradigms through a holistic, systems-oriented approach.

At the 21st Biennial ISCPES Conference in Kerala, India (2023)—his final keynote—Prof. Haag once again inspired the global community with a visionary message centred on peace, social responsibility, and global-local synergy. He outlined a roadmap for the future of ISCPES, emphasising:

- Expanding institutional membership;
- Establishing a tiered, globally-connected structure;
- Embracing both digital and analogue strategies;
- Developing regional in-service training programmes; and
- Promoting a realistic and humane understanding of human behaviour through sport.

In his own words, he challenged us to "think globally and act locally**,"** invoking the Olympic ideal of holistic human development, rooted in fairness, peace, and mutual understanding.

A Global Outpouring of Tribute and Remembrance

In the days following his passing, friends and colleagues from around the world shared heartfelt tributes—testaments to the profound impact Prof. Haag had on their lives and the international sport and academic community:

Rosa López de D'Amico (Venezuela), Current ISCPES President:

Professor Haag was more than a scholar—he was my mentor, guide, and friend. His wisdom shaped my academic path, and his unwavering support gave me the confidence to grow in this field. He always had a special place in his heart for me, and I will forever carry his teachings and his spirit with me.

His belief in the human being as a unity of movement, thought, emotion, and belief was not just his philosophy—it was how he lived. Professor Haag leaves behind a legacy of compassion, vision, and academic brilliance that will continue to inspire generations.

Walter Ho (China/Japan), Former ISCPES President:

Herbert Haag was the first life member of ISCPES. He entered my life when I was still a PhD student. I first met him in 1996 at the ISCPES Biennial Conference in Tokyo. We visited Mt. Fuji together, and that memory remains precious. His contributions to methodology, his kindness, and his unwavering support during difficult times for ISCPES have deeply influenced me. I will forever cherish his mentorship and warmth—from Tokyo to Berlin to Goa. Though this is sad news, Herbert leaves behind countless sweet memories that will continue to inspire us.

John E. Saunders (Australia), Former ISCPES President:

He was my first international mentor. I remember him as a great friend who made an inspiring contribution to our field and, through it, to his ambitions for a better world. Vale, Professor Herbert Haag.

Ken Hardman (England), Former ISCPES President:

He was a friend, colleague, and mentor of the highest order.

Pedro Guedes de Carvalho (Portugal), Former ISCPES President:

What a shame. RIP Prof Herbert.

Beatriz Ferreira (Brazil), ISCPES, ICSSPE, and IAPESGW:

Herbert Haag made significant contributions in various areas of Physical Education and Sport.

Dr. G. Kishore (India), ISCPES Vice President:

With profound sorrow and grief, I express my sincere condolences for the loss of a remarkable soul. May his soul rest in eternal peace.

Prof. Usha Nair (India), ISCPES Secretary:

I feel truly honoured to have had the opportunity to communicate with him online. His wisdom, passion, and unwavering commitment to the field deeply inspired me. His legacy will continue to guide and uplift future generations.

Dr. Darlene A. Kluka (USA), ICSSPE and IAPESGW:

Such a stature of a man… someone who represented all that was good with German academia and all that was pure of heart in our collective professions. May his soul rest in peace. His devotion to and care of his wife, Renatta, was phenomenal.

Rosa Diketmüller (Austria), IAPESGW President:

Herbert was indeed a great supporter of ISCPES and a global player in the international arena of sport science and physical education.

To his colleagues, he was often affectionately known as the **"Grandfather of ISCPES"**—a title he wore with humility, humour, and pride. He mentored countless students and scholars, generously opened doors for dialogue and collaboration, and believed deeply in the power of comparative study to advance not only academic knowledge but global human understanding.

Professor Herbert Haag's lifelong commitment to **education, ethics, global cooperation, and inclusive sport** stands as a beacon for present and future generations of ISCPES members. As we carry forward the mission he so passionately nurtured, we honour his legacy by upholding the values he embodied and so eloquently expressed.

Rest in peace, Professor Haag.
Your vision lives on—in the pages of our journals, the corridors of learning, and the hearts of all those you inspired.

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