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Message

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EDITORIAL

What Makes International Sport "International"?

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The term *international* appears frequently in sports research—across titles, abstracts, and journal names—because it signals reach, scope, and significance. Yet many studies that use this label rely exclusively on data from a single country, league, or institution. This raises a fundamental question: What should *international* mean in sport scholarship, and what obligations follow when authors invoke it?

This is not an argument against single-context research. Studies rooted in a single country or community provide essential, detailed knowledge: they illuminate histories, policies, and lived experiences that might otherwise go unseen. The challenge lies in addressing the gap between description and claim. A study conducted in one setting can legitimately speak to broader issues, but those claims must be supported by explicit reasoning rather than assumed by virtue of a global label alone. Clearer standards would make the term *international* more meaningful and the field more rigorous.

The Problem of Unspecified Reach

Phrases such as global trends, world sport, or international perspectives can imply broad relevance without specifying the level of analysis. A survey of teachers within a single education system is sometimes presented as evidence of "global practice." A case study of one federation may be framed as representative of governance in "world sport." These moves often reflect publication pressures to claim broad significance and the dominance of a few sport systems in the literature. The result is a narrow empirical base paired with sweeping rhetorical claims. A journal that calls itself *International* should identify this tendency and encourage more transparent alternatives.

International as a Concept, not a Badge

International should articulate the research problem, not merely advertise the study's hoped-for impact. Work that genuinely addresses international dynamics typically does one or more of the following:

- examines cross-border relations or transnational institutions;
- compares cases across multiple countries or regions;
- traces transnational careers of athletes, coaches, or officials;
- analyses media flows, labour migration, or sport diplomacy that link systems across borders.

In such studies, international dynamics are central to the research design and analysis, rather than decorative language. By contrast, rigorous single-context studies derive their value from depth and contextual clarity. They can inform broader debates, but that generalisation must follow from conceptual argument and evidence, not be presumed on the basis of a global label. A disciplined use of *international* will clarify what a study sets out to do and what it does not.

Journals can improve precision by asking authors who use terms like international, global, or worldwide to specify what they mean. Does the term indicate a comparative design? A focus on transnational processes? Or a claim that findings are relevant across multiple settings? These are distinct assertions that require different evidence and reasoning. Explicit statements of intended scope will sharpen dialogue between studies and strengthen critical appraisal.

Modes of International Sport Research

There is no single template for international sport research, but three recurring modes deserve attention.

1. Comparative research places two or more countries, regions, or organisations in a shared analytical frame. It compares policy responses to common problems—safeguarding, concussion, or physical inactivity—or shows how the same sport takes different forms under distinct political and cultural regimes. Rigorous comparative work attends to conceptual equivalence, measurement consistency, and careful case selection, revealing what is general and what is context-specific.
2. Transnational research treats flows and networks as the unit of analysis rather than the nation-state. It examines player and coach mobility, the diffusion of training methods, mega-event marketing, and the circulation of digital content. This approach frames international sport as a field of relations, exposing structures of power and dependency as well as patterns of resistance and creativity that national frames can obscure.
3. Multi-sited and networked research follows people, practices, or artefacts across locations. Studies might track athletes trained in one country and recruited to leagues elsewhere, trace how coaching philosophies adapt across cultures, or map sport-related social movements that span continents. These designs demand collaboration, time, and resources, but they yield rich accounts of international sport as lived experience.

International Sports Studies invites submissions across all three modes, encouraging submissions that bring comparative, transnational, and multi-sited designs into conversation. Each mode has distinct strengths and limits and connects to broader debates in the humanities and social sciences, including globalisation, cosmopolitanism, and post-colonial critique. In every case, international should denote an explicit research approach, not a loosely applied marker of scale.

Methodological Nationalism and Uneven Geographies of Knowledge

Advancing explicit international research requires confronting background habits that shape the field. Methodological nationalism treats the nation-state as the default container for social life: data are gathered within borders, and explanations begin and end with national cultures, policies, or institutions. This orientation is understandable given how many sport systems are organised, but it can obscure cross-border dynamics and multi-level processes.

Methodological nationalism also intersects with uneven global research capacity. International sport journals continue to draw disproportionately from a small set of higher-income countries with established academic infrastructures. Work from these contexts often sets the terms of debate, while research from regions with fewer resources or different traditions receives less visibility. The result is a skewed picture of international sport in which some settings appear normative and others marginal.

A single journal cannot resolve these structural inequalities alone, but it can respond constructively. It can welcome submissions from underrepresented regions and institutions, support rigorous qualitative, historical, and interpretive work that does not require costly infrastructure, and encourage equitable collaborations across contexts. Editorial and review processes should remain alert to the risk that some perspectives are treated as universal, while others are cast as local curiosities.

Theory Translation and Travelling Concepts

Theory and translation are central to international sport research. Many influential concepts in the social sciences and humanities originate in specific historical and cultural settings; they do not travel unchanged. Applying such frameworks to new contexts produces both friction and insight.

Authors should state how they adapt theories for different settings, clarifying which elements remain intact and which require modification in light of local practice. They should discuss a concept's limits when confronted with diverse social arrangements, languages, or histories. This reflexive work enriches both the local case and the broader theoretical conversation.

Language matters too. Sport scholarship now draws on sources in many languages, yet English-language publications remain dominant. Editorial practice can promote transparency about translation choices and welcome work that builds on non-English literatures, helping readers understand how those bodies of scholarship inform the argument. Moreover, doing so strengthens understanding of how concepts evolve across linguistic and cultural domains.

When *international* is treated as a conceptual commitment rather than a nominal badge, theory, translation, and reflexivity become central to research craft rather than afterthoughts.

Implications for International Sports Studies

For a journal that bears the word *International,* these themes carry practical implications. The journal should remain open to high-quality single-context studies while ensuring that claims of international relevance align with the research design and evidence. When authors use terms such as international, global, or worldwide in titles and abstracts, editors and reviewers should ask how those terms are justified: Is the study comparative, transnational, multi-sited, or otherwise cross-border in design? If it is grounded in one context, on what basis does it claim broader relevance? How are theory, culture, and language negotiated across cultures and contexts?

These questions are not meant to police usage but to align terminology, methodology, and evidence. The journal can also create spaces for explicit dialogue: special issues on athlete migration, sport and diplomacy, or global media events; symposia that convene work from different regions on shared problems; and exchanges that make contrasts in approach visible and productive.

A Call for Submissions

International Sports Studies invites manuscripts that treat international sport as a serious object of inquiry: comparative designs that bring multiple contexts into a common frame; studies that track transnational flows of people, capital, or ideas; multi-sited accounts of careers, organisations, or movements that cross borders; and reflective pieces on the politics and ethics of knowledge production.

Single-context studies remain valuable when they present rich, theory-informed, and methodologically careful accounts. Such work does not require global reach to belong here; what matters is precision about scope and transparency about the grounds for broader claims.

By treating *international* as a concept that demands intellectual work rather than a label that confers prestige, the journal can sharpen its identity, support diverse research designs, and contribute to a more balanced geography of knowledge. Achieving this vision will require sustained effort from authors, reviewers, and editors, but it offers a clear path to making international sport, in all its forms, genuinely *international.*

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

PERSPECTIVE

Sports Participation and Mental Health Among University Students: International Perspectives and Policy Recommendations

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mental health, physical activity, policy recommendations, student well-being, university sports

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Abstract

This paper examines how sports participation relates to the mental health of Korean university students and suggests policy directions to better support student well-being through structured physical activity. Although awareness of mental health issues among students has grown in recent years, regular engagement in sports remains limited. The primary objective of this study is to identify how international practices in university sports can inform policy frameworks in Korea and to propose evidence-based strategies that address student mental health more effectively. Drawing on government reports, previous studies, and policy cases from the United States, Europe, and Japan, this study identifies structural challenges in Korea's university sports landscape and offers practical recommendations. Existing research highlights that physical activity contributes not only to physical fitness but also to stress relief, improved emotional stability, and boosted self-esteem. Mental health in this paper is defined broadly to include reductions in stress and anxiety, alleviation of depressive symptoms, and improvements in self-worth and psychological resilience. The findings indicate that sports participation helps alleviate academic stress, enhances emotional stability, and strengthens self-esteem, thereby functioning as a critical mechanism for student well-being. Building on these insights, this paper presents a multi-layered policy framework that includes enhancing campus sports infrastructure; integrating physical activity with mental health services; fostering collaboration among governmental bodies, universities, local governments, and private companies; and promoting a long-term shift toward a more active and supportive campus culture. By drawing on comparative cases such as Title IX and the NCAA system in the U.S., the Healthy Campus Network and BUCS in Europe, and municipal–university partnerships in Japan, the study provides concrete international benchmarks that can guide Korean policy. This study frames sports as a strategic tool for student mental health and highlights the need for institutional reform in higher education. It contributes originality by linking international models with Korea's policy gaps and by proposing actionable strategies for sustainable well-being. However, the lack of primary data collection may limit the generalizability of the findings.

Introduction

In recent years, mental health concerns among Korean university students have emerged as a pressing social issue. Having endured intense academic competition throughout their adolescent years, these students continue to experience high levels of stress and anxiety even after entering university. Pressures related to academics, employment prospects, and societal expectations have contributed to a growing prevalence of psychological challenges such as depression, lethargy, and diminished self-efficacy (Lee, 2023).

Although this stage of life represents a critical transition period during which physical health and psychological resilience can be restored and strengthened, many students continue to suffer from poor physical condition and lack of exercise due to limited opportunities for physical activity during middle and high school (Cho, 2023; Yang & Son, 2020). In particular, several barriers hinder sports participation among Korean university students, including academic stress, time constraints, inadequate access to sports facilities, and a generally low awareness of the benefits of regular physical activity (Yang & Son, 2020).

However, sports participation is increasingly recognised not merely as physical engagement but also as a highly effective means of improving mental health and overall quality of life. Regular physical exercise has been shown to alleviate stress, reduce symptoms of depression, and boost self-esteem. Furthermore, it enhances social interaction and fosters a sense of belonging, all of which contribute to improved mental well-being (Park, 2021). Participation in sports during early adulthood also encourages long-term engagement and re-engagement in physical activity, thereby laying the foundation for lifelong health and social self-actualisation (Ding, 2021).

Against this backdrop, the promotion of sports participation among university students should be understood not simply as an effort to expand recreational opportunities but as a critical component of achieving the broader educational goals of mental health support and holistic development. Lee et al. (2014) highlighted the need to implement integrated programs that connect sports and mental health at the university level, while Yoon (2020) emphasised that sports participation can meaningfully cultivate both individual expertise and a sense of community, which are essential elements of university education. Nevertheless, institutional support and policy implementation within Korean universities remain insufficient.

Despite these valuable insights, prior studies have not fully addressed how university-level sports participation can be systematically linked to national mental health policy, nor have they explored its integration within broader international practices. This study builds on such research by directly linking sports participation to student mental health policy gaps and by situating Korean experiences within a comparative, cross-national framework. In doing so, it diverges from earlier work that focused mainly on individual or program-level effects.

This study aims to analyse the current state of sports participation among Korean university students, identify key influencing factors, and propose policy solutions to enhance students' mental health through greater engagement in physical activity. By examining international practices, this research also seeks to offer practical, evidence-based policy recommendations applicable to the Korean university context and to serve as a foundation for institutional reform. This study is original in linking Korean students' low sports participation with mental health policy and situating it within international comparisons.

The analysis draws primarily on national policy documents, government reports, and domestic statistics, combined with literature-based comparisons of international models. The comparative framework is grounded in document analysis. Sources were selected according to the following criteria: (1) publication primarily after 2020, (2) language in Korean or English, and (3) focus on university students' sports participation and mental health, while also including some studies on younger student populations for a broader context. Both academic articles and official government documents were included. To ensure methodological rigour, documents were cross-checked for credibility and relevance, and the analysis process followed a policy-analysis framework emphasising feasibility, effectiveness, and transferability to the Korean context.

Based on these aims, this study addresses the following three research questions:

1. What are the main factors contributing to the low rate of sports participation among Korean university students?
2. What policies have been implemented in other countries to promote university students' participation in sports, and what effects have they produced?
3. What types of sports promotion policies are feasible and applicable in Korean higher education settings?

Current Status of Sports Participation in Korea

Participation Gaps and Barriers. According to a recent report by the Ministry of Culture, Sports and Tourism (2022), Korea's national participation rate in physical activities—defined as exercising at least twice per week—rose by approximately 13.1% from 2012, reaching 48.1% in 2022 (Kwak, 2022). This trend reflects a growing public interest in sports as a part of health and leisure culture. However, such positive developments are not yet adequately reflected in the university student population.

Data from the Ministry of Health and Welfare (2021) indicate that fewer than 20% of university students engage in moderate-to-vigorous physical activity for at least 30 minutes, three times a week (Song et al., 2021). Moon (2010) argues that the Korean education system's emphasis on exam-oriented academic instruction and parental educational aspirations has long marginalised physical education. As a result, by the time students reach university, physical activity has become largely absent from their daily lives. Taken together, these government statistics and meta-analytic findings provide robust, student-specific evidence of a persistent participation gap in this population.

Several factors have been identified as barriers to university students' participation in sports: lack of time, academic and job-search pressures, low motivation, limited access to sports facilities, financial burdens, and restricted opportunities for organised activities (An et al., 2024). For example, although university sports facilities are often open to the general student body, research by Olmedilla et al. (2023) shows that both club participation and facility usage rates remain low, particularly during the academic semester.

The COVID-19 pandemic has further shifted students' leisure behaviours toward sedentary, solitary activities. Kim et al. (2020) found that students increasingly devoted their time to watching television, consuming mobile content, and engaging in social media, while physical activity was further deprioritised. Sa, Lee, and Lee (2021) caution that such passive leisure habits can negatively impact both physical and mental health, contributing to sleep disturbances, accumulated fatigue, and increased levels of depression and anxiety.

Given these trends, universities need to recognise sports participation not simply as a form of exercise, but as a valuable and accessible mode of healthy leisure. Institutional interventions are necessary to encourage student engagement and create enabling environments for participation (Lee et al., 2022).

Mental Health Impacts of Sports. Mental health, as discussed in this study, encompasses a broad spectrum of psychological well-being, including reduced levels of stress and anxiety, alleviation of depressive symptoms, enhanced emotional stability, and improved self-esteem. It also refers to an individual's capacity to cope with academic and social pressures, form healthy relationships, and maintain motivation and confidence in daily life. This comprehensive understanding aligns with current public health perspectives that view mental health not merely as the absence of illness, but as a positive state of psychological resilience and functioning.

Mental health is one of the most critical challenges currently facing Korean

university students. According to Hong and Jeon (2017), students' levels of stress, depression, and anxiety have been steadily rising, primarily due to academic pressure and uncertainty regarding their future careers. Some studies suggest that the prevalence of depression among university students is even higher than that of the general adult population, underscoring the need for more proactive support systems.

In this context, sports participation is increasingly recognised as an effective form of both prevention and intervention for mental health issues. In particular, team-based sports can provide opportunities for peer interaction and a sense of belonging, which are especially beneficial for students facing interpersonal stressors.

Despite this potential, most universities in Korea do not fully utilise sports to support mental well-being. Outside of basic physical education courses, few structured programs actively promote student involvement in sports. At the same time, mental health services are often limited to individual counselling and rarely integrated with physical activity initiatives. The lack of programs that bridge sports participation and mental health support constitutes a significant policy gap. This indicates that the challenge is not merely to reaffirm the benefits of exercise, but to critically evaluate why these findings have not yet shaped university-level policies. However, previous Korean studies have primarily examined sports participation and student mental health in isolation, without linking them to broader policy frameworks. This gap underscores the originality and importance of the present study.

To address this issue, it is imperative to design policies that enable students to build psychological resilience and restore self-efficacy through participation in sports. University-based physical activity should not be viewed merely as a general education requirement but as a viable tool for enhancing mental health. This calls for a paradigm shift that integrates sports and psychological well-being, which could serve as a central focus in the future development of university sports policies.

Current Comparison with International Cases

Across the globe, many countries actively promote sports participation among university students as a means of enhancing mental health and supporting holistic development. In particular, the cases of the United States, Europe, and Japan offer practical insights—both policy-oriented and cultural—for revitalising university sports in South Korea. These three contexts were selected because they illustrate complementary approaches: the United States emphasises institutional systems that link sports and mental health, Europe integrates sports into public policy, and Japan demonstrates a culturally embedded bukatsu model.

United States: An Integrated Approach to Sports and Mental Health. In the United States, sports are regarded not merely as physical activity but as a key contributor to academic achievement and mental health. The National Collegiate Athletic Association (NCAA) oversees a well-organised nationwide collegiate sports system, offering student-athlete scholarships, professional coaching, and access to sports psychology services (Cho, 2006; Eckenrod & Nam, 2021). Integrated initiatives such as the Mind-Body Wellness Program combine exercise with therapeutic interventions to reduce stress and support emotional recovery (DePace et al., 2019).

Most U.S. university campuses are equipped with advanced athletic infrastructure, including fitness centres, swimming pools, and indoor gyms. In addition to varsity athletics, a wide array of intramural leagues and recreational programs is available to general students, encouraging voluntary engagement. These systems foster social connection, stress relief, and the restoration of self-esteem through sports participation—providing a valuable model for Korean universities.

Notably, a mixed-methods study conducted at the University of Arkansas found that participation in intramural sports significantly reduced student stress and improved mental health. Key mediators included social bonding through physical activity and enhanced self-efficacy (Comas, 2023). Furthermore, a recent meta-analysis reported that team sports were more effective than individual sports in alleviating anxiety and depression, while also improving self-esteem and life satisfaction (Zuckerman et al., 2021). These findings reinforce the psychosocial benefits of community-based sports activities.

Europe: Public Policy Integration and Institutional Support. European countries approach sports participation as a core component of public health and educational policy. In the United Kingdom, for example, some universities require physical education as a mandatory course or set minimum physical activity standards for graduation. The British Universities and Colleges Sport (BUCS) organisation manages nationwide university sports leagues, thereby encouraging sustained student participation (Brunton & Mayne, 2020).

Countries such as Germany and the Netherlands adopt a welfare-based perspective, providing public subsidies for university sports clubs and enhancing access to sports facilities at minimal cost to students. The Netherlands' "Healthy University" initiative represents a comprehensive well-being strategy that integrates physical activity, mental health, and nutrition. It has been shown to positively influence not only academic performance but also students' emotional resilience (Douwes et al., 2023). This example demonstrates that university sports can be positioned as a critical infrastructure within the broader context of higher education.

Japan: Culture-Embedded Participation and Mental Health Support. Japan presents a distinctive model through its long-standing bukatsu (extracurricular club) culture, which fosters structured participation in sports as an extension of the educational process. Rather than being limited to leisure, bukatsu involves academic, interpersonal, and character development dimensions, continuing into the university setting (Asakura, 2025). University-level bukatsu activities help students cultivate personal growth and social solidarity through sports.

In addition, several Japanese universities have established sports psychology centres that offer integrated support for physical activity and mental health. These centres provide professional interventions for psychological difficulties while promoting stress reduction through exercise, resulting in more substantial and lasting mental health outcomes.

Bukatsu culture emphasises "process-centred participation," valuing sustained engagement and community growth over athletic results or records. This experience nurtures autonomy and a sense of responsibility in students while also enhancing emotional resilience through peer support networks (Omi, 2015). Such holistic development translates into improved employability and interpersonal skills after graduation.

Policy Recommendations

Authors: To enhance sports participation and promote mental health among Korean university students, a structural shift beyond mere activity-based approaches is necessary. This includes institutional reforms and strategic policy interventions. This section outlines four key policy directions: (1) strengthening the university sports infrastructure, (2) integrating sports with mental health initiatives, (3) establishing a multi-stakeholder cooperation framework, and (4) anticipating the policy impacts.

Strengthening University Sports Infrastructure. To create an environment where students can regularly engage in physical activities, institutional support for physical education, student clubs, and campus leagues must be reinforced. This is particularly urgent in Korea, where limited facilities and the dominance of elite-athlete programs have long restricted general students' access to regular sports participation.

First, universities need to expand their physical education curriculum. Currently, many institutions offer physical education only as an elective, and some do not offer such courses at all. Credit recognition should be expanded, and a certain level of physical education should be considered a graduation requirement. Moreover, a variety of courses should be offered across skill levels and sports types to accommodate students' diverse interests and fitness levels.

Second, tangible financial and facility support must be provided to student sports clubs and league activities. To ensure autonomy and continuity, basic operational funding should be guaranteed by the university, with scholarships potentially linked to participation or achievement. The parallel operation of both friendly leagues and competitive interdepartmental leagues could further encourage broader student participation.

Third, non-credit programs that combine physical activity with emotional recovery—such as yoga, meditation, and Pilates—should be expanded and offered as morning or regular extracurricular options. These programs would help stabilise students' emotional well-being and enhance academic focus.

Integrating Sports with Mental Health Strategies. In response to growing mental health concerns among university students, sport-based psychological support must be urgently implemented. A three-stage strategy is proposed: awareness campaigns, counselling, and integrated programs. Given the post-COVID surge in student mental health issues, linking counselling services with physical activity is both feasible within current university structures and highly time-sensitive.

First, universities should launch awareness campaigns under the theme "Sports and Mental Wellness" to promote understanding of how exercise contributes to mental health. Multimedia content, testimonial videos, and promotional banners should be utilised to improve public perception of the psychological benefits of physical activity.

Second, hybrid counselling programs that link exercise with psychological support should be developed. These could include post-exercise therapy sessions and models that combine sports coaching with psychotherapy—approaches already proven effective at universities in the U.S. and Japan. Korean universities could implement such programs through collaboration between student counselling centres and physical education departments.

Third, structured programs that combine physical exercise and mindfulness should be officially recognised as non-credit extracurriculars. Incentives such as attendance-based mileage points or inclusion in career portfolios should be introduced to encourage participation.

Building a Multi-Stakeholder Cooperation Framework. Creating a sustainable ecosystem for university sports requires more than isolated efforts from individual institutions. A cooperative framework involving government, universities, local governments, and private companies is essential (Table 1). This recommendation is realistic in Korea, where government-university partnerships and corporate CSR initiatives already exist but have not yet been mobilised for university sports.

Table 1. Role Distribution among Policy Stakeholders

Stakeholders	Primary Responsibilities
Government (Ministry of Education, Ministry of Culture, Sports and Tourism)	- Develop a National University Sports Development Plan - Secure and allocate stable funding - Support modernization of sports facilities and implementation of student programs
Universities	- Expand physical education curriculum - Support student clubs and organize campus leagues - Develop extracurricular programs integrating sports and mental health - Operate integrated counseling services
Local Governments	- Establish facility-sharing agreements with universities (MOUs) - Share maintenance costs - Provide access to local sports infrastructure for students
Private Companies	- 3 Sponsor university sports leagues and clubs - Offer scholarships based on participation or performance - Fulfill CSR through long-term support for campus wellness initiatives

First, the central government should establish a "National University Sports Development Plan" and secure stable funding. The Ministry of Education and the Ministry of Culture, Sports and Tourism should jointly create a dedicated budget line to support regular initiatives such as facility upgrades, programs for non-athlete students, and campus league operations.

Second, universities should partner with local governments to increase student access to public sports facilities at reduced cost. Facility-sharing agreements (MOUs) and cost-sharing for maintenance would alleviate spatial limitations.

Third, private sector involvement should be encouraged through structured corporate sponsorships. Companies can fulfil their CSR (Corporate Social Responsibility) goals by supporting university leagues or clubs and offering scholarships based on participation or performance.

Fourth, a formal "University Sports Policy Council" should be established. This council, comprising university officials, government representatives, corporate sponsors, student delegates, and mental health professionals, would serve as a governance body responsible for long-term policy planning, including legal reforms, certification systems, and program standards. Inspired by the European Healthy Campus Network, a governance model integrating health, sports, and welfare could be implemented at the university level to reduce inefficiencies and foster synergy across departments.

Anticipated Policy Outcomes. If the proposed policies are effectively implemented, several positive outcomes are expected, centred around increasing sports participation and improving mental health among university students. These outcomes would mark a transformative shift in the culture of Korean higher education. Highlighting that these outcomes directly address Korea's policy gap will further emphasise the study's originality and necessity.

First, student participation in sports is expected to increase significantly. Making physical education compulsory and expanding credit options, supporting sports clubs, and running well-structured campus leagues will provide a solid foundation for voluntary student engagement. Significantly, transitioning away from an elite-athlete model to one that ensures accessibility for all students will normalise physical activity as part of daily life. In the long term, this will also contribute to improved self-regulation and academic focus.

Second, a sports-based mental health support system will be established on university campuses. Counselling programs integrated with physical activity, therapeutic practices like yoga and meditation, and awareness campaigns will help students become more attuned to and capable of managing their emotional well-being. As the neurobiological effects of exercise on stress reduction and self-esteem recovery are increasingly validated, sports participation can function as a proactive mental health strategy.

Third, a more inclusive and robust sports culture will emerge within universities. Currently, the sports culture at Korean universities is often centred on elite athletes, limiting opportunities for non-elite students. With proper institutional support for campus leagues and clubs, students will come to view sports not as competition, but as a means of self-care and community engagement. This shift will redefine sports as a vital element in enhancing quality of life rather than as mere recreation.

Fourth, stable collaboration among government, universities, local governments, and private companies will lay the groundwork for a sustainable university sports ecosystem. With institutional funding and support, university educational and welfare-driven initiatives, infrastructure sharing by local governments, and private-sector contributions, university sports will evolve into a long-term, systemic platform for student wellness. Such governance will not only prevent future mental health crises among students but also strengthen ties between universities and local communities.

Ultimately, the proposed policy framework can serve as a catalyst not only for individual students' physical and psychological well-being but also for transforming the overall educational and cultural environment of Korean higher education. In doing so, it can make a meaningful contribution to the long-term enhancement of educational quality in Korea.

Discussion

This study examined the impact of university students' sports participation on mental health and, based on the findings, proposed policy directions to revitalise campus sports in Korea. The results indicate that engagement in sports contributes not only to physical health but also helps alleviate academic stress, enhances emotional stability, and improves self-esteem. These findings suggest that university sports function as a critical mechanism not only for individual student well-being but also for the psychological and social revitalisation of higher education.

Despite these benefits, Korea's current university sports environment faces multiple structural limitations: physical education is often relegated to elective status, programs for non-athlete students are lacking, connections between sports and mental health services are underdeveloped, and collaboration with local communities and the private sector remains insufficient. To address these constraints, this study conducted a comparative analysis of international models and identified applicable strategies for the Korean context.

The U.S. ensures gender equity in sports participation through Title IX legislation and maintains a highly institutionalised collegiate sports system

via the NCAA. In Europe, governance-based frameworks such as the Healthy Campus Network integrate sports, mental health, welfare, and education. The British Universities and Colleges Sport (BUCS) league exemplifies a successful model that links private sponsorship and scholarship programs to promote mass participation in sports. In Japan, municipalities and universities sign MOUs to share public sports facilities, offering a highly effective solution to infrastructural and financial limitations.

These international practices provide valuable insights for Korean university sports policy. First, the institutionalisation of physical education through curriculum integration and recognition of academic credit should be prioritised. Second, on-campus sports leagues open to all students should be expanded to foster a culture of recreational physical activity. Third, stronger integration between sports activities and mental health services—such as meditation, counselling, and group-based wellness programs—must be pursued to facilitate psychological recovery. Fourth, collaborative frameworks among universities, local governments, and the private sector are needed to enhance infrastructure and ensure stable financial support. Finally, a multi-stakeholder governance council should be established to oversee and coordinate sustainable sports policy ecosystems.

Conclusion

In conclusion, university sports should not be regarded merely as leisure but recognised as a strategic instrument for promoting mental health, community restoration, and sustainable educational environments. With coherent collaboration among universities, government bodies, local authorities, and private companies, Korea can achieve not only an improvement in students' quality of life but also a qualitative advancement in higher education itself.

Future research should examine disparities in sports participation by gender, region, major, and socioeconomic status. It is also necessary to investigate the feasibility of online or remote exercise programs and assess the long-term psychological effects of sports participation. Such empirical foundations will help position university sports as a structural and sustainable driver of student-centred educational reform—beyond short-term campaigns or isolated events.

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Ethical Considerations

This study did not involve human participants or primary data collection. All sources were publicly available documents and published research; therefore, ethics approval and consent were not applicable.

Notes on Contributors

Shinjae Park is a professor at the College of General Education, Kookmin University, South Korea. Her research involves learner-centred pedagogy, interdisciplinary educational studies, and the use of AI to support personalised learning. With national research funding, she conducts studies on AI-based feedback systems for English learners and educational innovation. Her work has expanded to include the educational and psychological effects of sports participation and improving learning environments through interdisciplinary approaches. Please direct correspondence to muhando@kookmin.ac.kr

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INTERNATIONAL SPORTS STUDIES

ORIGINAL RESEARCH ARTICLE

Intercultural Learning Opportunities in International Voluntary Service in Sport: The Case of *Play Handball*

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Abstract

In recent years, international volunteering has become very popular in Germany, and this also applies to the opportunities in sport-related development work. For young adults, this means familiarising themselves with a foreign culture and contributing their sport-related competences. At the same time, this field of work offers a wide variety of intercultural learning opportunities. This immediately raises the question of how such learning opportunities are designed and accompanied, and how they can lead to the acquisition of intercultural competences. In this study, eight young adults were interviewed about their voluntary service with the organisation Play Handball. The interviews were analysed using qualitative content analysis and interpreted through the lens of the Process Model of Intercultural Competence from Deardorff. The presentation of results is therefore guided by the central research question of which intercultural learning opportunities emerge in the reconstruction of key intercultural competences among the participants. The analysis demonstrates that the volunteers' prior sport-related experience created specific occasions for learning and reflection that fostered the development of intercultural competences. In particular, the introduction of handball, an underrepresented sport in South Africa, proved ambivalent: while it facilitated experiences of self-efficacy and intercultural learning, it simultaneously revealed colonial power asymmetries and Eurocentric dominance patterns, thereby necessitating critical postcolonial reflection.

Introduction

In recent years, international volunteer service has gained popularity in Germany—this trend is also evident in the field of sports. For young adults participating in such programmes, engaging in voluntary service abroad means adapting to a new cultural environment while contributing their skills in sport-related contexts. These sporting environments offer a variety of intercultural learning opportunities for volunteers.

This raises the central question of how such learning moments are structured and experienced, and whether they contribute to the development of intercultural competencies or influence existing ones. Based on a document analysis, Schreiner, Mayer, and Kastrup (2020) argue that Germany's sport-related development initiatives, while diverse, remain fragmented and insufficiently embedded within a coherent national strategy. They emphasise the need for stronger policy frameworks, more rigorous evaluation, and

critical engagement with the actual role and impact of sport in development cooperation.

Given the lack of empirical studies on these specific settings, this study draws on interviews with eight young adults from Germany and Switzerland who completed a volunteer service with the organisation Play Handball in South Africa.

The interviews were analysed using qualitative content analysis and interpreted through the lens of Deardorff's (2006) Process Model of Intercultural Competence. The aim was to foreground the perspectives of the interviewees. The analysis addresses the guiding research question: What intercultural learning opportunities can be identified in the reconstruction of key intercultural competencies among participants in an international sports-related volunteer service?

Furthermore, the findings are discussed in relation to the goals of Play Handball to explore how the organisation can strengthen its conceptual approach to supporting children through sport-based project work.

Theoretical Framework

International Volunteering Service.

International volunteering is commonly defined as an activity undertaken abroad that involves voluntary, unpaid engagement in development cooperation. It is regarded as an educational experience abroad (Genkova & Schubert, 2020) and is offered by both publicly funded and private organisations. Volunteers typically participate in local projects or institutions, working primarily in education, social services, and health (AKLHÜ e.V., 2018). In recent years, this sector has experienced continuous growth and appears far from reaching saturation (Monshausen et al., 2018). However, particularly in the case of flexible volunteering programs, questions of quality and reliability have increasingly become subjects of critical debate (Monshausen et al., 2018; Seidel & Stammsen, 2018). Private providers frequently lack clearly defined selection criteria and systematic mechanisms for evaluating activities and standards of volunteer support—both during and after the placement abroad. Even among publicly funded providers, evaluation practices remain the exception rather than the rule (Engels et al., 2008).

International volunteering is undertaken primarily by young adults who have completed secondary education (Abitur) (AKLHÜ e.V., 2018). Key motivations include interest in the host country and its culture, personal development, the pursuit of new experiences, and the desire to improve foreign language skills (Genkova & Schubert, 2020). The academic literature to date has primarily focused on the impact of volunteering on local host organisations and communities (Callanan & Thomas, 2005; Guttentag, 2009; Wearing & Gard McGehee, 2013).

More recent German-language studies, however, have increasingly examined the individual characteristics and motivations of volunteers (Engels et al., 2008; Genkova & Schubert, 2020; Monshausen et al., 2018; Seidel & Stammsen, 2018). Despite this growing body of work, there remains a notable gap in empirical findings concerning intercultural learning opportunities in the context of international volunteering, particularly within the field of sport.

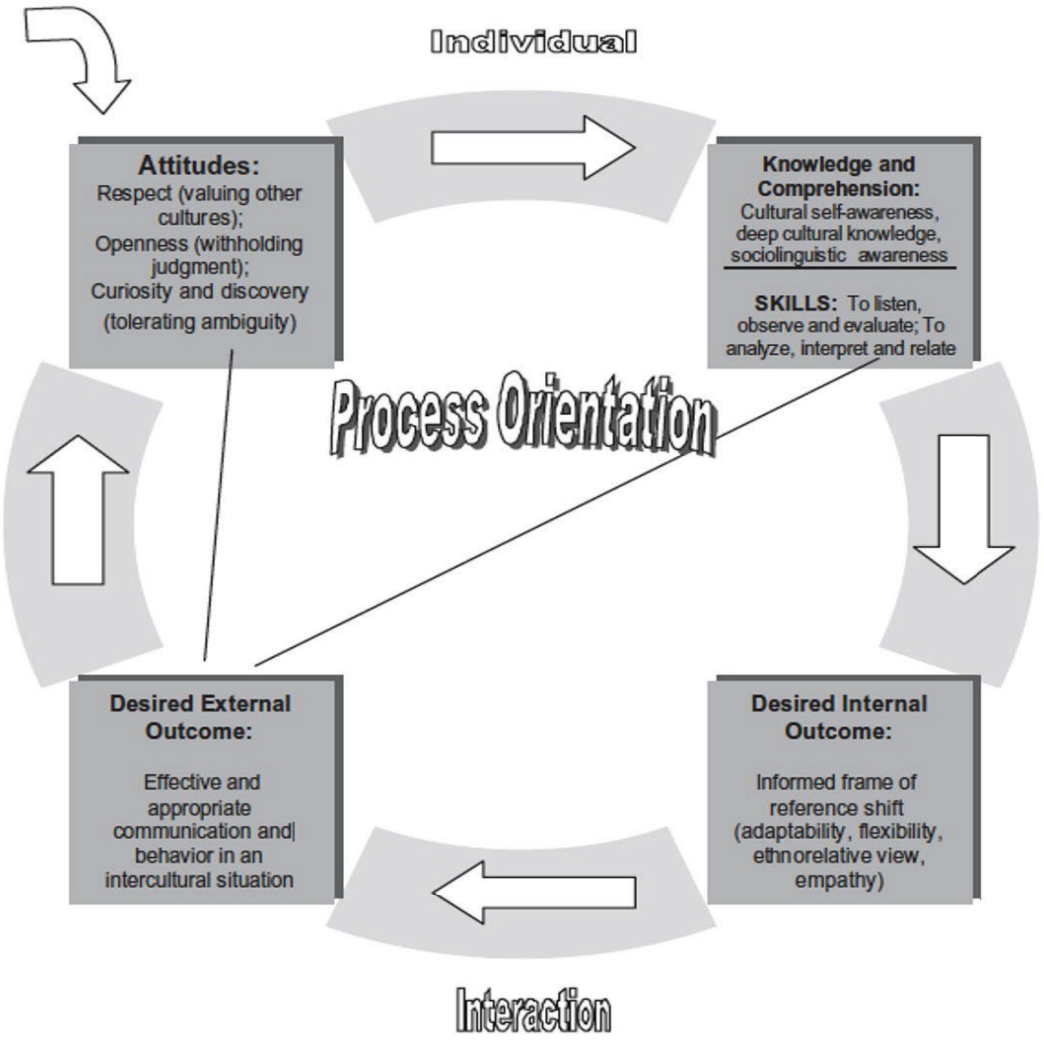

Figure 1. Process Model of Intercultural Competence (Deardorff, 2006, p. 256)

Learning Opportunities in Intercultural Contexts. Due to a shifting perspective on immigration and integration, the field of intercultural competence has become a firmly established part of national research discourse. It is analysed from a variety of academic viewpoints (Schondelmayer, 2018). Although intercultural competence is now considered a key qualification of the 21st century (Boecker & Ulama, 2008; Schondelmayer, 2018), there is no universally accepted definition or consistent list of associated skills. The interpretations and research focuses vary significantly between disciplines.

Figure 1 shows the Process Model of Intercultural Competence (Deardorff, 2006).

Most concepts of intercultural competence can be linked to three basic assumptions:

- There are different cultures.
- These cultures are associated with national and/or ethnic origins.
- Communicating with different cultures requires a specific form of social competence (Schondelmayer, 2018).

Intercultural competence is regarded as a collection of skills rather than a stand-alone form of action competence (Bolten, 2007); rather, it is a complex construct (Deardorff, 2006) that must be understood in conjunction with other theories of

competence and communication (Bolten, 2007). Notably, many definitions emphasise communication aspects (Auernheimer, 2005).

The acquisition of such competences is inherently linked to learning processes; consequently, attention must be directed toward learning within intercultural contexts. Intercultural learning "takes place when an individual is compelled to engage with a foreign cultural environment in some form" (Layes, 2009, p. 126). When this definition is combined with the perspective that interculturality emerges not only through interactions between different nations and cultures but also among individuals belonging to diverse social groups and possessing varying characteristics (Auernheimer, 2013), it becomes evident that opportunities for intercultural learning can be found in virtually all areas of social life.

However, a distinction must be drawn between learning and a learning opportunity. Learning occurs "when people discover novel perspectives and previously unknown knowledge for themselves and engage in processes of self-transformative learning. Learning becomes framed as a crossing of boundaries" (Schäffter, 1997, p. 693). For the unfamiliar to be perceived as a learning opportunity, an irritation, understood as a "signal indicating the crossing of meaning structures" (Schäffter, 1997, p. 694), is required. However, not every irritation necessarily leads to learning; this transformation requires active exploration and reflection on the part of the individual. Consequently, learning opportunities represent only the learning potential, which must be realised through conscious engagement and interpretive processing.

To better understand irritations in intercultural interactions, Auernheimer (2013) proposes four dimensions of intercultural encounter:

- Power asymmetries: Unequal relationships and resources among interaction partners.
- Collective experiences: (Historical) experiences of one cultural group in relation to another (e.g., colonialism).
- Stereotypes and images of others: Socially produced and widely accepted opinions/prejudices about a cultural group.
- Different cultural patterns or scripts: Behaviours shaped by socialisation within a cultural group, perceived as normative.

Intercultural learning can be initiated through specific learning opportunities, enabling the development of intercultural competences (Boecker & Ulama, 2008). Deardorff (2006) developed a process model that outlines the impact of intercultural learning in four domains (see Figure. 1). Deardorff's model stands out for its process-oriented, consensus-based, and practice-oriented design, its holistic integration of attitudes, knowledge, skills, and outcomes, and its reflexivity toward power and contextual factors—offering clear advantages over more linear, narrower, or less application-oriented models (Ang et al., 2007; Bennett, 1986).

The four domains evolve through intercultural experiences, thereby expanding an individual's intercultural competences. At the same time, the domains influence one another (Genkova & Schubert, 2020).

Acquiring intercultural competences during a stay abroad requires adaptation to the local culture, which can often be challenging (Genkova & Schubert, 2020), especially when initial enthusiasm gives way to negative experiences that lead to feelings of being overwhelmed or alienated (Bolten, 2007). The so-called culture shock can be overcome by accepting—and ideally understanding—cultural differences (Bolten, 2007). Understanding these differences often coincides with adaptation and identification with local conditions, a process referred to as acculturation (Bolten, 2007; Layes, 2009). The engagement with

foreign culture becomes intertwined with the individual's experience of their own culture (Layes, 2009).

In conclusion, irritations can serve as learning opportunities that initiate the development of intercultural competences. The following section explores how such intercultural learning opportunities can arise, specifically in the context of sport volunteering.

Intercultural Learning Opportunities in Sport.

Sport holds significant potential for fostering intercultural competence—though not automatically. While several studies have demonstrated positive outcomes in this regard (Braun, 2020; Gieß-Stüber et al., 2020), the overall body of scientific evidence remains limited and inconclusive (Burrmann & Mutz, 2015).

In a comprehensive review, Svensson and Woods (2017) identified 955 sport-for-development organisations worldwide, the majority of which operate in Africa and predominantly employ football as their central intervention tool. Most of these programmes focus on areas such as education, health, and livelihood improvement. Existing research in the field of sport and development cooperation primarily reports positive social and educational impacts on young participants—findings largely derived from football-based, community-oriented qualitative projects. However, the available evidence remains fragmented and geographically uneven. While most projects are implemented in the Global South, much of the corresponding academic research continues to originate from institutions in the Global North (Schulenkorf et al., 2016).

Sport-based projects in development cooperation pursue diverse goals that can be addressed through sport (e.g., conflict resolution, health education, empowerment and self-determination, social inclusion, education, and prevention; Brand, 2020). However, the role of sport in development cooperation is also subject to criticism. The global spread of modern sports has, in many regions, occurred alongside colonialism, leading to accusations that sport has been instrumentalised (Digel, 2008; Ndee, 2002). Digel (2008) argues that sport continues to act as a colonial power in international contexts by transmitting central elements and values of Western societies. In the context of development cooperation, this critique is understandable, as interventions often "reflect the classical model of externally defined development aid, reproducing North-South asymmetries" (Brand, 2020, p. 110). Moreover, many projects lack transparent impact evaluation, with noticeable discrepancies between the claimed goals and the actual outcomes of sport development programs (Brand, 2020). In response to this critique, it must be noted that, like many other development projects, sport-based initiatives face attribution problems—meaning that project outcomes are only partially attributable to the sport-specific interventions (Petry et al., 2020).

To ensure the success of sport projects in development cooperation, the personnel involved are considered a key factor (Schmid & Arnemann, 2020). Training them to deliver high-quality sports programs for children and youth is seen as a top priority.

Methods and Materials

Play Handball is a non-profit sport and development organisation that aims to promote handball among children and young people (Play Handball, n.d.). The organisation supports local clubs and schools across Africa in building training and organisational structures. Its core activities include networking, training and continuing education of coaches, and the placement of volunteers. In addition to promoting technical sports competencies, Play Handball utilises the sport as "an educational tool for the personal development of individuals as well as for socio-economic and community development in a broader context" (Play

Handball, n.d.). The organisation places and supports volunteers within various projects in South Africa and Kenya. These volunteers mainly come from Germany and are typically young adults.

The sample comprised eight former volunteers from the organisation Play Handball. Participants were selected using purposive homogeneous sampling (Misoch, 2019). This approach was applied to ensure a group of cases with similar characteristics, thereby enabling meaningful comparison across participants (Döring & Bortz, 2016). Specific eligibility criteria were established for inclusion in the study. Participants have completed their volunteer service with Play Handball in South Africa within the past 5 years, with a minimum of 3 months. In addition, all participants grew up in a German-speaking country.

Homogeneous sampling in qualitative research facilitates the comparison of individual experiences and meaning-making processes. It also increases the likelihood that others similarly experienced situations encountered by one participant during their service abroad. For recruitment, the director of Play Handball contacted former volunteers. Eleven of them expressed interest in participating. Based on the eligibility criteria, eight were selected for interviews (five women, three men).

All participants were provided with detailed information about the aims, procedures, and scope of the study prior to their participation. They were informed about their rights, including the right to decline participation or to withdraw from the study at any time without negative consequences. Participation was entirely voluntary. Written informed consent was obtained from all participants before data collection. To protect confidentiality and anonymity, all personal identifiers were removed or pseudonymised in the transcripts and in the reporting of the findings.

For data collection, the former volunteers were interviewed using a semi-structured interview guide. To gain a detailed insight into the life worlds and perspectives of the former volunteers, the guide was deliberately kept open in many parts (Misoch, 2019).

The interviews were analysed using qualitative content analysis (Kuckartz, 2018). The coding of the material was based on a category system (see Table 1), developed through both deductive and inductive category formation. Initially, categories were derived from the theoretical framework and used to structure the material deductively. In line with a dynamic

Table 1. Main Categories and Subcategories

Main Categories	Subcategories
K1 – Challenges	Communication; Language; Personal safety; Unknown conditions and structures
K2 – Experiences of Otherness	Feeling of foreignness; Discrimination; Privileged otherness
K3 – General Observations	Positive representations; Attitudes and mindsets in South Africa; Apartheid; Poverty; Crime; Cultural knowledge / general structures
K4 – Reflection on Home Country	Privileges; Attitudes in Germany; Perception of wealth
K5 – Personal Reflection	Identification; Self-reflection; Perceived personal development; Inner conflict
K6 – Organizational Framework	Support; Host family; Partner organization; Handball; Expectations and demands
K7 – Function of Sport	Connection and communication opportunities through sport; Personal relation to sport; Challenges in sport

analytical process, the category system was continuously revised during transcript analysis—by adding, modifying, or removing (sub-)categories. Some subcategories emerged inductively from the data material. Two researchers were involved in this process. They coded the material and continuously engaged in critical reflection on their results to secure the credibility of the findings.

Results

The findings are drawn from in-depth interviews with eight volunteers, providing insights into their intercultural learning experiences. Based on the data analysis, prominent phenomena are described and supported with anchor quotes. Due to the qualitative research design, this study does not aim for statistical generalisation. Instead, it seeks to generate context-sensitive insights that, in the sense of analytical generalisation, may be transferable to similar contexts. In line with the stated research interest, intercultural learning opportunities both within and outside the specific sport project are analysed to determine the significance of sport in fostering intercultural competence (Figure 2).

Learning Opportunities Outside of Sport

The volunteers describe experiences that deviate from their own expectations of normality and can be interpreted as moments of irritation. These irritations stem either from specific events or from the general living conditions in South Africa. Examples include climatic conditions, which directly affect work situations, and personal safety issues stemming from rampant crime and poverty. One volunteer, for instance, reported being involved in a robbery together with other volunteers. Others mentioned that they were not allowed to leave the house alone during certain hours. These circumstances were described as challenges or (temporary) overwhelm. These interpretations provide learning opportunities, as the situations were unexpected and the responses unprepared.

Further irritations emerged in social interactions, which the volunteers explained in interviews as being linked to cultural differences – also rooted in their own personalities. For instance, interacting with members of the host family was perceived as challenging, as the following example illustrates:

"Yes, for example, I as a person am probably more like the Nordic cliché, quieter and more introverted. Moreover, I

Figure 2. Results

was in a coloured township, and the typical coloured person is, of course, much more extroverted, has lots of people around, and is always talking and communicating. That naturally led to misunderstandings at first. My host family thought: 'What's wrong with him?' And then I first had to explain that actually everything was fine with me, even if I wasn't talking. And that when I read a book or just sit on the couch and listen to a podcast, that everything is still okay." (T 7, Pos. 42)

The volunteer attributes the differences in communication styles to cultural stereotypes and personal traits, referring to the "typical coloured" and himself. Notably, this statement is made during the interview, i.e., after the stay in South Africa. The continued use of stereotypical thinking suggests a degree of persistence. This raises the question of whether any meaningful learning process took place or whether the situation could have prompted deeper reflection. Such an emphasis on cultural differences is reflected in various statements in which volunteers reflect on life in South Africa or on residents' attitudes. From repeated observations of behaviour, broader conclusions were drawn about South African culture or society, as in the following quote:

"And like I said, the typical African thing for me is: there's always a solution—no matter what the problem was, somehow there was always a solution. It was really absurd at times, it was never just the problem. And then, like I mentioned, this sense of community, this care for others. I would best describe it with the term Ubuntu. That you always look to your left and right and make sure everyone's doing okay." (T 1, Pos. 42)

Another prominent topic is the standard of living, which volunteers compared to conditions in Germany and Switzerland. After returning home, many reflected on South African living conditions and re-evaluated their own privileges and wealth. In addition, the values and social attitudes of their personal environments were critically questioned:

"And then I realised how much I actually live in a bubble here in Germany. I've tried to break out of it a bit [...] In my friend group, almost everyone went to university, there are hardly any foreigners, and you just live in your German bubble and can't really judge what's happening between cultures here in Germany." (T 3, Pos. 64)

"And when I got back, I just shook my head and thought: 'Look at all the cars here. This can't be real—people over there are starving and here we indulge in our fifth family car.' And that, I think, was honestly more of a culture shock than anything I experienced in South Africa." (T 2, Pos. 69)

Both statements clearly reflect learning about one's own living conditions in Germany or Switzerland through the experience in South Africa—between cultures, so to speak. The volunteers' reflections demonstrate increased awareness of the lives of people with a migration background in Germany. At the same time, they critically engage with their own situation ("in my German bubble"). In the second example, Western affluence is contrasted critically with the poverty experienced in South Africa.

Learning Opportunities Within the Project

Further learning opportunities—specifically those tied to Play Handball—were reported by volunteers during their work in schools, after-school programs, or local sports clubs. Volunteers perceived the material conditions and working with children as particularly challenging. Ethnic attributions also appeared in the context of project work:

"I was the first volunteer there and the only white person in my township. So, it was super exciting for the kids that their class had me—the white person. Now and then I even noticed how they would touch my hair, I think it was all very exciting for them. That's also why they were highly

motivated. They really tried to make an effort." (T 5, Pos. 26)

The volunteer describes her experience as the only person of a different skin colour in her environment. The behaviour of the children—who showed "a high level of motivation" and were apparently fascinated by the unfamiliar—is highlighted. Another volunteer reported a clear experience of discrimination:

"I also felt a lot of hostility towards me. Like, a kind of reverse racism. People just didn't want to talk to me. And they really approached me with a lot of prejudice." (T 4, Pos. 39)

"On the other hand, it's probably also tied to the project structures. Like, okay. Some rich white German women in our town, trying to do something with balls, pretending she's one of us? It's understandable that this kind of classic in-group/out-group dynamic creates some hate and racism." (T 4, Pos. 65)

The volunteer describes a perceived form of discrimination, using the term "reverse racism," which indicates a reflective interpretation of the situation. The volunteer, in the sense of Schäffter (1997), is irritated but, in this intercultural encounter, perceives a power asymmetry (sensu Auernheimer, 2013). Her image of the children is a negative hetero-image, shaped by the prejudices of the children at school about her as a white person. She further attributes this experience to the project structure itself—which, by positioning her as a white trainer or teacher, potentially reinforced such dynamics. The perceived foreignness of handball as a sport ("doing something with balls") also becomes evident here and will be explored further in the next section.

The Role of Sport in Fostering Intercultural Learning

For all interviewees, sport was a key reason for engaging with Play Handball, as they had a personal connection to handball—either as players or coaches. Despite varying levels of handball-related experience, volunteers identified challenges stemming from different local conditions and from working with children:

"There were handball court markings, but the cones were still just cones, and the goals were cones, too. The balls were old, worn-out handballs donated from Germany. I know it was also super dangerous on that asphalt court, doing jump shots and such. Sometimes the kids trained barefoot, even at school." (T 2, Pos. 30)

"I don't really have a comparison, but it was sometimes very hard to work with the children, especially to teach them something new. I often felt they just didn't concentrate. I had the impression they really enjoyed the attention, and when you tried to explain something, they'd all talk over you or start doing something else." (T 8, Pos. 68)

In the first example, the volunteer contrasts local conditions with their own sport-specific socialisation. In the second case, the volunteer—who had no prior coaching experience—found it challenging to facilitate learning, attributing this to the children's limited ability to concentrate. This, in turn, is explained by the fact that the children may not receive much attention in their everyday lives. His statement refers to the children's social environment, which he learned about through the project. This perceived lack of discipline is also mentioned.

The volunteers also emphasised the unifying aspects of sport, which they believed played an important role in development cooperation. Handball often inspired enthusiasm and engagement among the children, thereby easing project work. Volunteers further noted the potential of sport to serve preventive functions and to convey values:

"It's not just about achieving sporting goals in the games—there's also this other level. For example, which team lets all players participate—that counts toward the result, too. Or M. [a staff member at Play Handball] also had these environmental goals. Like, who keeps the field clean

before the game starts. Sport is a great tool, and I tried to reflect that in my concepts—especially the idea that the kids referee themselves. Sport as a tool to teach values through play was just perfect. You connect on a completely different level compared to standing in a classroom and saying: 'Honesty is a great value.' On the sports field, you realise—yeah, if I stick to the rules, it works, and everyone has fun. That's a whole different thing." (T 8, Pos. 82)

At this point, the specific rules for handball games in the Play Handball program are described. Some go beyond sport itself (e.g., "environmental goals"), while others create new learning opportunities through the act of playing and competing (e.g., "refereeing themselves"), or are implemented as supplementary rules (e.g., "let all players participate"). The volunteer reflects here on the broader function of sport within the project and highlights the multiple goal dimensions enabled through this format.

Discussion

The phenomena described often represent deviations from what is familiar or perceived as normal. This corresponds to the assumption that learning opportunities arise from irritations that differ from prior knowledge or expectations (Schäffter, 1997). The volunteers reported negative experiences that were unfamiliar and unforeseen. These can be linked to the concept of culture shock (Bolten, 2007; Layes, 2009), defined as a reaction to negative experiences in an unfamiliar environment that can lead to feelings of alienation and being overwhelmed. The volunteers' personal coping processes, as well as changes in attitudes and perspectives, became particularly evident when they were able to reframe the circumstances they encountered (e.g., safety issues or housing conditions) (Deardorff, 2006).

The phenomena presented here can be situated within the Process Model of Intercultural Competence (Deardorff, 2006, 2011; Grein, 2019). In particular, the dimensions of attitudes, skills, and behavioural adaptability are addressed. However, statements regarding external outcomes (i.e., constructive interaction) cannot be reliably derived from the data.

It is noticeable that volunteers often connect immediate challenges with general observations and reflections about their own personalities or previously known norms. This supports the notion of intercultural competence as an interdependent interplay of internal and external processes (Boecker & Ulama, 2008; Deardorff, 2006, 2011). Given the complexity of the phenomena under consideration, the strengths of Deardorff's model become particularly apparent. The learning and appropriation processes of volunteers rarely evolve in a strictly linear fashion—as suggested by Bennett's model (1986)—but instead tend to progress in dynamic leaps and surges. Referring to Schäffter (1997), these can be interpreted as intercultural learning moments, as the volunteers actively processed the experiences through reflection.

The changes in attitude and mindset, within the process model framework, are intertwined with a revised understanding of one's own socio-cultural position and national identity. Many volunteers recognised the privileges they enjoyed as German or Swiss citizens, both in their home country and in South Africa. These reflections also opened the door to a recognition of power asymmetries (Auernheimer, 2013), which in South Africa are still visibly shaped by the legacy of apartheid.

One indicator of at least temporary adaptation is that most volunteers reported difficulties with reintegrating into their home environments. They attributed this to newly developed worldviews, which partly clashed with prevailing social attitudes in their home countries. In analogy to the concept of culture shock, this can be described as a reintegration crisis,

suggesting that the volunteers developed a newly acquired cultural distance from their country of origin (Layes, 2009).

Regarding the role of sport, it can be concluded that Play Handball has developed a project design that clearly addresses intercultural learning. The project's structure and participation requirements appeal to a specific target group—namely, individuals with an affinity for sport and prior experience as coaches or players. Such prior experience is unusual for international volunteering programs (Monshausen et al., 2018) but brings several advantages: it enables volunteers to contribute their expertise with greater confidence, fosters independence in project work, and enhances their engagement.

Because of these sport-specific backgrounds, sport projects offer distinct opportunities for learning and reflection. This pertains to both the material conditions of training and to collaboration with local project staff and children. Since the project environment did not align with the volunteers' previous understanding of structured training, they demonstrated adaptive flexibility to meet the demands of the setting (Bolten, 2007; Gieß-Stüber et al., 2020).

A crucial aspect is the sport's relative unfamiliarity in South Africa. This uniqueness within the project also created intercultural learning opportunities. Although children and youth often showed strong enthusiasm for the training sessions, some volunteers reported experiencing external attribution or even discrimination. Handball, in these cases, was associated with the "white" volunteers who were introducing a new and unfamiliar sport. This power asymmetry (Auernheimer, 2013) is rooted, among other factors, in historical circumstances.

This dynamic is especially significant given that sport played a particular socio-political role during apartheid in South Africa (Chappell, 2005) and is generally criticised for its Eurocentric dominance in international development programs (Brand, 2020; Digel, 2008). Consequently, the volunteers' observations could be used more actively as reflection opportunities in future iterations of the project—both for the volunteers themselves and for Play Handball as an organisation, and in cooperation with local partners. At this point, it is crucial to engage with this realisation—that the "white" sport of handball is not only perceived as foreign but may also carry negative connotations at this level—sensitively and reflectively. Where appropriate, consideration could be given to an adapted staging approach.

In doing so, Play Handball could further realise its overarching goal of strengthening social cohesion through sport (Play Handball, n.d.) by integrating critical reflection and the development of intercultural competence into its conceptual foundation.

Conclusion

This research demonstrates that international sport volunteering offers substantial potential for intercultural learning—particularly when volunteers are exposed to unfamiliar contexts that challenge their prior assumptions and lived experiences. Such moments of irritation, whether triggered by living conditions, social interactions, or project dynamics, can initiate reflection and transformation. However, these learning processes are neither automatic nor universal; they require personal willingness, contextual awareness, and supportive frameworks.

The findings underscore the importance of integrating structured reflection into volunteer programmes, especially those operating in development cooperation contexts. Organisations like *Play Handball* already address intercultural learning implicitly through their educational goals and sport-based methodologies. However, more explicit strategies—such as intercultural training, facilitated reflection, and dialogue with

local communities—can further enhance these outcomes.

Sport, in this context, serves not only as a tool for social inclusion and engagement but also as a mirror of socio-cultural dynamics. Its effectiveness in promoting intercultural competence lies in its capacity to create shared experiences while also revealing cultural distinctions. To fully harness this potential, future program designs should critically engage with the cultural implications of introducing Western sports in post-colonial settings and recognise the reciprocal nature of intercultural encounters.

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ORIGINAL RESEARCH ARTICLE

Physical Education Teachers as Homeroom Teachers: Professional Identity, Perceptions, and Implementations

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quality education, teacher well-being, sustainable education, homeroom teacher, conflict management in educational setting

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Abstract

This study examined the perceptions of Physical Education (PE) teachers who are also homeroom teachers regarding their professional identity and methods for transforming perceptions into actions. A mixed methods design was employed. 128 PE teachers working as homeroom teachers completed a questionnaire examining perceptions of their professional identity and tasks as homeroom advisers. For the qualitative phase, four focus groups of PE teachers identified as homeroom teachers (n = 28) were interviewed to gain deeper insight into the results. Quantitative findings showed that once PE teachers became homeroom teachers, they developed a strong dual-role identity as teachers, in addition to their professional teacher identity. They extended the scope of educational values and became more holistically oriented in their attitude. Conversely, the qualitative results revealed that they could more clearly see the student's worldview beyond the physical aspects of sport and movement. They were empathetic towards the students and more oriented towards creating a positive climate with social acceptance. In their view, a deeper understanding of the complexities of student life enhances student-teacher communication and increases the likelihood of achieving educational goals. They also became an integral part of the staff, affecting their centrality and sustainability in the school. The discussion elaborates on how PE teacher education programs should integrate specific preparation for becoming a homeroom teacher within their curriculum. Such preparation would equip them with tools to cope with the conflicts, dilemmas, and difficulties they will encounter.

Introduction

In countries with a homeroom teacher system in K–12, such as China, Japan, South Korea, Israel, and certain Western nations like Denmark, France, the USA, and the United Kingdom, there are two primary teaching roles (Popper-Giveon & Shayshon, 2017): the subject teacher and the homeroom teacher. The subject teacher instructs in specific academic disciplines. In contrast, the homeroom teacher oversees a broader range of responsibilities, including organisational, educational, social, and administrative tasks related to the students in their class (Gosen, 2015). This investigation is a national case study of the Israeli educational system that explicitly examines the role of high school PE teachers who also serve as homeroom teachers. By focusing on these dual responsibilities, the study underscores the importance of PE teachers in classroom management and student support. This

research will provide insights into how their roles can be refined and updated to meet learners' evolving needs better.

Role Theory offers a valuable framework for analysing the multifaceted responsibilities of PE teachers, particularly when they are tasked with dual roles such as teaching PE and serving as homeroom or advisory teachers. Role ambiguity occurs when individuals lack clear information about their job responsibilities, expectations, or role scope, leading to uncertainty and stress. For PE teachers who also serve as homeroom or advisory teachers, this ambiguity can be particularly pronounced. The dual nature of their responsibilities, balancing the physical development focus of PE with the academic and socio-emotional support expected in homeroom settings, can create conflicting expectations and unclear boundaries. Recent research highlights that such ambiguity negatively impacts teachers' subjective well-being, teaching efficacy, and their sense of connection to the school community (Macovei et al., 2023). The COVID-19 pandemic further exacerbated these issues, as rapid transitions to remote instruction blurred role definitions and increased uncertainty (von Haaren-Mack et al., 2020). Addressing role ambiguity through clear communication, defined responsibilities, and supportive professional development is crucial in mitigating its adverse effects.

Role strain occurs when the demands of multiple roles become overwhelming, leading to stress and decreased job performance. PE teachers often experience role strain when juggling instructional duties with additional responsibilities such as coaching or administrative tasks. A study by Pitney et al. (2008) found that dual-role PE teachers and athletic trainers reported significant role strain, primarily due to extended working hours and the complexity of managing multiple responsibilities. Furthermore, role conflict, where the expectations of different roles are incompatible, can lead to tension and difficulty in effectively fulfilling all role demands. Iannucci and MacPhail (2018) observed that PE teachers who concurrently teach another subject experience inter-role conflict, necessitating strategies such as role prioritisation to manage competing demands. These challenges underscore the importance of organisational support and clear role expectations in enabling teachers to navigate their multifaceted roles effectively.

The role of the homeroom teacher, as presented by the Israel Ministry of Education (MoE, 2024), comprises two types of duties: classroom instruction and classroom management. The homeroom teacher is a leader who employs a two-pronged approach, combining the technical-managerial and emotional aspects (Leitwood et al., 2020; Timor, 2017). As a manager, the homeroom teacher oversees technical and organisational tasks, including monitoring student lateness and absenteeism, coordinating the number of lessons delivered by the entire teaching staff, ensuring sufficient time between exam dates, and maintaining students' and the classroom's proper appearance. This role should be regularly revised to remain relevant to the changing needs of both students and society (Volansky, 2020). Teachers maintain a unique role in managing emotions within the classroom, both in teacher-student and student-student interactions. Additionally, they are also expected to encourage and sustain various forms of collaboration with parents, such as policy setting, parent instruction and volunteering, data exchange, and fundraising efforts. Parental involvement positively influences students' academic achievement, motivation for learning, and self-esteem, while contributing to reductions in school violence and absenteeism (Childs & Grooms, 2018; Lesneskie & Block, 2017).

Having teachers equipped with social and emotional competencies to manage a variety of complex interactions with students, both collectively and individually,

is imperative (Jennings & Greenberg, 2009). Jennings and Greenberg proposed a conceptual model that describes the prosocial classroom, a model of teacher social and emotional competence in conjunction with classroom and student outcomes. Following this model, studies have noted the relevance of emotions in the learning process. While negative emotions hinder students' ability to focus on schoolwork and attain high academic achievement (e.g., Boekaerts & Pekrun, 2016; Sainio et al., 2019), positive emotions support academic achievement and generate better learning opportunities (e.g., Boekaerts & Pekrun, 2016; Schweder, 2020). For example, Kashy-Rosenbaum and colleagues (2018) examined 73 classes in grades 7-12 in Israel and found that homeroom teacher support and a positive emotional climate in the classroom predicted positive academic achievements. They suggested a model similar to that of Jennings and Greenberg (2009), which both models contend is tied to **t**eachers' social and emotional competence, which is essential for establishing and sustaining positive student–teacher interactions, managing classrooms effectively, and creating the conditions necessary for high-quality social and emotional learning.

Rhodes (1994) compared the duties of homeroom teachers in the USA with the class atmosphere of their Japanese counterparts. In both cases, teachers meet with the class for at least one hour per week. They ensure that every child attends school regularly and makes progress in accordance with the program goals for all subjects in which they are enrolled. The teachers' responsibility is to ensure the students' social and emotional welfare is maintained. Additionally, they should be in touch with the student's parents and encourage them to be positively involved with their child's school life. Everyday activities are essential, but a particular emphasis should be placed on the weekly, one-hour education class with the homeroom teacher. The homeroom teacher is a familiar figure in other countries as well, including China (e.g., Wang, 1997), Japan, the United States, the United Kingdom, Australia, Israel, Canada, and Argentina (Shi & Leuwerke, 2010).

The Hour of Education

"The hour of education" is a mandatory one-hour lesson in the Israeli curriculum from first to twelfth grade and is among the homeroom teacher's responsibilities. This lesson is one of the core subjects taught in schools. Seven goals have been set by the Israel MoE (2024) for the hour of education lesson: (1) To nurture the class as a social group, and to have a respectful and protected discourse in response to emotional and social needs and values of students in the class; (2) To serve as a framework for dealing with various routine and/or risky life situations, and to strengthen mental well-being; (3) To enable students to experience individual and group self-management processes while maintaining a democratic basis; (4) To serve as a framework for discussing values concerning the class's day-to-day events and issues on the public agenda; (5) To develop moral judgment, and to build a personal value system that will strengthen the students' ability to sustain informed processes of choice in their lives; (6) To prepare students for social and cultural activities, including their planning and entrepreneurial skills; and (7) To conduct a reflective discourse for processing emotional and cognitive reactions to the students' social and cultural experiences after they occur. Hence, education classes enable teachers to lead educational and social processes, as well as value-driven discussions, and to influence the classroom climate. The classroom, as a social structure, is a significant factor in the development of students' personal, gender, group, cultural, civic, and national identities. At its best, the educational lesson integrates students as active partners in the educational processes in their classroom.

Nevertheless, a study that collected data from homeroom teachers in 20 regions in Russia and classified them according to their teaching styles (Polyakov, Stryukova, & Krivtsova, 2018) determined that about half of the teachers used the direct instruction model, in which they encourage students to remain passive, while the remaining half used the cooperative teaching model, in which they call on students to be actively involved. No associations were made concerning learning or social outcomes.

It follows that teachers' roles and duties are reflected in their professional identities, a multidimensional construct in which the personal and the social are interwoven (Beijaard & Meijer, 2017; Richardson & Watt, 2018). Professional identity is considered a developmental, dynamic, and fluid concept that is continually changing (Fomunyam, 2016). It is characterised by a sense of belonging and identification with the profession (Richardson & Watt, 2018). Teachers' professional identity comprises sub-identities, such as knowledge, pedagogical proficiency, and didactic expertise (Kozminski & Klavier, 2021). Congruence between the sub-identities will lead to a harmonious balance and identity, accompanied by positive feelings among teachers regarding their professional identity.

Building a professional identity in teacher education during the year of induction (i.e., the first year of teaching) is a central axis reflected in theoretical and practical courses, teaching experience, internship workshops, and advanced training (Caza & Creary, 2016). Vocational teachers have additional roles in middle and high schools, with the most common role being the homeroom teacher. Like their peers, PE teachers are also offered the role of the homeroom teacher. Teachers are usually integrated into this role with little preparation and may act intuitively. To the best of our knowledge, the literature lacks information on the uniqueness of the PE teacher as a homeroom teacher.

Although the goals of the hour of education and the role of homeroom teachers have been clearly defined, non-systematic observations and informal reports from students and teachers reveal significant variability in their implementation. This raises questions about the ecological validity of the homeroom hour of education and the extent to which its objectives are achieved. Consequently, this study aims to (1) examine the perceptions of PE teachers who are homeroom teachers concerning their professional identity and (2) examine their methods of transforming perceptions into actions. The findings may shed light on the value of tailored training, as currently incorporated into teacher education programs in Israel, and underscore the importance of developing a strong professional identity among prospective PE teachers. Additionally, the insights are designed to support educators as they progress in their careers.

Methods and Materials

This study used a mixed-methods concurrent triangulation design. This design establishes a parallel execution of the quantitative and qualitative methodologies. Quantitative and qualitative data are analysed separately, providing cross-validation and confirming findings from the two parts of the study (Almeida, 2018). Both quantitative and qualitative data were integrated and interpreted.

Quantitative Phase

Participants. Participants were 128 PE teachers (males = 39; females = 89) aged 25-66 (M = 45.5; S.D. = 4.2) who completed the study questionnaire. Three-quarters of the graduates were from the same college, and the rest were from four other colleges with PE programs in teacher education. Their teaching experience was distributed as follows: 52 beginning teachers (1-5 years), 76 veterans (6+ years); 63 with 0-3 years of experience as a homeroom teacher, 32 with 4-10 years, 19

with 11-20, and 12 with more than 20 years of experience. Two-thirds taught in high school, and one-third taught in middle school.

Instrumentation

Questionnaire. A questionnaire was developed by the authors of this study, which comprised both quantitative and qualitative parts. The quantitative part includes nine questions on a Likert-type scale (1 = not at all; 5 = very much) concerning the participants' habits and educational perceptions: Q1 = A College suitable preparation; Q2 = Investment vs. reward; Q3 = HT as the primary professional duty; Q4 = The extent of your lesson goal achievement; Q5 = Generally, to what extent education lessons achieve their goals; Q6 = Self-involvement in school life; Q7 = Student engagement in preparation of the lesson; Q8 = Student involvement in the lesson; Q9 = Meaningfulness of the lessons.

The development of the questionnaire and the open-ended questions for the interviews was grounded in the official role definition document for homeroom teachers published by the Israeli Ministry of Education, as well as the authors' professional expertise as homeroom teachers, PE instructors, and experienced pedagogical mentors in teacher education programs. The initial draft was collaboratively constructed by the authors and subsequently reviewed by a panel of eight teacher educators from an academic college and five PE teachers who also serve as homeroom teachers. The feedback obtained informed revisions to improve item clarity, relevance, and alignment with the intended construct, thereby establishing both content validity and expert validity. The final versions of the questionnaire and interview questions were written in Hebrew, the native language of both the authors and the target population. To evaluate the reliability of the instruments, a pilot study was conducted with a sample of 23 participants (13 females and 10 males) drawn from the target population. Internal consistency was assessed using Cronbach's alpha, with coefficients for the questionnaire sections ranging from 0.76 to 0.88, indicating acceptable to good reliability ($\alpha = 0.76$-0.88).

We chose the odd-numbered scale for several reasons. First, **o**dd-numbered scales include a midpoint or neutral option, which can be valuable if you want to allow respondents to express neutrality or ambivalence. This is particularly useful if respondents have mixed feelings or are genuinely undecided about their choice. In addition, it reduces forced choice. Second, odd-numbered scales help avoid forcing respondents into choosing a side when they may not have a strong opinion. This can lead to more honest and accurate data, as respondents are less likely to "lean" toward an option simply because they are uncomfortable with the choices provided. Lastly, it increases data range: Odd scales allow you to capture a broader range of responses, including those who might otherwise fall into a "no opinion" or "neutral" category. This can provide a fuller picture of opinion distribution and attitudes (e.g., Chyung et al., 2017; Colman & Norris, 1997; Kulas & Stachowski, 2013; Nadler et al., 2015).

The qualitative part comprises 15 open-ended questions, each of which can be answered with a brief response. Examples include:

- "Is there any added value to the PE teacher as a homeroom teacher?"
- "What is the importance of the homeroom teacher?"
- "Briefly detail five appropriate goals to achieve in the education lesson."
- "What helps you in achieving these goals, and what hinders or prevents you?"

To test the questionnaire's external reliability, 23 PE homeroom teachers filled out the questionnaire twice, two weeks apart. Reliability was demonstrated over time using test-retest (.79-.88).

Qualitative Phase

Participants. An email was sent to PE teachers who served as homeroom teachers, requesting volunteers for the study. Four heterogeneous focus group interviews were conducted, each with seven participants (comprising males and females, inexperienced and very experienced). The participants had 5-22 years of experience as PE and homeroom teachers.

Focus group interviews. Interviews with the four focus groups, each comprising seven participants, were conducted via Zoom. Focus groups offer distinct advantages over individual interviews in qualitative research, particularly when exploring shared experiences and collective perceptions. The interactive nature of focus groups fosters dynamic discussions, enabling participants to build on one another's ideas and yielding richer, more nuanced data. This group interaction can uncover insights that might remain hidden in one-on-one settings (Akyıldız & Ahmed, 2021). For instance, Guest et al. (2017) conducted a randomised study comparing focus groups and individual interviews. They found that specific sensitive topics appeared more frequently in focus groups, suggesting that the group setting can encourage participants to share experiences they might withhold in individual interviews. The study concluded that focus groups could elicit a broader range of information due to the synergistic effects of group discussions.

Additionally, a focus group was conducted via Zoom to facilitate logistical coordination among participants, allowing for remote access regardless of geographic location. This online format enabled efficient scheduling and facilitated broader participation. Microphones were intentionally left unmuted to foster an open, interactive environment, and participants were encouraged to contribute actively to the discussion. When a participant did not engage voluntarily, the moderator proactively invited them to share their perspectives to promote inclusivity and comprehensive dialogue.

They included questions regarding participants' perceptions, feelings, and thoughts about their duties as homeroom teachers; how they implemented their ideas into practice; and what they suggested to include in teacher preparation programs to better prepare student teachers for these duties. The interview was semi-structured, with questions like:

- How do you perceive the homeroom teacher's importance and contribution to the individual students and the class as a group?
- What is the content of the lessons?
- Who chooses it?
- How are the lessons conducted?
- How do you cope with large classes?
- How do you reach each and every child?

Nevertheless, the interviews were flexible enough to follow the interviewees' examples, emphases, and suggestions that arose during the conversation.

Procedure and Data Analysis

After receiving permission from the Academic College at Wingate's institutional review board (IRB) (No. 238), the study began. The questionnaire was distributed via email, with a link to Google Docs, to all PE teachers who serve as cooperating teachers at the College of PE Teacher Education. Additionally, a snowball technique was employed to recruit more participants. We collapsed the 5-point Likert scale into a 3-point scale, grouping responses 1 and 2 as "Disagree," 3 as "Neutral," and 4 and 5 as "Agree." This is done, as suggested by others (Jeong & Lee, 2016; Van Dusen & Nissen, 2020), for several reasons. First, it simplifies data interpretation by reducing readers' cognitive load, making patterns in the data more apparent and easier to communicate. Second, most respondents select extreme values; merging adjacent categories creates more balanced distributions. Finally, from a theoretical standpoint, distinctions between

adjacent Likert categories may not always be meaningful, particularly if the difference between "agree" and "strongly agree" does not reflect a substantively different attitude.

Two focus groups met via Zoom for 90 minutes each. The first author moderated the discussion. However, all four authors participated in these meetings, contributing by asking clarifying questions, prompting further elaboration, and raising questions involving dilemmas and ideas. Conversations were recorded and transcribed verbatim.

Trustworthiness

We conducted thematic content analysis to interpret qualitative data from open-ended questions in the questionnaire and for the data generated from the focus group interviews, following the six phases outlined by others (Nowell et al., 2017; Stahl & King, 2020): familiarisation with the data, generation of initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the final report. This structured process enabled us to gain a comprehensive understanding of participants' perspectives and experiences. By systematically coding and categorising the data, we ensured a rigorous and transparent analysis that enhanced the credibility and depth of our qualitative findings.

To establish trustworthiness, we applied Lincoln and Guba's (1985) criteria of credibility, transferability, dependability, and confirmability. We achieved credibility through investigator triangulation, with four researchers independently coding the data before discussing and reconciling differences. Transferability was addressed by providing rich, thick descriptions of the research context, allowing readers to assess the applicability of the findings to other settings. Dependability was ensured by maintaining a detailed audit trail documenting all stages of the research process, enabling external reviewers to evaluate the consistency of our study. Confirmability was established by demonstrating that the findings were grounded in participants' responses rather than in researcher bias, and supported by the audit trail and reflexive documentation. By systematically attending to these criteria, we enhanced the rigour and trustworthiness of our thematic analysis of the focus group data.

The textual analysis was initially conducted independently by each author. Subsequently, we engaged in paired discussions about our analyses, generating themes that were partly unique to individual researchers and partly shared. In the third phase, we convened as a quartet, with each pair presenting their thematic developments. During this stage, additional themes were generated, as not every pair had identified identical thematic elements. This methodological approach preserved the distinctiveness of individual interpretations while simultaneously facilitating consensus regarding shared themes. This multi-stage analytical process aligns with the investigator triangulation described by Nowell et al. (2017), thereby enhancing the credibility of our thematic analysis through multiple analyst perspectives.

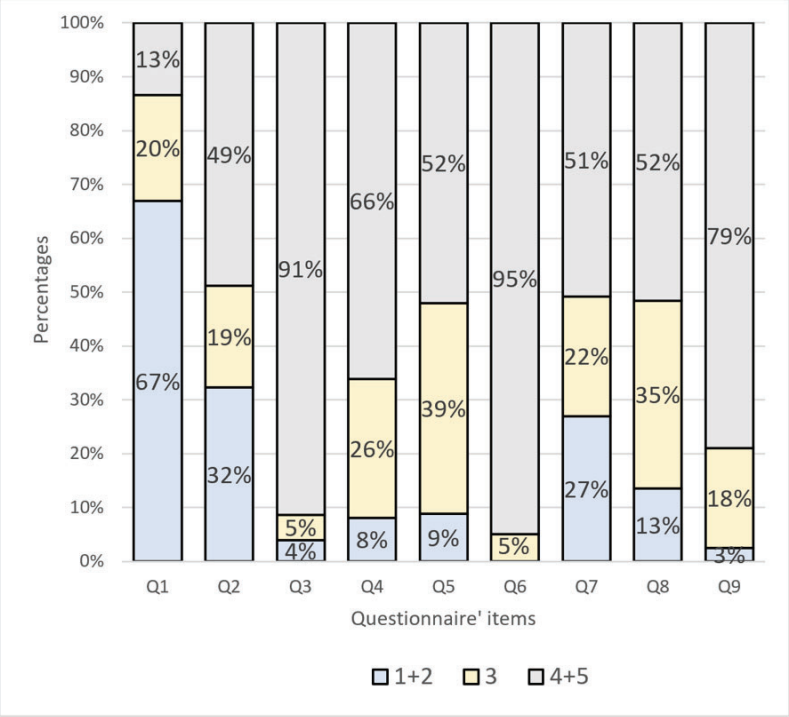
Results

The results are presented according to the research procedure: first, the quantitative part; then the results of open-ended questions; and finally, a description of the themes generated in the qualitative part. The interviewees' perceptions and beliefs were presented first, followed by their descriptions of the implementation methods.

Quantitative Results

Figure 1 illustrates the distribution of participants' answers to the quantitative section of the questionnaire._Teachers felt that college preparation for the duties of homeroom teachers was not satisfactory. Additionally, they reported that their effort in their work was not congruent with the reward they received.

Figure 1. Distribution of teachers' perceptions concerning their roles/professional identities



*Q1 = A College suitable preparation; Q2 = Investment Vs reward; Q3 = HT as the main professional duty; Q4 = The extent of your lesson goal achievement; Q5 = Generally, to what extent education lessons achieve their goals; Q6 = Self-involvement in school life; Q7 = Student engagement in preparation of the lesson; Q8 = Student involvement in the lesson; Q9 = Meaningfulness of the lessons

Another interesting result, as demonstrated in Figure 1, was the low student engagement rate in the education lesson, whether in preparation or during the lesson itself. In addition, participants attached great importance to their role.

In open-ended responses about their perceived roles, the metaphors "mother," "father," “I am everything for them," and even "God" were prevalent in about one-quarter of responses. PE teachers believe their role significantly contributes to students' well-being by fostering their abilities and encouraging aspirations for improvement. They also act as intermediaries between students and school authorities, enhancing the classroom's positive social and emotional climate. The top five goals of the 128 participants were cultivating class cohesiveness, empowering students' self-identity and self-efficacy, clarifying values, teaching respect for others, conducting a respectful dialogue, and fostering life skills. About 85% of participants thought the educational lesson was important, but about half did not believe they had achieved the lesson's goals.

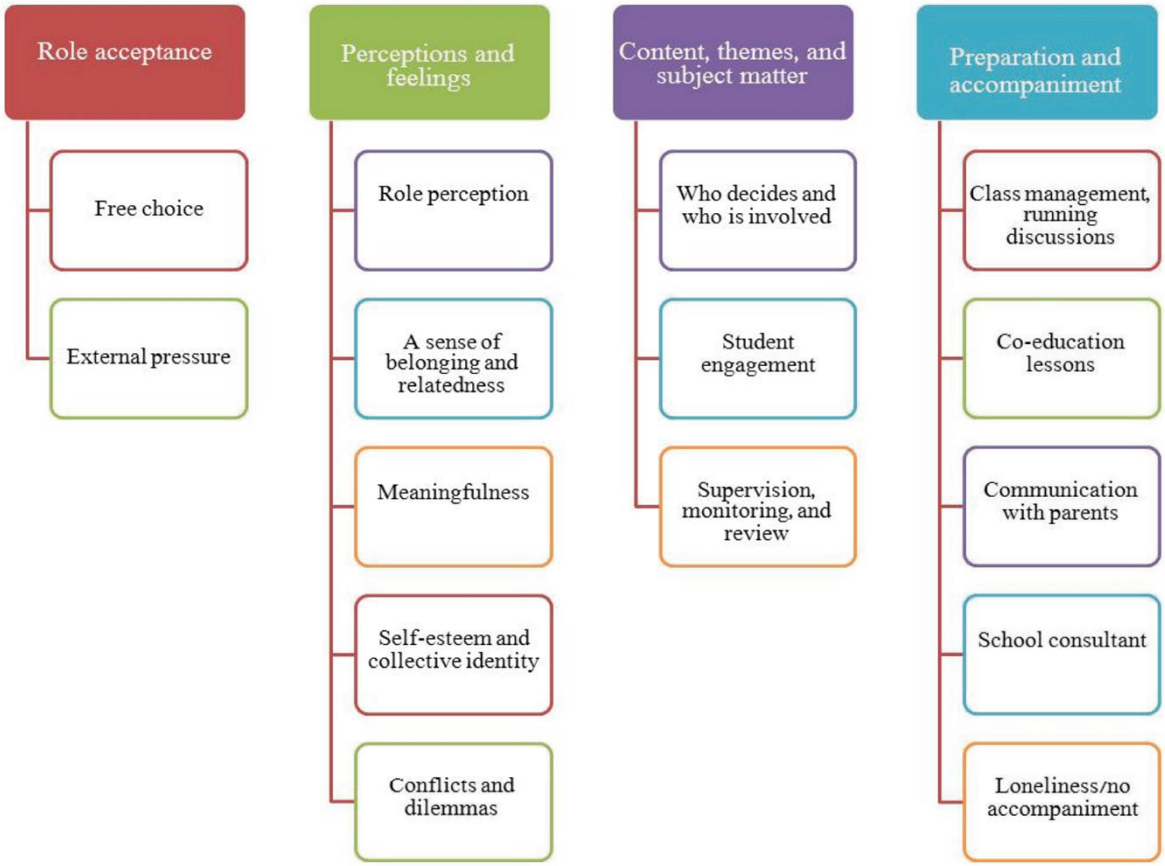
Qualitative Results

Thematic Analysis of the Interviews

The analysis of interviews by the four authors revealed four main themes that represent the issues that preoccupied the homeroom teachers, with sub-themes that were generated from a deeper analysis (see Figure 2): (1) role acceptance, (2) perceptions and feelings, (3) content, themes, and subject matter, and (4) preparation and accompaniment.

Role acceptance. Refers to the extent to which teachers acknowledge, internalise, and identify with the roles and responsibilities assigned to them within the school setting. In the context of PE, teachers who also serve as homeroom teachers must recognise and accept the dual professional identities associated with both positions. This includes understanding the expectations, duties, and values inherent in each role and integrating these aspects into one's professional self-concept. High role acceptance is associated with greater job satisfaction, commitment, and effectiveness in both teaching domains, as teachers feel confident and motivated to fulfil the diverse requirements of their positions.

Figure 2. Thematic map: Main themes and sub-themes



Free choice. In the context of PE, teachers' autonomy refers to the degree of autonomy teachers have in making decisions about instructional methods, activities, and classroom management. When teachers experience free choice, they can select or adapt content, structure lessons, and respond to students' needs based on their professional judgment rather than strict external directives. This autonomy is linked to greater job satisfaction, motivation, and a stronger sense of professional identity, as teachers feel empowered to shape their work environment and teaching practices in line with their values and expertise (Bennie et al., 2017; Leisterer & Paschold, 2022; Zach et al., 2015).

External pressure. On the other hand, involves demands or constraints imposed by school policies, administrative requirements, standardised curricula, or societal expectations. When teachers face high external pressure, their ability to exercise professional autonomy is limited, and they may feel compelled to follow prescribed routines or meet external standards, even when these conflict with their pedagogical beliefs or students' needs. This can undermine role acceptance, as teachers

may feel less connected to their work or less able to fully embrace their professional identity (Bartholomew et al., 2014).

Participants explained how they became homeroom teachers, including who was involved in this decision and to what extent they were free to accept or reject it. Most participants reported that the school principal approached them very early in their teaching experience and asserted that they took on the role of homeroom teacher, which made them feel obligated to do so. Only two interviewees claimed they decided to take on this role willingly, of their own free choice.

There are not many choices. First, in terms of a job, if you want to work full-time, sometimes with no choice, you also "take education." There is a lot of pressure on novice teachers who enter the system to educate, not just on PE teachers, of course. When I first arrived at the school 11 years ago, the principal put pressure on me to become an educator. I refused to do so until the second year. I felt that I was not ready at that time for such a mission.

Perceptions and feelings. This theme refers to how PE teachers interpret, understand, and emotionally respond to their professional roles, classroom environments, and interactions with students. Perceptions encompass teachers' attitudes, beliefs, and expectations, which are shaped by their experiences, professional background, and the broader educational context. These perceptions influence how teachers approach instruction, manage classroom dynamics, and set goals for student development (Isyabella et al., 2024; Opstoel et al., 2022). Feelings refer to the emotional states, such as joy, frustration, satisfaction, or anxiety, that teachers experience in relation to their work and the challenges they face (Barker et al., 2020; Petsos et al., 2019; Simonton et al., 2021).

Role perception refers to how PE teachers interpret their professional obligations and their potential to influence students' academic, emotional, and social development. As previous literature has shown, teachers' metaphoric self-perceptions – such as "parent," "mentor," or "protector" – reveal deeply internalised educational commitments that transcend disciplinary boundaries (Isyabella et al., 2024; Opstoel et al., 2022). Teachers perceive their role as educators as more important, with a greater likelihood of influencing the educational processes they deem necessary. They use metaphors such as "I am like a mother, a father, and a friend to my students," "I am God for them," and "They know I will be there for them through fire and water." They take responsibility for monitoring students' achievements and perceive themselves as mediators among students and between students and parents. They encourage students to strive for excellence and take responsibility for creating an atmosphere that promotes cooperation and inclusion in the classroom.

My perception of the role of the educator evolves from year to year. As time goes on, the answers I have to give also change. There is the logistical part that I am a connecting thread between myself and the students' parents, the other teachers in school and among themselves. And there is the emotional aspect, which is more central – to be there, to listen, to support, to advise, and to reflect the truth even when it is unpleasant.

A sense of belonging and relatedness. This sub-theme highlights the socio-professional integration experienced by PE teachers when they assume the role of homeroom teacher. Transitioning from marginal departmental spaces (e.g., gymnasiums) to central teaching roles fosters a stronger connection with colleagues and institutional processes (du Plessis & Sunde, 2017). The shift aligns with findings that collegial networks strengthen professional identity and organisational commitment (Popper-Giveon & Shayshon, 2017). PE teachers typically have their own room for staff

meetings, usually located in the gym. Therefore, they can develop a sense of collegiality.

Nevertheless, that situation has mixed outcomes because they are less involved with the other staff members and the life in the teachers' general room. PE teachers who are homeroom teachers, however, have regular meetings with all the staff members. They feel that, alongside their role as educators, they are more connected to the daily life of the school and feel a greater sense of belonging to the school, as described below:

From the moment I started educating, I saw the role of classroom education as something that connected me much more to the school. Of course, there is more work with this role, but the sense of belonging is amazing; it makes it something completely different.

Meaningfulness. Teachers articulated a heightened sense of meaning in their work as homeroom educators, particularly when they could influence students' lives beyond physical achievement. This aligns with Lavy and Naama-Ghanayim's (2020) argument that teacher empathy and emotional engagement enhance professional fulfilment and student outcomes. When the teachers talked about meaningfulness, they distinguished between what is personally meaningful to them and what is meaningful to their students. For teachers, the ability to be empathetic and supportive, to instil a positive learning atmosphere that leads to student self-improvement, and to earn their students' appreciation was considered meaningful. However, achieving this level of meaningfulness is very demanding, as can be seen in the following example:

Classroom education is very meaningful to me, but as it becomes more meaningful, it also becomes more intense. I think the more you give of yourself, the more involved you are. Sometimes you can be very happy, and sometimes you can be very disappointed and take things hard. I can say I'm coming to school for my education students right now. They give the meaning to my duty. It is very significant for me; I really like them.

In addition, according to the interviewees' perceptions, students consider teachers meaningful when they feel comfortable and open in their presence, feel they can trust them, and perceive that teachers acknowledge their value.

They know that they can trust me, and that means a lot to them. They feel open to sharing ideas, feelings, and experiences, and to ask for advice and to listen very carefully. They know that I am there for them and not against them. It gives them confidence.

Self-esteem and collective identity. This sub-theme addresses the perceived professional marginalisation of PE teachers and how homeroom responsibilities help mitigate it. As noted in prior research (Mäkelä et al., 2014), the dual-role context enhances teachers' visibility and credibility within the broader school community, thereby contributing to a more cohesive professional identity. PE teachers believe they have an advantage over other teachers in school. They asserted that sport and movement lessons convey endless social-emotional situations in which students' strengths and weaknesses, personality traits, and social status can be reflected. Moreover, since academic achievements are not the focus in PE lessons and the usual evaluation scale is not utilised to assess their performance, students do not feel threatened, as presented in the following quote:

PE teachers are charismatic, with a dominant presence in school; they invest a lot of effort in school. But what makes them unique is their close relationship with the students. They have the best potential in school to understand and support the students.

Conflicts and dilemmas. This multifaceted sub-theme encompasses ethical, interpersonal, and professional tensions

arising from the dual roles. Teachers described internal conflicts such as balancing loyalty between students and colleagues, negotiating family responsibilities, and responding to ethical dilemmas involving confidentiality. Such challenges highlight the moral weight of the homeroom teacher role (Zarra, 2016) and its psychological toll (Simonton et al., 2021). Two colliding roles: PE teacher versus homeroom teacher. They contended that being a homeroom teacher requires significant time and effort, particularly given the role of physical education. For example, the conflict between loyalty to colleagues and students is described as follows:

As an educator, I encounter many difficulties between students and other teachers. On the one hand, I have to be loyal to teachers because they are my colleagues. On the other hand, there are teachers who make mistakes – not intentionally but because they come with different perceptions and sometimes their approach is different.

Another example is the dilemma of balancing emotional load and work between family and work. Some of the teachers expressed their frustration regarding this issue, as in the following example:

I have discovered that many of my emotional difficulties that I experience at home towards my children and husband stem from working as an educator. On this background there are many fights at home. I feel that I don't know how to regulate the time between work and home.

Another example concerns morals and ethics. Teachers' students engage in both close and open communication, fostering confidence (Zarra, 2016). Therefore, when teachers are privy to student secrets, they can encounter unethical, immoral, or even risky behaviour. This loyalty dilemma is described in the following example:

There are things we must not leave with us. For example, as soon as I hear from a student about a sexual assault or something like that, it is my duty to tell the child that I am going to the school consultant, so we can both help. I inform every child that if something serious has occurred I will have to share it with other professionals.

To what degree should parents be involved? On many occasions, dilemmas arose concerning what to keep between the teacher and the child, and to what extent to include the parents, to what extent to recruit parents with their children's discipline problems and academic problems, as stated in the following quote:

There are cases where the parents also give up and get to a point where they are already having a hard time dealing with their children, and then we find ourselves coping alone.

Content, themes, and subject matter. The theme of "Content, Themes, and Subject Matter" reflects a central axis in understanding the pedagogical constraints and affordances experienced by PE teachers serving as homeroom teachers. In the present study, this theme captures the tension between top-down curricular mandates and the educator's capacity for contextual adaptation and responsiveness. Although Israeli policy defines the weekly educational lesson as a structured space for addressing students' social, emotional, and civic development, the findings reveal that PE teachers, who often function as homeroom teachers, often experience limited autonomy in selecting lesson content. Instead, predetermined topics – such as substance abuse, exam anxiety, or time management – are handed down by school counsellors or coordinators, leaving little room for tailoring the curriculum to the evolving needs of a particular class. This lack of professional agency stands in contrast to contemporary pedagogical models that advocate for teacher autonomy and the co-construction of meaning with students (Wang, 2016).

Furthermore, while the educational discourse increasingly promotes student voice as essential to fostering engagement,

well-being, and democratic values, the study found that students were rarely involved in the selection or design of lesson content—an omission that may undercut both motivation and relevance (Leisterer & Paschold, 2022). These findings suggest a structural misalignment between the normative goals of homeroom education and the institutional mechanisms that govern its implementation. As such, this theme not only illustrates the complexity of translating educational policy into meaningful classroom practice but also calls for a re-examination of how teacher professionalism and student participation are conceptualised in homeroom contexts. Who decides and who is involved – This sub-theme highlights the tension between top-down curricular planning and teacher autonomy in education lessons. While national guidelines (MoE, 2024) outline key topics, the rigid framework restricts teachers' capacity for responsive, individualised instruction (Wang, 2016). This disconnect undermines pedagogical innovation and limits alignment with classroom needs. The content, themes, and subject matter are usually dictated in a top-down manner; however, the teacher finds ways to adapt the themes to the class, whether they do it with peers or independently, and the variety regarding these interpretations is clear:

Education lessons are not something that a teacher can determine what their content will be; there are perhaps only 10% of education lessons a year that the teacher is independent to decide upon. In August we build the program together with the counselor, social coordinator, and myself as a coordinator, and we publish a booklet for all the educators. There is an advisory program of the Ministry of Education and we cannot miss it. There are topics like drugs and alcohol, friendships, adolescence, test anxiety, academic motivation, time management, preparations before an annual trip, farewell at the end of the year, and others. The subject is not for them to select; the teachers can only choose the methods of teaching.

I have a team of educators with me and we meet together once a week for two hours to plan the next education lesson. It helps me a lot. Then, I gain more confidence, and there are more successful and relevant things to do with the class.

Student engagement. Despite policy rhetoric promoting student-centred learning, teachers reported limited student involvement in planning and delivering education lessons. Leisterer and Paschold (2022) emphasise that autonomy-supportive teaching environments, where students co-create content, are associated with greater emotional engagement and academic motivation. We were surprised to realise that most lesson planning and preparation do not include students. Some teachers who insist on students' engagement require it partially or occasionally, meaning that learning engagement in independent study is not a common phenomenon:

I have several committees comprised of students who volunteer to be a member. Every three months, the committee members initiate an event in honour of the birthday boys and girls. We also have student council representatives who occasionally give lessons on themes that they choose. There is a group at the school that teaches alcohol and drug prevention classes. That means the students are active. It's amazing to see them thrive and collaborate, but I cannot say that all students are involved.

Supervision, monitoring, and review. The absence of systematic oversight or reflective evaluation mechanisms for the education lesson surfaced as a key concern. While peer reflection was informally practised, it lacked structured feedback or formal assessment. This finding raises questions about the sustainability of teacher growth in the absence of institutional support (Nowell et al., 2017).

Concerning the question of who supervises, monitors, or reviews the content, processes, and products of the education lessons, the teachers testified that none of these exist:

Once a month, the homeroom teachers have a staff meeting where they discuss all issues that arise regarding their duties and the "lesson of education". We reflect upon our experiences, share, and learn from each other. There is no documentation or supervision. We believe that we improve gradually through the process of peer learning in a reflective manner.

Preparation and accompaniment. This theme highlights the crucial interplay between teacher education and the practical challenges faced by PE teachers who assume homeroom responsibilities. Recent studies highlight a persistent gap between theoretical training and classroom application, particularly in the context of PE. For instance, a study conducted in Germany revealed that pre-service PE teachers exhibited no significant improvement in teaching performance over a five-month internship, suggesting that current training programs may not adequately equip teachers for the dynamic demands of the classroom (Greve et al., 2020). In Israel, novice PE teachers have reported a disconnect between their academic preparation and the challenges they encounter in actual teaching environments. These educators often feel unprepared to manage large class sizes, limited resources, and the need for improvisation, indicating that teacher education programs may not sufficiently address the complexities of real-world teaching (Zach et al., 2020). Moreover, the transition from subject-specific didactics to practical teaching poses additional challenges. Research indicates that pre-service PE teachers often struggle to integrate theoretical knowledge with hands-on practice, resulting in a fragmented understanding of their professional roles (Westerlund, 2023). This fragmentation can impede the development of a cohesive teaching identity and diminish the sense of accomplishment.

Class management. The PE world differs from that of non-PE teachers in many ways, as they are confined to teaching in classrooms. PE teachers usually teach in larger spaces (e.g., gyms, arenas, swimming pools, tennis courts, and track and field stadiums); they are constantly in motion rather than continually sitting, and it is the only lesson where students invest physical effort. Transitioning from a large space to a limited classroom space requires PE teachers to be adept at a range of classroom management strategies. Moreover, running a discussion requires knowledge and skills. They must plan these lessons carefully to achieve educational goals:

As a matter of fact, when I enter the classroom, I know I have all my students together for a weekly one hour. Therefore, I have to carefully plan this hour. I don't remember learning how to run a discussion, how to empower students, how to deal with social problems that arises every now and then, and how to help them solve emotional problems that interfere with their well-being. I study all these in a trial-and-error manner, and it demands a lot from me.

Co-education lessons. PE lessons in Israel are segregated by gender, posing a unique challenge for homeroom teachers expected to support mixed-gender classes. This scenario presents a challenge – namely, considering not only the characteristics of the other gender but also how to manage a mixed-gender class. This is especially challenging when working with adolescents. Teachers reported that this structural separation affects relational depth and equity in communication, a nuance that is often neglected in teacher training programs (Greve et al., 2020).

PE is the only lesson where boys and girls are separated. So, as a female, I meet the girls, in addition to the education lesson –

two times a week for PE class. Altogether, I meet them three times a week, whereas with the boys we meet only once. I have to be aware of this potential imbalance, which might lead to less effective communication with the boys.

Communication with parents. Many novice teachers expressed discomfort and a lack of preparedness in engaging parents, a gap that is often overlooked in existing curricula. Since parental involvement is linked to improved student outcomes (Childs & Grooms, 2018), the lack of systematic preparation for parent-teacher interaction reveals a critical training deficiency. According to all the interviewees, one aspect missing from PE teacher preparation programs was the establishment of teacher-parent relationships. A young novice teacher stated:

I was afraid of the first meeting with the parents. They were all older than me, and their children are now under my responsibility. Who am I to tell them something about their children?

I think that parents should be more involved. I know they have their life and career, and you cannot invite them often to school, but when I do invite them, I want it to be meaningful for everybody. I am still not sure how exactly to do this.

I am educator of the 7th grade. The whole year is dedicated toward the Bar-Mitzva event of the children with their families. The parents are involved from day one. Such cooperation creates a wonderful atmosphere of enthusiasm and willingness for action. It is a year in which parents are truly involved in the school.

School consultant. Cooperation with school consultants appears as a cornerstone of support for educators dealing with complex student issues. These partnerships serve as informal learning communities and emotional buffers, aligning with recommendations for distributed responsibility in student care (Jennings & Greenberg, 2009; Timor, 2017). Educators work in cooperation with the school consultant in various venues, including preparing social events, creating syllabi for educational lessons, and conducting ongoing meetings throughout the year. These meetings effectively form learning communities where educators plan, discuss, reflect, consult, and collaborate to assist one another. In addition, emotional and behavioural problems are dealt with between the educator and the school consultant, as described in the following example:

There are students who face emotional difficulties, deprivation at home, and domestic violence, and many times, I take it very hard, and really, the counsellor is very helpful. I have an hour-long meeting with the counsellor once a week, where we raise issues with students and learn how to solve the problems, when to call the student for a conversation or a personal conversation only with the student or decide to invite the parents to school. There is a collaboration of the educator, counsellor, and school coordinator.

Loneliness /no accompaniment. Despite collaborative practices, novice teachers described feelings of isolation once initial institutional support diminished. The abrupt expectation of self-sufficiency post-induction has been documented as a persistent problem across educational systems (du Plessis & Sunde, 2017). It reflects a systemic underestimation of the emotional labour involved in the homeroom role.

Induction into school is a complex process that demands mental toughness from novice teachers. They must apply all their theoretical knowledge in practice and adapt to the school environment as a new organisation. Although they should have support from within the school system, they are expected to become independent quickly. For example:

Many times, I feel lonely in certain situations. Even with all the assistance that

I sometimes get, actually, I am coping alone by myself. After the first year, it is even worse because everybody thinks that you are not a novice anymore and expects you to solve problems independently.

Discussion

We examined PE teachers who were also homeroom educators regarding their perceptions of their role as educators and how they translate these perceptions into actions. In other words, we wanted to examine their professional identities and how they implement their ideas into behaviour. We will first discuss the results of the quantitative analysis and then present the findings.

One of the prominent findings from the questionnaire's closed-ended questions was that teachers felt unprepared for the duties of homeroom teachers. Such a claim aligns with previous research, in which novice teachers reported a lack of confidence due to the perception of inadequate preparation for the school working environment (e.g., Zach et al., 2012). In addition, teachers reported that the effort they invest in their work is incongruent with the rewards they receive. Such a claim may highlight a gap in the job description, the experience that follows, and the appropriate compensation for a job with dual responsibilities. Such a perceived gap may reflect underlying frustration that has influenced teachers' professional identity. Another notable gap was observed between the elevated importance that teachers attribute to the goals and to the educational lesson, and the moderate levels of reported goal achievement. These observations could stem from a lack of knowledge and skills in transforming ideas into behaviour and powerfully express the need for improvement.

Two central questions in the questionnaire explored the teachers' perceptions of the importance of their role as educators and their definitions of educational goals. Participants attached great importance to their role. The metaphors "mother," "father," I am everything for them," and even "God" were prevalent (about one-quarter of the responses). Like other teacher educators (Graham et al., 2016; Lavy & Naama-Ghanayim, 2020), PE teachers believe that their role contributes to the well-being of the students—they help them to increase their abilities and aspire for improvement, mediate between them and school authorities, and enhance the class's positive social and emotional climate. The top five goals of the 128 participants were (1) cultivating class cohesiveness, (2) empowering students' self-identity and self-efficacy, (3) clarifying values, (4) respecting others and respective dialogue, and (5) fostering life skills. With that in mind, we expect teachers to report high rates of student involvement and engagement in the education class.

Nevertheless, teachers reported low engagement rates in lesson planning, preparation, or involvement. These results contradict the messages presented in the following section, which are based on our interviews. That is, we would expect teachers who clearly define the educational lessons' goals to aim to promote students' sense of autonomy and to see this autonomy reflected in students' behaviour. We claim that such a discrepancy between what is declared and what is seen might stem from a lack of teaching skills that promote perceptions, usually abstract ideas. A similar explanation was found by Barnes et al. (2014) and Srivastava et al. (2015), who asserted that teachers are equipped with beliefs and theoretical knowledge but are not necessarily equipped with the skills to put them into practice. It might also explain why about 85% of participants think the education hour is essential, but about half of them do not think they meet the lesson's goals.

Results from the focus groups revealed that role acceptance, whether willingly or in response to the principal's offer to become a homeroom teacher, strengthened the educational sub-identity of PE teachers.

Along the lines of other research (e.g., du Plessis & Sunde, 2017; Popper-Giveon & Shayshon, 2017) claiming that professional teachers who become educators increase their sub-professional educational identity, the current study also showed that becoming a homeroom teacher requires a higher involvement in school life, strengthens the educational identity of the teachers, and increases their sense of belonging to the school. This means that homeroom teachers have many duties in school that require their presence. They must communicate with the class teachers, the school coordinator, the principal, educator peers, students, and parents. Hence, many activities require deep involvement in school life, at least regarding three levels: student life in school, interactions between homeroom teachers and their peers, and collaborations between homeroom teachers and managerial staff (du Plessis & Sunde, 2017; Popper-Giveon & Shayshon, 2017).

Meaningfulness is a value that "helps" teachers see students holistically. PE teachers often strain themselves, so becoming homeroom educators enables them to innovate, introduce novelty, and foster renewal, which can instil meaning in their work. In the focus groups, teachers asserted that once they became homeroom teachers, they developed a strong sub-identity as educators in addition to their sub-identity as professional discipline teachers. They also stated that this positively affects the teacher's personality within the school and may improve the professional status of PE. The study affirms the position of Lavy and Naama-Ghanayim (2020), suggesting that caring for students and showing empathy are key elements that offer reciprocal benefits to both teachers and students. It enhances the teachers' professional identity development while promoting students' well-being, academic achievements, and emotional and social functioning. PE teachers who became educators strengthened their caring and empathy towards their students. They gained a deeper understanding of the students' worldviews that extended beyond the physical aspects of sport and movement. They were more oriented towards creating a pleasant climate with social acceptance.

PE's low status was reflected in the data, as reported elsewhere (e.g., Mäkelä et al., 2014), in the self-esteem and collective identity of the teachers' interviews. Findings reveal that one of the most effective ways to increase PE's status in schools is to enhance the integration of PE staff into the school's general staff, including serving as homeroom educators and assuming managerial duties.

It is noteworthy that our sample is comprised of experienced PE teachers who serve as homeroom advisers; they are not the beginner teachers whose struggles they described in the interviews. As such, their accounts were written retrospectively, recalling their experiences when they began as novice PE teachers and were subsequently asked to serve as homeroom teachers as well. In this context, retrospective feedback has helped experienced teachers reflect on their earliest challenges and lack of preparation, which were hardly noticeable or readily available when they first entered the school. Teachers can reflect on their early years, providing insight into the shortcomings in preparation that helped them gain confidence and effectiveness as both PE and homeroom teachers. On this account, the retrospective view enriches the data, as it reveals how their past experiences of not being adequately prepared for these roles have shaped their professional development, lending depth to the current findings regarding the teachers' preparation. It also strengthens the argument for tailored training programs that better equip both newly qualified and experienced teachers to manage their roles.

Practical Implications

Our findings highlight the importance of professional identity in shaping the experiences of PE teachers who also serve

as homeroom teachers. The thematic analysis revealed that these educators negotiate multiple professional roles, balancing the distinct expectations of PE instruction with those of classroom teaching and student guidance. The emergence of both shared and individual themes underscores the complexity of this dual professional identity, shaped by institutional norms and personal values.

In practical terms, our results suggest that professional development programs for PE teachers should explicitly address the challenges and opportunities inherent in holding multiple roles. Specifically, we recommend integrating opportunities for reflective practice and peer dialogue within teacher training and ongoing professional learning. Such activities can help teachers articulate their evolving sense of professional self, reconcile the demands of different roles, and develop strategies for managing role conflicts. Providing forums for sharing experiences and best practices can also foster a sense of community and support among teachers facing similar challenges.

By acknowledging and supporting the multifaceted professional identity of PE teachers who are also homeroom teachers, schools and teacher educators can better prepare these educators to thrive in their complex and dynamic roles. Our study thus offers concrete recommendations for enhancing the professional well-being and effectiveness of this specific group of teachers.

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INTERNATIONAL SPORTS STUDIES

ORIGINAL RESEARCH ARTICLE

From Novice Sprint All the Way up to Ironman! Exploring the Progression of Recreation Specialisation for Amateur Ironman Triathlon Finishers

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Abstract

This research provides an in-depth interpretation of how amateur Ironman triathlon finishers develop their skills and commitment to the sport. A qualitative approach was adopted to collect data from 25 amateur Ironman triathlon finishers through a two-step process—individual in-depth interviews followed by a focus group interview—and the resulting data were analysed to synthesise key themes. The analysis revealed that progression along the recreational specialisation continuum involves three areas encompassing eight themes. The first area, facilitators, underscores the influence of personal motivation and social support in sustaining participation. The second area, specialisation development, reflects growth in knowledge, behaviour, and affective engagement with the sport. The third area, changes after progression, highlights personal insights, evolving event preferences, and shifts in social or individual roles. Based on these findings, this research enhances the application of serious leisure theory and recreational specialisation literature, particularly in the context of Ironman triathlon participants. It also lays the groundwork for future large-scale model development and identifies two promising research directions: strategies for mental adjustment to overcome obstacles and approaches to maintaining a sense of balance in life. Overall, the findings offer a concise theoretical basis and practical guidance for fostering sustained participation in recreational triathlon.

Introduction

When participating in recreational activities, the types of activities participants engage in differ over time (Backlund & Kuentzel, 2013). Some may choose to participate less or no longer participate in the activity, while others may choose to maintain the status quo and continue participating regularly (Rundio & Buning, 2021). Among these participants who might pour in all efforts as if pursuing a career, might have entered the 'progression' of recreation specialisation.

Recreation specialisation is a concept proposed by Bryan in 1977. It is defined as "the progression of recreationists' behaviour from normal or low involvement to specialised or high involvement, and the behaviours are reflected through their equipment, techniques, environment (activity setting), and preferences. Moreover, participation behaviour is a continuum" (Bryan, 1977, p. 175). Based

on Bryan's definition, "progression" is a critical element in the recreational specialisation concept. Oh et al. (2010) defined progression as a process in which participants show higher involvement, accumulate more knowledge and skills, and demonstrate higher commitment to the activity over time. Moreover, there exists an ultimate goal during progression. During progression, the elite or the privileged can emerge in a certain social world with sharing and support; more specifically, progressing along the recreational specialisation continuum signifies a deepening of the cognitive, behavioural, and affective domains (Kim et al, 2023; Lee & Scott, 2013; Scott & Shafer, 2001; Shafer & Scott, 2013).

Also, it is essential to note that specialisation is not only a progression of skills and commitment but also a process of identity transformation (Jun et al., 2015). As participants deepen their knowledge, behavioural engagement, and affective connection to an activity, these changing patterns become integrated into their self-concept, shaping how they define themselves within a social world. This perspective positions specialisation as both a behavioural and identity-based trajectory, thereby clarifying its relevance to understanding participants' long-term involvement.

However, not all recreational enthusiasts progress along the specialisation continuum over time. Unruh (1979) suggested that most recreationists do not progress along the recreational specialisation continuum; only very few would. Much like the normal curve in statistics, recreationists who progress along the recreational specialisation continuum are the constituent minorities at the extremities of the curve (Kuentzel & Heberlein, 2006; Liu & Lou, 2019; McFarlane, 1996).

For amateur Ironman triathletes, progress along the specialisation continuum over time is typical (McCarville, 2007). In triathlon racing rules, the total distance increases from 25.75 km to 51.5 km, then to 113 km, and finally to 226 km, corresponding to the goals set for the sprint, the Olympic/standard, the half Ironman, and the Ironman (Sharma & Périard, 2020). Because triathletes must complete swimming, cycling, and running within time limits, the Ironman competition is an energy-intensive sport (Maxcy et al., 2019). For most amateur participants, a detailed training plan comprising continuous practice is needed to complete the race. These amateur ironmen need to use their time after work and during vacation, and even sacrifice family time, to train in swimming, cycling, and running, and to practice the transitions between events (Cohen, 2023). In addition to self-discipline and self-demand, determination and perseverance are indispensable (Andreasson & Johansson, 2019; Atkinson, 2008). McCarville (2007) believed that participants require technical training and high levels of involvement and commitment due to the long-distance (226 km) challenge; thus, the degree of recreation specialisation is high. Accordingly, those Ironman triathletes who invest deeply in preparatory practices—through persistent training, the acquisition of specialised knowledge and skills, and the refinement of performance-related equipment (Wicker et al., 2013)—demonstrate clear progression along the recreational specialisation continuum.

We based this study on previous studies for "the progression along the recreational specialization continuum" (Manning, 2011; Needham et al., 2013; Scott & Shafer, 2001) and other relevant literatures (Backlund & Kuentzel, 2013; Kuentzel & Heberlein, 2006; Oh et al., 2010) investigate the recreational specialization progression from the amateur Ironman triathlon finishers' points of view. In general, there is a lack of research on amateur Ironman triathlon finishers and their progression along the recreational specialisation continuum. Also, few studies examine the whole trajectory from novice

to Ironman within the recreational specialisation framework. Further investigation on this topic is needed. Therefore, the purpose of this research is to examine amateur triathletes' experiences (including facilitators, specialisation development, and changes) as they progress along the recreational specialisation continuum from novice to Ironman.

Literature Review

Facilitators of progression

Over time, recreationists can choose to get involved, maintain the status quo, or give up the activity (Backlund & Kuentzel, 2013). Only a small portion choose to progress along the recreational specialisation continuum (Kuentzel & Heberlein, 2006). Yet little is known about why amateur triathletes continue to challenge themselves after suffering from training and racing, or what key factors lead participants to decide to specialise.

Research shows that specialisation in serious leisure is not shaped by isolated factors but by the interaction of personal traits, skills, and social contexts. Personality characteristics such as persistence, self-challenge, and identification with the activity foster a willingness to learn and improve (Codina et al., 2017; Tsaur & Liang, 2008). While in activities such as birding or fishing, progression is often fueled by knowledge accumulation (species identification, gear use) and enjoyment of nature (Scott & Shafer, 2001; McFarlane, 1996), Ironman athletes must integrate perseverance, self-discipline, and time management at a scale rarely demanded in these other settings. Personality traits such as persistence and goal-setting drive participants to embrace discomfort and prolonged exertion, reflecting not only motivation but also lifestyle sacrifice. Unlike hiking or birding, where transferable skills (e.g., general outdoor familiarity) facilitate participation, Ironman specialisation relies on cross-disciplinary skill transfer across swimming, cycling, and running (Smith et al., 2022). However, individual effort alone is insufficient. Social support—from family encouragement to peer networks and professional coaching—reinforces motivation and offers technical knowledge that individuals cannot acquire in isolation (Andreasson et al., 2018; Scott & Lee, 2010). In contrast to more solitary or casual forms of recreation, triathlon's extreme physical and logistical demands create a sharper dependency on social support. Taken together, these factors operate synergistically: personal desire fuels persistence, transferable skills enable progress, and social support sustains long-term commitment.

In summary, amateur Ironman specialisation develops through the combined influence of personal motivation, multifaceted skill acquisition, and sustained social reinforcement, distinguishing it from other recreational pursuits.

Specialisation development

Recreation specialisation can be classified into three main domains (Bricker & Kerstetter, 2000; De Salvo et al., 2020; Lee & Scott, 2004; McIntyre & Pigram, 1992): (A) The cognitive domain: evaluation of the participants' techniques, knowledge, and ability to perform a specific activity. Participants with high specialisation demonstrate better techniques, abilities, and knowledge than those with lower specialisation. (B) The behavioural domain: Participants' behaviour to participate or get involved, which includes participating experience, frequency, amount spent, and equipment investment. (C) The affective domain: Participants' level of involvement and commitment to the activity and the proportion of this activity in their daily lives. Participants with high specialisation are highly involved and committed to the activity and mentally devoted. However, the Ironman context magnifies these domains in ways that differ from those of other well-studied activities.

First, in the cognitive domain of recreation specialisation, amateur Ironman

participants build and apply knowledge to prepare effectively for races. In birding or fishing, cognitive specialisation often involves expanding taxonomic knowledge or environmental awareness (McIntyre & Pigram, 1992). By contrast, Ironman participants must acquire integrated, technical expertise across three sports, nutrition, and race logistics simultaneously (Kennelly et al., 2013; Caru et al., 2022). The necessity of mastering event transitions and race pacing highlights a multidimensional knowledge burden absent in single-discipline activities. Together, these forms of cognitive development illustrate how knowledge acquisition and application are inseparable in the specialisation process.

Next, in the behavioural domain of recreation specialisation, hiking and birding may require long-term engagement, but Ironman preparation involves structured, high-volume regimens that mimic professional training loads (Dupont et al., 2022). Preparing for a 226 km course often involves months of intensive training, with sessions increasing in both frequency and duration as competition nears (Kennelly et al., 2013). Many adopt professional-style regimens, including tailored race plans and coaching, while sacrificing rest, leisure, and family time to sustain progress (Spowart, 2024). Participation in races of varying distances and terrains (Myburgh & Kruger, 2022) further extends learning from experience, reinforcing skill development and resilience. Commitment is reinforced through substantial financial investments in equipment, coaching, and travel (Baird, 2019), a depth of resource allocation not typically paralleled in lower-cost leisure pursuits. Collectively, these behaviours—regular training, competition experience, and significant financial outlay—illustrate how specialisation is embedded not only in athletic practice but also in lifestyle and resource allocation.

Lastly, in the affective domain of recreation specialisation, endurance training and racing foster resilience by normalising discomfort and challenge, which many participants come to value as part of the sport. Completing a race generates self-fulfilment and happiness (Maxcy et al., 2019), while regular exercise provides stress relief and opportunities for enjoyment beyond everyday routines (Lamont et al., 2019). Emotional attachment is common in most serious leisure contexts, yet Ironman athletes often describe triathlon as a "way of life" (Verchère, 2017). The normalisation of pain and fatigue as meaningful reinforces identity transformation to a greater extent than in less physically taxing pursuits such as fishing or hiking. Collectively, these affective outcomes illustrate how emotional engagement, lifestyle integration, and symbolic identification work together to deepen specialisation.

To summarise, cognitive, behavioural, and affective specialisation jointly shape the Ironman experience: cognitive demands involve mastering multidisciplinary knowledge; behavioural engagement reflects sustained, resource-intensive commitment; and affective attachment integrates endurance, meaning, and identity. Together, these domains illustrate how Ironman participation transcends ordinary recreation to become a holistic, lifestyle-defining pursuit.

Changes in recreation specialisation

Specialisation produces physical, social, and psychological benefits across many recreational activities, but Ironman racing uniquely amplifies these outcomes. For instance, while hiking or birding enhances health through moderate activity and nature contact (Oh et al., 2013), Ironman training requires sustained, high-intensity exercise that reshapes body composition, endurance capacity, and energy regulation (Lamont et al., 2019). Socially, both fishing communities and birding groups provide networks of belonging. Yet, Ironman athletes often describe near-exclusive immersion in triathlon culture, with friendships and routines revolving around

shared training and racing (Andreasson et al., 2018). Psychologically, perseverance and resilience are common outcomes across leisure contexts. Still, Ironman's extreme distances frame adversity as a central component of identity construction, producing stronger analogies between sport and life challenges (McCarville, 2007).

At the activity-choice level, while hikers or anglers often seek diverse environments, Ironman athletes show attachment to specific race organisers or routes for both symbolic and practical reasons (Aicher & Newland, 2018). This highlights how specialisation in Ironman is not only deeper but also more tightly bound to structured competitive environments.

Thus, while recreational specialisation theory has been widely applied to settings such as birding, hiking, and fishing, the Ironman triathlon presents a radically different test case. Its blend of extreme physical demand, cross-disciplinary knowledge, resource intensity, and lifestyle integration situates it at the far end of the specialisation continuum. This makes Ironman not just another example of serious leisure, but a distinctive context for refining and extending recreational specialisation theory.

In conclusion, Ironman specialisation exemplifies the most advanced form of serious leisure, integrating physical transformation, social immersion, and psychological growth within a highly structured and identity-defining environment. It expands traditional models of recreational specialisation by demonstrating how extreme endurance contexts intensify both personal and social dimensions of commitment.

Methods

Data collection and participants

The researchers investigate and describe the process of recreational specialisation among amateur triathletes. A qualitative study was adopted to emphasise the participants' subjective experiences and to illustrate the meaning of triathlon to them. Qualitative studies are suitable for understanding participants' personal experiences and thoughts (Silverman, 2010). Also, Neuman (2000) noted that qualitative studies can yield enriched, detailed opinions or experiences. Hence, qualitative studies are appropriate for explaining a specific phenomenon, especially the situation of a selected candidate (Fangen & Nordli, 2005). The participants in this study are involved in a specific recreational activity, and their personal experiences and feelings are elucidated. Therefore, a qualitative study method can reflect our desire to understand the phenomenon of progression from novice to expert and the process of specialisation in recreation among triathletes who have completed an Ironman race (226 km). The phenomenon could offer insights that may be conceptually transferable to other contexts with similar conditions (Lincoln & Guba, 1985).

The researchers aim to understand the data in depth and in great detail, rather than focusing on generalisation and reproducibility, especially in the behavioural domains of the topic (Denzin & Lincoln, 2005; Neuman, 2000; Prior, 2018). Thus, the researchers integrated personal experiences (our researchers also participated in triathlons and completed multiple races) and drew on our understanding of the racing process, which was convenient for fieldwork. The researchers then reviewed the literature and connected it with other participants to start a conversation. Participation in triathlons facilitated recruitment, as the researchers' familiarity with the triathlon community and established networks enabled us to identify and approach suitable participants efficiently. This insider access also helped us build rapport and trust with participants, encouraging more open and detailed sharing of experiences. This study used purposive sampling to select participants. In purposive sampling, researchers select the most suitable participants for the study based on their backgrounds and knowledge.

This method provides abundant information, and the data obtained closely reflect the research focus (Parker et al., 2019; Patton, 2002). This study uses amateur triathletes who have completed an Ironman course as participants and investigates their process of recreation specialisation. We based our sampling method and recommendations on past literature (Simmons et al., 2016). The selection criteria were (a) non-professional athletes, (b) aged over 20 years, and (c) must have completed at least one Ironman race (226 km).

To gain an in-depth understanding of the progression of recreational specialisation, the researchers use qualitative methods that enable more personal interaction and the collection of detailed data from participants. Hence, a two-stage interview (an in-depth interview and a focus group interview) is used to collect the data. The researchers first conducted in-depth interviews to familiarise themselves with the interview process and steps, and to gather preliminary data for the focus group interview. Small focus groups were held to better understand participants' thoughts and achieve concept saturation (Wu et al., 2023), which assisted the researchers in identifying and extracting the main concepts and their connections. Focus group interviews spark new information from group interactions and can prompt more comprehensive and diverse ideas (Barbour, 2007; Prior, 2018).

In-depth interviews

Taking race (gender and age) into account, the researchers began by recruiting acquaintances among amateur athletes, and through snowball sampling, five participants (as indicated in Table 1) were recruited for in-depth interviews. Each interview lasted between 75 and 120 minutes.

Focus group interviews

This study aims to understand recreation specialisation among a specific group (amateur Ironman finishers); thus, we adopted a single-category design, following Patton's (2002) recommendation. Participant recruitment was done through group recommendation or snowball sampling. Participants were referred or recruited through group recommendations from triathlon organisers (associations or companies), triathlon clubs, or social media groups (e.g., the Triathlon Notes Facebook group). Additionally, through the initial round of the in-depth interviews, additional participants were recruited for the next round, and recruitment continued through snowball sampling. Four rounds of focus group interviews were held, with 5 participants per round, for a total of 20 participants (see Table 2). Each round of focus group interviews lasted between 120 and 150 minutes. This study used a two-stage data collection approach. The frequency of new concepts emerging from the focus group meeting decreased by the third round, and repetition became apparent (Krueger, 2014; Lincoln & Guba, 1985). A new concept did not appear by the fourth round of the focus group meetings; hence, we confirmed that data collection was saturated.

Table 1. Profile of in-depth interview respondents

Code of interviewee	Gender	Age	Occupation	Marriage	Seniority	Number of races completed (Unit/times)		
						51.5	*113*	*226*
P-01-A	Male	50	Retiree	Married	5	45	21	15
P-02-B	Male	42	Researcher	Married	7	15	8	9
P-03-C	Female	39	Finance	Unmarried	7	3	2	3
P-04-D	Male	35	Self-employed	Unmarried	9	50	10	6
P-05-E	Female	33	Service Industry	Unmarried	6	1	4	5

Table 2. Profile of focus group interview respondents

Code of interviewee	Gender	Age	Occupation	Marriage	Seniority	Number of races completed (Unit/times)		
						51.5	*113*	*226*
G-01-A	Male	45	Technology	Married	9	7	2	3
G-01-B	Female	39	Teacher	Unmarried	16	20	2	1
G-01-C	Female	49	Insurance	Unmarried	10	6	10	7
G-01-D	Male	43	Chef	Married	5	10	4	1
G-01-E	Male	49	Finance	Married	5	5	4	1
G-02-A	Male	40	Doctor	Married	7	20	15	10
G-02-B	Male	50	Self-employed	Married	12	15	4	3
G-02-C	Male	51	Insurance	Married	12	6	5	7
G-02-D	Female	46	Lawyer	Married	9	10	4	1
G-02-E	Female	40	Self-employed	Unmarried	3	10	3	2
G-03-A	Female	32	Service	Married	7	5	2	1
G-03-B	Female	44	Teacher	Married	4	2	5	2
G-03-C	Male	57	Finance	Married	6	3	2	2
G-03-D	Male	32	Technology	Unmarried	8	2	2	1
G-03-E	Male	44	Technology	Unmarried	7	3	2	5
G-04-A	Female	31	Technology	Married	5	5	3	3
G-04-B	Male	41	Finance	Married	8	20	20	15
G-04-C	Male	40	Teacher	Married	7	49	4	2
G-04-D	Male	39	Civil servant	Unmarried	14	5	1	1
G-04-E	Male	42	Technology	Unmarried	13	5	3	2

Open-ended interview questions

This study used a two-stage interview process (in-depth and focus group interviews), both of which were semi-structured. Fielding and Thomas (2008) suggested that, in semi-structured interviews, the interviewer asks specific or main questions; however, the order of the questions can be at random. The interviewer can adjust the order based on the content and seek to explore further information through the topics covered. Bryman (2004) indicated that this type of interview emphasises the interaction between interviewer and interviewee: discussion is not limited, allowing critical issues relevant to the topic to emerge. Therefore, the design of the interview outline questions is based on the relevant literature on racing experience (Atkinson, 2008； McCarville, 2007) and the complete interview guide in the appendix.

Data analysis

Data collected from the in-depth and focus group interviews were systematically coded and analysed to generate meaningful insights. Informed by the literature review, sensitising concepts were adopted as an initial analytical lens to guide the interpretation of participants' narratives while remaining open to emergent meanings. Meanwhile, axial coding was employed to identify relationships among initial codes, grouping them into broader categories that captured underlying patterns within the data. Building upon these structured categories, thematic analysis was subsequently conducted to integrate the axial coding outcomes into overarching themes that represent the core findings of this study. This integrative analytic process strengthened the validity of the findings by ensuring that the derived themes were grounded in the data and theoretically well-founded.

(1) Sensitizing concept

Charmaz (2014) defined the sensitising concept as the examination, analysis, and consolidation of data from a commonly accepted concept in a specific field (e.g., the leisure behaviour concept in this study, such as the facilitators of the development and changes in recreation specialisation). This idea provides a starting point for the research analysis rather than a conclusion.

(2) Axial coding

To identify the causal relationship, thread of thought, phenomenon, and results, axial coding was used to analyse the data (Silverman, 2010; Strauss, 1987). In this study, we followed our amateur Ironman finishers' specialisation process by coding data from facilitators, specialisation development, and changes over the course of progression.

(3) Thematic analysis

Thematic analysis uses repeated reading and examination of interview content to identify repetition, emphasis, salient statements, implications, and symbolic phrases, and to discover topics or subtopics. Implications and connections among topics were assessed to construct the study's final findings (Bryman, 2004; Ryan & Bernard, 2003).

Trustworthiness

During data interpretation and analysis, the insider perspective of the researchers provided a nuanced understanding of the terminology, emotions, and contextual subtleties embedded in participants' narratives. At the same time, we recognised the inherent bias in this position. Hence, reflexivity was actively incorporated throughout the research process to minimise potential biases. To enhance analytical rigour, the research team (authors of this study and research assistants) conducted regular debriefing sessions to discuss preliminary findings, challenge individual interpretations, integrate multiple perspectives, and refine the coding framework and thematic interpretations. This study establishes trustworthiness through three indices: credibility, transferability, and dependability. Together, these strategies promoted transparency, reduced researcher bias, and

ensured that the findings remained grounded in participants' experiences.

(1) Credibility

Credibility refers to the internal validity of the data obtained. In other words, researchers observe what they expect to observe. First, when drafting the interview summary questions, the research team (the authors of this study and research assistants) discussed the summary multiple times, and a third researcher (an outdoor recreational sport expert) revised it and provided suggestions. Next, during the interview, the interviewees were given sufficient time to share their thoughts. Moreover, triangulation was used post-data analysis. Our research team members conducted the primary analysis. All the authors have experience in triathlon and qualitative research. We should be able to grasp the meaning and connection of the interview context. However, explanations of deeper meanings may deviate from the original due to personal experiences. During analysis, sensitising concepts and thematic analysis were combined to balance insider understanding with theoretical rigour. Data were revisited iteratively to ensure interpretations remained grounded in participants' narratives rather than in researchers' preconceptions. To avoid deviation, the results were also compared with records and data provided by the interviewees (Facebook, triathlon notes and posts, etc.).

(2) Transferability

Transferability refers to the external validity of the data. In other words, the researchers transcribed the interviewee's experience to reduce the researcher's subjective idea. Our research team members completed qualitative research and interview skills training, and our team conducted all interviews. Moreover, the interview was transcribed during the interview. We confirmed the accuracy of our interpretation and clarified any unclear details. Last, during the data analysis, in addition to examining and discussing within our team, an additional qualitative researcher with triathlon experience was invited to explore the results to avoid divergence in the analysis.

(3) Dependability

Dependability refers to the reliability of the data. Researchers need to clearly state the research processes and ensure data reliability. In addition to audio recordings of the interview content, written notes on the interviewee's nonverbal behaviour, emotions, and speaking tone were noted. The interview was transcribed immediately after the interview. The authors listened to the interview again to check the transcription. Subsequently, the transcript was given to the interviewee to confirm the context and to further revise or add missing parts.

Research ethics concern

During the qualitative interviews, the researcher may inadvertently expose the interviewee's personal life. Thus, ethical concerns are considered when using people as research participants. The ethical measures employed include informed consent, confidentiality, and compensation for participation. This study began after participants provided informed consent. In addition, the ethics of this study were reviewed and approved by the National Taiwan Normal University Research Ethics Review Committee (File number: 202005HS036).

Findings

This research aims to investigate the progression of recreational specialisation in amateur Ironmen. After data analysis, the researchers identified three concepts: 'Facilitators,' 'Specialisation development,' and 'Changes after the progression.'

Facilitators and their Subthemes

Based on the interview results, we categorised the facilitators into two subthemes: personal desire and social support.

(1) Personal Desire

Personal reasons or personality traits, such as persistence and perseverance, are important facilitators.

"I think I can do better. That is why I kept challenging myself." (G-02-B-P9)

"I have the mentality of an athlete to never give up. I kept on participating. (G-04-C-P26)

In addition, setting goals to consistently improve and learn is another facilitator.

"I think that entering the sport, people will start setting goals. How do you set different steps to achieve that ultimate goal? (G-03-D-P27)

"As an amateur athlete, I hope to become an expert-level participant. I use this as a starting point. This is my biggest dream." (G-04-A-P16)

Moreover, prior experience can be transferred or expanded, thereby promoting a personal desire to further self-challenge.

"I got into the sport because I like to run and swim. A triathlon team was starting up when I was in school, and I was one of them." (G-04-B-P7)

"I know how to ride a bike and run. At the time, I ran a half-marathon. I started triathlon, so I learn how to swim." (P-02-B-P2)

(2) Social Support

Social support, such as encouragement and support from family and other triathlon hobbyists, is also a crucial facilitator.

"This bike was given to me by my father-in-law, so I cannot give up. I participated year after year, and I became more interested in it." (G-03-A-P3)

"Support from friends is important. They will determine if I can wake up in the morning or not. To be able to do early group training, you need to show up." (P-01-A-P4)

Guidance from people who have been in the field for longer and from professional coaches is also a facilitator that allows amateur Ironmen to progress along the recreational specialisation continuum.

"In the beginning, I'd find friends or teammates who were good at cycling and ask for their guidance. I found people who were better at running, too." (G-04-C-P32)

"Coaches allow you to save time. They'll guide you with advice in a timely manner. (G-03-E-P9)

Participants' tendency for serious leisure and their willingness to continually learn directly affect the recreational specialisation continuum and promote their personal desire to specialise (Smith et al., 2022). At the same time, the responses show that social support enhances the progression of recreation specialisation, such as friendships with people with similar interests.

Specialisation development and its subthemes

During the progression of specialisation, from 51.5 km to 113 km and 226 km, a person's cognition, behaviour, and affection might develop.

(1) Cognition

When acquiring triathlon knowledge, tangible experience is needed to verify, digest, adjust, and consolidate it into information best suited to you.

"I acquired cognitive information from online sources and books, and then I internalised it. I then adjusted myself and put down things that I am overly fixated on." (G-02-A-P20)

By improving skills and learning techniques for equipment maintenance, and with a detailed plan, long-term preparation, and a training regime, the techniques needed to complete the race are strengthened.

"To prepare for a 226 (km race), generally people start five to six months ahead of time. To respect the race and to challenge myself, I practice about 17 or 18 hours per week." (G-02-B-P16)

"Techniques will, of course, improve. For instance, from 51.5, 113, to 226 (km), techniques like cycling and running pace, ways to save energy, and taking a breath when swimming will develop." (G-01-D-P21)

Participating in race simulation trainings and pre-race meetings improved participants' understanding of the racecourse.

"I will see what kind of race or route it is, and train accordingly." (G-02-C-P18)

"Everyone must go to a pre-race meeting. I learned from others' experiences." (P-01-A-P8)

(2) Behaviour

Participation behaviours are reinforced despite long-term, frequent races.

"One of the craziest things I did was when I raced two 113 and a 226 in a month! That month, I was so busy." (G-01-A-P6)

Post-race self-examination and accumulation of experiences also help to improve participants' performance.

"I will self-examine post-race to see where I can improve. I want to analyse my weaknesses compared to opponents and know where to improve." (G-02-B-P17)

There is a constant investment in racing costs for equipment upgrades, training courses, transportation, and accommodation.

"I have two bikes. Plus, I have taken ultramarathon, kinesiology taping, and physical fitness courses, and I have medical bills for injuries. As I mentioned from the Ironman course, I had the opportunity to spend money extensively (chuckle)." (G-03-C-P18)

"The registration fee is a big expenditure, plus there is also transportation and accommodation. If I had to do multiple races, I would set the two-day race as a goal. For example, a 226 first followed by a 51.5 or a 226 on the first day and a 113 on the next. Using this strategy, I can save money." (G-04-B-P12)

(3) Affection

Long-term involvement and participation enabled participants to enjoy the happiness racing brought.

"I get goose bumps when racing. Wow, racing! How satisfying! I am finally seeing the results of my hard work. Enjoy it. I really love the feeling of racing." (G-02-C-P18)

It is vital to blend triathlons into your daily life.

"Triathlon takes up about one-third of my daily life. It takes up the proportion besides working, sleeping, and resting." (G-02-A-P21)

"I sacrifice many other sports for triathlons. Now, triathlon has taken up most of my time. It's like true love. It is part of life." (G-03-B-P26)

Triathlons become a source of satisfaction and self-fulfilment, heightening participants' emotions.

"I want to see my improvement from races. It is a kind of self-affirmation. Triathlon, to me, is a big source of satisfaction." (G-02-C-P19)

"I hope triathlon can bring motivation to continuously challenge myself. It can empower me to do things that I don't think are possible." (G-04-B-P13)

According to several studies (Bricker & Kerstetter, 2000; De Salvo et al., 2020; Lee & Scott, 2004; McIntyre & Pigram, 1992), the progression into recreation specialisation involved changes in cognition, behaviour, and affect. The respondents directly indicated how they changed and developed across the three recreational specialisation domains (cognitive, behavioural, and affective) as an amateur Ironman progresses along the recreational specialisation continuum and challenges him- or herself to complete a 226 km Ironman race.

Changes After the Progression and its Subthemes

(1) Personal inspirations

The Ironman journey might bring personal inspiration, including improved health from regular exercise, a sense of self-identity, and moral enlightenment.

"Physiologically and psychologically, it helps to a certain extent. It helps to increase confidence. To prepare for a race, I will force myself to have a healthy routine and diet." (G-04-D-P6)

"I don't just see it as a fun exercise. I also need to find an outlet and a comfortable

method to keep myself happy and have a motivation to live, despite having many worries." (G-04-A-P23)

Many make friends with others who share their interests, which reinforces their self-affirming mindset.

"In the past, when I went abroad, I would line up for luxury handbags like others. Now, all I look for is cycling shoes with cleats, sneakers, and workout clothing (chuckle). I have a completely different spending style. I don't buy clothes that much now because I have too many t-shirts from races." (G-01-C-P5)

"All you have is ironmen because other people would not understand you. Other friends will think that you are a psychopath. For example, my old friends were girls who would go out for afternoon tea. Now, I think this is a waste of time." (G-03-B-P20)

Additionally, participants turn the experience of finishing an Ironman race into a source of edification for life and work.

"We can't avoid frustration in life and in work. Just think that you have already achieved something so difficult. We just have to have patience and do things step by step. All problems can be solved." (G-01-A-P15)

"226 is like a miniature life. At the start or in the middle of the race, you might encounter a flat tyre, lose your goggles, and other odd things that cannot be predicted. This is just like what life gives you. No one is going to whip you on the back or force you to do it. When you register for the race, that is the challenge you give yourself." (P-05-E-P 13)

(2) Participating preference

Furthermore, from extensive participation experience, participants develop preferences for a particular location, route, or race organiser.

"I like the feeling 'Challenge Taiwan (CT)' creates. It is so lively. Companies and hosts who create a joyful atmosphere can certainly attract more people to participate, especially family participation." (G-04-E-P35)

"IRONMAN to me… I think I like its spirit. Additionally, IRONMAN would close roads to traffic, which makes it special. They use a ROLLING START, so you can easily stretch your ankles." (P-03-C-P12)

(3) Role changes

Participants share their experiences because they completed their goal to finish an Ironman race.

"I think I can share my personal experience with others. It feels like I can actually help people. Yes, now I think my role is different. It's like being a teacher." (P-05-E-P10)

Participants might develop a desire to tackle other challenges.

"Now, for example, if my friends want to hike, we will attempt summit on the same day. You have the physical capability to do other sports." (G-01-C-P6)

Participants also reach a point at which they experience a role change, relax, and stop pursuing.

"Very few would go back and register for a 51.5 if he/she has finished a 226. Sometimes, when you train on your own, you may do a 51.5 on a weekend. When you get to 226, there's not much more to do. You would stop for a little while and stop participating." (G-03-C-P18)

The responses demonstrate that the specialisation process of triathlons has a positive effect on participants' physical health and develops friendships and a sense of identity and belonging, which are consistent with the previous research, such as the personal and social influences in the process of recreational specialisation in amateur triathletes (Andreasson et al., 2018; Lamont et al., 2019).

Table 3. The concepts of progress of recreation specialization for amateur ironman

Concepts	Themes	Sub-themes
Facilitators	Personal Desire	1. Traits of serious leisure
		2. Willingness to continue learning
		3. Ability to transfer learning
	Social Support	1. Encouragement and support from families and friends
		2. Professional lead and accompany
Specialization development	Cognitive Domain	1. Unify the knowledge
		2. Strengthen finishing techniques
		3. Understanding of the racecourse
	Behavioral Domain	1. Long-term intensive participation
		2. Accumulation of experiences
		3. Investment in racing costs
	Affective Domain	1. Enjoy the happiness
		2. In the daily life
Changes after the progression	Personal Inspiration	1. Maintain good health
		2. Self-identity
		3. Life work inspiration
	Participating Preference	1. Location-specific routes
		2. Favorite race selection
	Role Change	1. Inheritance of veteran experience
		2. Rest and stop pursuing
		3. Move to other sports

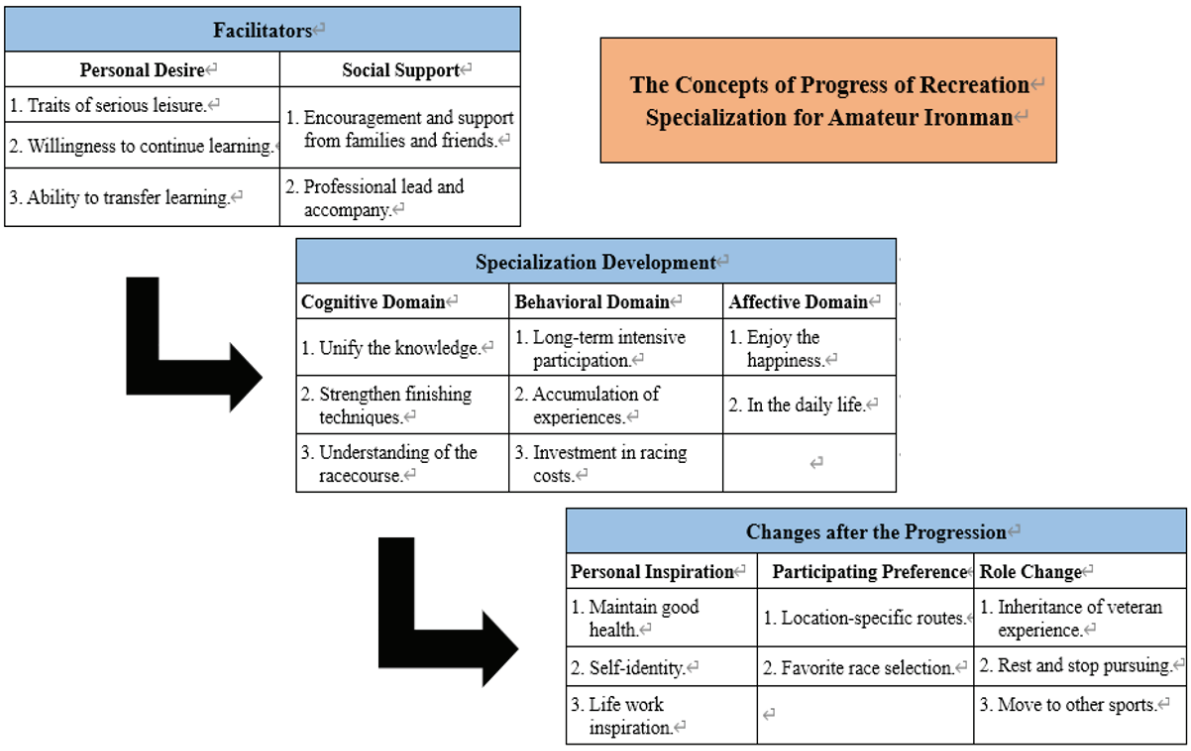

Figure 1. The concepts of progress of recreation specialization for amateur ironman

Discussion

This study examined how amateur Ironman triathletes progress along the recreational specialisation continuum. The results reveal a coherent trajectory shaped by three interconnected concepts: 'Facilitators', 'Specialisation development', and 'Changes after progression', as well as eight themes (see Table 3) (see Figure 1). These findings confirm and extend existing frameworks of recreational specialisation (e.g., McIntyre & Pigram, 1992; Bricker & Kerstetter, 2000; Lee & Scott, 2004), while highlighting how the Ironman context intensifies the integration of motivation, behaviour, and identity.

Firstly, facilitators of progression emerged as personal desire and social support. Traits such as perseverance, persistence, and goal-setting reflect the characteristics of serious leisure (Stebbins, 1992) and align with previous studies highlighting continuous learning and challenge-seeking (Codina et al., 2017; Tsaur & Liang, 2008). Transferable experiences from running, cycling, or swimming further accelerated engagement (Smith et al., 2022). Yet internal motivation alone was not enough to sustain involvement. Family encouragement, peer accountability, and professional coaching provided essential support, consistent with findings by Andreasson et al. (2018) and Scott and Lee (2010). Progression, therefore, reflects a dynamic interaction among personal traits, prior skills, and social support (Backlund & Kuentzel, 2013; Kuentzel & Heberlein, 2006).

Secondly, specialisation developed across cognitive, behavioural, and affective domains. Cognitively, triathletes consolidated knowledge about training, nutrition, and race strategy through experiential learning (Kennelly et al., 2013; Caru et al., 2022). Behaviourally, long-term training routines, repeated race participation, and substantial financial investment demonstrated growing commitment (Dupont et al., 2022; Baird, 2019). Participants reported strong emotional attachment, stress relief, and symbolic identification with triathlon culture (Lamont et al., 2019; Maxcy et al., 2019; Verchère, 2017). These findings reaffirm the three-domain model of specialisation and show how the extreme demands of triathlon embed specialisation not only in athletic practice but also in lifestyle and identity.

Finally, changes after progression extended into broader life contexts, reshaping values, choices, and roles. Consistent with previous research, participants reported gains in physical health, confidence, and resilience (Lamont et al., 2019; McCarville, 2007), as well as the development of stronger social networks and a deeper sense of belonging (Andreasson et al., 2018). Many developed attachments to specific routes or race organisers for both practical and symbolic reasons (Oh et al., 2013; Aicher & Newland, 2018). Role transitions also emerged, reflecting diverse post-achievement paths: some participants became mentors, others pursued new challenges, and some withdrew from active participation after reaching peak goals. These patterns highlight the cyclical nature of specialisation as triathletes redefine their identities after achieving major milestones—such as completing a 226 km race.

In summary, amateur Ironman specialisation reflects a multidimensional progression driven by personal motivation and social reinforcement, structured through cognitive, behavioural, and affective integration, and culminating in identity transformation. The process demonstrates how extreme endurance contexts extend recreational specialisation theory by linking sport participation with broader life adaptation, resilience, and self-redefinition.

Theoretical contributions

The findings of this research contribute to theoretical advancement by refining, challenging, and extending both

recreational specialisation theory (RST) and the serious leisure perspective (SLP). First, they refine RST by showing that specialisation is not always a linear progression from general to highly committed participation; instead, triathletes may display cyclical or situational shifts in specialisation depending on factors such as training demands, injury, or life stage. Second, the findings challenge the assumption in both RST and SLP that skill acquisition and commitment inevitably lead to deeper engagement. Instead, evidence suggests that participants sometimes adopt flexible or hybrid patterns of involvement—balancing serious commitment with casual engagement—which complicates the traditional binary between "serious" and "casual" leisure. Finally, the study extends both frameworks by emphasising the role of social worlds, identity negotiation, and lifestyle integration as mediating forces that shape long-term participation. This broader lens suggests that recreational specialisation and serious leisure should be theorised less as static trajectories and more as dynamic, socially embedded processes.

Recommendations

Future research directions

This study serves as the basis for future large-scale model construction. As the number of Ironman participants increases over time, we recommend that future studies develop survey items, construct scales, and conduct validity tests based on our main and sub-concepts to further build on and validate the findings of this qualitative study and the connections between the concepts.

We discovered during the interviews that recreational specialisation does not always proceed smoothly. During specialisation, personal limitations (e.g., technical difficulties and sports injuries) or external limitations (e.g., financial difficulties, family life cycle, and unexpected events or changes) can create obstacles. Overcoming these obstacles will allow participants to continue progressing. Strategies to adjust one's mentality to overcome obstacles and find a balance in life are future topics worth investigating. Finally, "the water that bears the boat is the same that swallows it." While the progression of amateur triathletes along the recreational specialisation continuum brings physical and mental benefits and life edification, it can also have negative impacts on individuals, their work, and their families. Addiction and over-involvement can lead to an imbalance and are thus issues worthy of further investigation.

Practical implications

At the individual level, coaches can support Ironman participants by using structured goal-setting to sustain motivation and reorient them after milestones such as completing a 226 km race. Training should emphasise experiential learning—through simulations, route familiarisation, and equipment handling—while also addressing psychological resilience, lifestyle balance, and injury prevention. In addition, peer mentorship programmes that connect experienced finishers with novices can strengthen knowledge sharing and community bonds.

At the organisational level, sport clubs play a crucial role in sustaining engagement by fostering community through group training, accountability networks, and family involvement. Flexible pathways, ranging from casual participation to high-performance squads, allow Ironman participants to remain engaged across stages of specialisation. Clubs can also ease financial burdens through partnerships with equipment providers and health professionals, while recognition events and storytelling reinforce identity and a sense of belonging.

At the policy level, recreational sport policy should promote lifelong engagement by supporting participation at all ages with subsidies and wellness-oriented programs. Policies can incentivise organisers to create

inclusive, family-friendly events and integrate Ironman participation into broader public health initiatives that highlight both physical and psychological benefits. Finally, investment in mentorship support and safe infrastructure, such as bike lanes and open-water swim zones, will enhance accessibility and ensure the long-term sustainability of the sport.

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Appendix

Interview Guide

Interview Date: _____

1. Facilitating Factors

- Looking back on your participation in triathlon, what initially motivated you to join?
- What led you to set the completion of the Ironman 226 race as your ultimate goal and continue your involvement?
- What supportive factors (people, events, or resources) contributed to this process?

2. Recreation Specialisation Development

a. Cognitive Dimension
   - During your journey in triathlon participation, how has your knowledge of the sport, technical skills, and understanding of competitions evolved?

b. Behavioural Dimension
   - In preparing for the Ironman 226 race, how much training time did you spend?
   - How many competitions did you participate in annually (including different distances)?
   - What were your expenditures on race registrations, equipment, and gear upgrades?

c. Affective Dimension
   - What were your feelings during training and participation in Ironman competitions?
   - What emotions did you experience after completing these challenges?
   - What proportion of your life does triathlon occupy, and what role does it play?
   - What meaning does triathlon hold for you personally?

3. Changes of recreation specialisation

- After completing the Ironman 226 race, what influences or inspirations have you experienced personally?
- Has your participation in triathlon affected your preferences in training venues, race routes, or frequency of competition?

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INTERNATIONAL SPORTS STUDIES

ORIGINAL RESEARCH ARTICLE

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

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Abstract

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

Introduction

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Methodology

Study Design

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

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

Participants & Sampling

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

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

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

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

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

Table 1. Demographic information of teacher participants

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

Procedure

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

Data Collection

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

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

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

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

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

Box 1. Broad headings of the interview schedule

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

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

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

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

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

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

Table 2. Translation and back-translation verification

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

Data Analysis

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

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

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

Reflexivity

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

Trustworthiness

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

Table 3. Examples of initial code generation with researcher comments

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

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

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

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

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

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

Results

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

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

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

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

SDG 3: Good health and well-being

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

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

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

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

SDG 4: Quality Education

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

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

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

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

SDG 10: Reduced inequalities

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

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

SDG 5: Gender equality

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

Discussion

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

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

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

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

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

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

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

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

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

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

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

Conclusion

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

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

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

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

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Supplementary Material 1

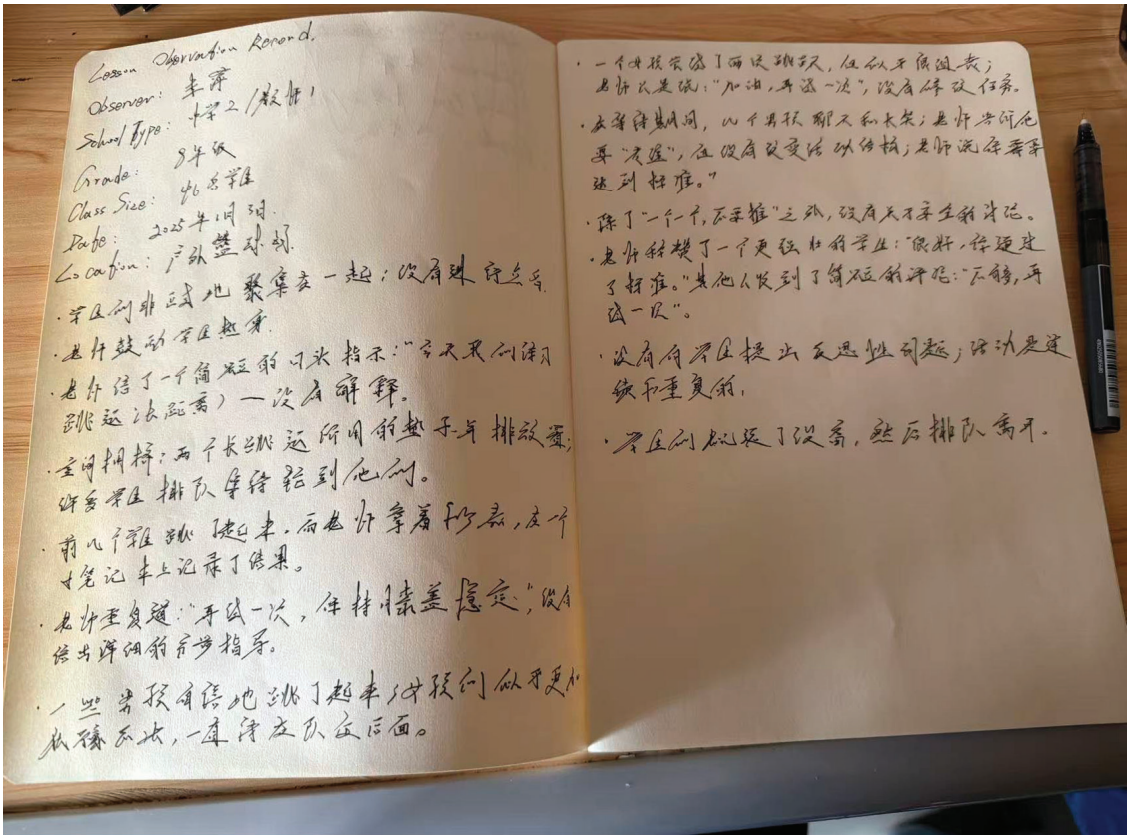

Figure 1. Observation notes

Supplementary Material 2

Table 6. Code framework

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

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

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

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

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ORIGINAL RESEARCH ARTICLE

Family–School Collaboration for Preschoolers' Physical Activity During Movement Restrictions: Barriers, Strategies, and Implications

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Abstract

The COVID-19 pandemic disrupted traditional educational and physical activity routines, particularly for preschool children who require consistent movement for optimal development. This study examined the role of family–school collaboration in supporting preschoolers' physical activity (PA) during periods of movement restrictions. A total of 489 participants (46 teachers and 443 parents) completed the Preschoolers' Home Collaboration Questionnaire (PHCQ-T and PHCQ-P). Findings revealed that 35% of parents engaged in family exercise every 2–3 days, typically for 21–30 minutes. In contrast, teachers reported engaging in 31–60 minutes of daily physical activity. Both home and preschool environments faced barriers to PA, including poor weather, time constraints, lack of space or equipment, and limited confidence or knowledge in organising physical activities. Gender differences in activity preferences were notable: boys preferred basketball ($p < 0.001$), football ($p = 0.004$), and balance biking ($p = 0.034$), while girls showed a preference for gymnastics ($p = 0.029$), yoga ($p = 0.036$), roller skating ($p = 0.021$), and skateboarding ($p = 0.022$). Despite challenges, over 80% of both teachers and parents agreed that shared responsibility and collaboration were essential for promoting PA. Communication preferences varied: parents favoured livestreaming and chat groups, while teachers preferred news platforms and chat groups. However, preschoolers overall failed to meet the National Association for Sport and Physical Education's recommendation of 120 minutes of daily PA. This study highlights the urgent need for sustained family–school partnerships to promote preschoolers' physical activity, particularly during disruptions. A proposed multi-platform hybrid model—featuring weekly livestreams, interactive chats, and accessible digital resources could support PA continuity. Furthermore, targeted training for parents and teachers is necessary to enhance their capacity to engage children effectively in physical activities.

Introduction

During the COVID-19 pandemic, online teaching, based on collaboration between families and schools, has provided robust support for global education, owing to its multiple advantages, including remote learning, comfort, and accessibility (Mukhtar et al., 2020). However, as the pandemic gradually comes to an end, children are gradually returning to regular face-to-face schooling. Nevertheless, it remains vital to stay vigilant against the potential resurgence of the pandemic (Malaysia (MOH), 2023) and the emergence of Anthrax (WHO, 2025). Such public health threats may recur unpredictably and result in prolonged disruption. The unscheduled closure of schools has disrupted classes. Therefore, establishing a flexible hybrid teaching mode that integrates school- and family-based learning, and adjusting the proportions based on different educational needs and pandemic conditions, becomes increasingly important. Such measures can provide greater adaptability for the education system, ensuring the continuity and stability of education, and effectively addressing potential periods of pandemic restrictions.

The importance of physical activity (PA) in preschoolers' development (Gabbard, 2021) has led the National Association for Sport and Physical Education (NASPE) to recommend that preschoolers (aged 3–5 years) engage in a minimum of 120 minutes of daily exercise; 60 minutes of scheduled exercise, and 60 minutes of unstructured exercise (Beets et al., 2011). However, under restrictive circumstances, stakeholders have not followed recommendations for children's physical activity (Graber et al., 2021). The disruption of classes in schools has led to irregular preschoolers' physical activity, which has subsequently affected preschoolers' motor, musculoskeletal, and psychological development (Cordovil et al., 2021; Kim et al., 2021), as well as the risk of being overweight or obese (Ferentinou et al., 2023; Tsangaridou, 2017). Physical inactivity due to class disruptions has increased the average body mass index (BMI), with boys more affected than girls (An, 2020). These findings underscore the critical need for consistent, structured physical activity programmes for preschoolers to mitigate adverse effects during movement restrictions.

Family–school collaboration has exerted a positive influence on children's physical activity behaviours (Van Lippevelde et al., 2012), influencing both motor skills and physical competences (Chapelski et al., 2023). Previous studies have addressed family-school collaboration during crises primarily through technology-mediated and family-supported solutions. Mukhtar et al. (2020) demonstrated that online platforms supported continuity of academic instruction during lockdowns, while Clarke et al. (2021) emphasised parental involvement as a critical success factor. In a systematic review, Santos et al. (2023) found that short-term family–school collaboration interventions were more effective than long-term interventions at enhancing physical activity, physical fitness, health behaviours, and lifestyle-related skills, highlighting the necessity of long-term strategies. However, gaps persist in the context of preschoolers' physical activity (PA): First, existing collaborations focus on general education but fail to address PA's unique requirements; Second, researchers have noted reduced PA during restrictions, and no prior study systematically examined how barriers such as weather, parental time constraints, and facility shortages interact.

The importance of collaboration between families and schools was further underscored during the COVID-19 pandemic, as traditional opportunities for physical activity became severely restricted. Through cooperative efforts, parents and educators can address and mitigate common barriers to physical

Table 1. Demographic Data of Teachers and Preschoolers

Teacher		Frequency	Percentage
	Male	0	0%
	Female	46	100%
Teaching Experience	< 1 year	12	26.09%
	1-5 years	26	56.52%
	6-10 years	4	8.7%
	11-15 years	3	6.52%
	> 15 years	1	2.17%
Preschoolers		**Frequency**	**Percentage**
	Male	243	54.85%
	Female	200	45.15%
Age	3-4 Years Old	165	37.25%
	4-5 Years Old	135	30.47%
	5–6 Years Old	143	32.28%

activity, including unfavourable weather conditions, limited access to facilities, concerns regarding injury, and time constraints. Implementing a family–school collaborative program tailored to periods of movement restriction is essential to ensure that preschool children engage in sufficient physical activity to support their healthy development (Elinder et al., 2021). Given that preschoolers are generally unable to participate effectively in online learning and should minimise screen exposure, understanding both the necessity and feasibility of family–school collaboration becomes crucial. Effective implementation depends not only on proactive leadership and institutional support from schools but also on the active engagement and cooperation of families.

Methods and Materials

Participants

This study recruited 500 participants, comprising 46 preschool teachers and 454 parents, from three preschools in Quanzhou, an urban city in southeastern China. The overall response rate was 97.8%, with valid responses obtained from all 46 teachers and 443 parents. The participants included preschool teachers responsible for organising daily physical activities for children, as well as parents of the enrolled preschoolers. In accordance with ethical standards for research involving human subjects, all participants provided informed consent electronically prior to data collection. The demographic data of the participants were collected as shown in Table 1.

Instrumentation

For this study, the Preschool and Family Co-Teaching Questionnaire (PHCQ) was adapted from an existing instrument designed to assess barriers to physical activity, incorporating perspectives from parents, school administrators, preschool teachers, and sport educators (Bulca et al., 2019). The PHCQ comprises two components: the Parent Questionnaire (PHCQ-P) and the Teacher Questionnaire (PHCQ-T).

The PHCQ-T consists of 18 items: two on demographic information, two on physical activity status, 12 on perceived barriers to preschool physical activity, and two on responsibility and attitudes toward co-teaching. The internal consistency of the PHCQ-T, as measured by Cronbach's alpha, was 0.83, indicating good reliability.

Similarly, the PHCQ-P includes 18 items: two on demographic information, three on physical activity status, 11 on barriers to physical activity within the family context, and two on responsibility and attitudes. The PHCQ-P demonstrated acceptable internal consistency, with a Cronbach's alpha of 0.65.

Data Collection and Analysis

Two types of data were collected in this study: demographic information and responses from the Preschool and Family Co-Teaching Questionnaire (PHCQ). Descriptive statistics were used to describe the status of and barriers to preschool children's physical activity during the non-restricted period, as well as to explore parents' and teachers' expectations, perceived responsibilities, and attitudes toward children's participation in physical activity during restricted conditions.

Additionally, an independent sample t-test was conducted to compare differences in children's physical activity levels by gender during the non-restricted period. Statistical significance was determined at the $p < 0.05$ level.

Results

Physical Activity Status

According to the family questionnaire (PHCQ-P), the most reported physical activities among children during the non-restricted period were hiking (46.95%), jumping (46.50%), and running (43.34%) (see Table 2). An independent sample t-test was conducted to examine sex differences in children's preferred physical activities. Significant gender-based differences were found in the top sport preferences. Boys ($n = 243$) were more likely to prefer basketball ($p < 0.001$), football ($p = 0.004$), and balance biking ($p = 0.034$). In contrast, girls ($n = 200$) showed a stronger preference for gymnastics ($p = 0.029$), yoga ($p = 0.036$), roller skating ($p = 0.021$), and skateboarding ($p = 0.022$).

The most common frequency with which parents accompanied their children for physical activity was every 2–3 days, reported by 35.44% of respondents. In contrast, a small percentage (2.26%) reported never engaging in physical activity with their children. Most parents (78.10%) reported spending 10–30 minutes per session exercising with their children, while only a small proportion (3.16%) reported sessions lasting more than 60 minutes (see Table 3). In the preschool setting, physical activity was typically conducted through a combination of teacher-led play and free play, as reported by 56.52% of teachers. Fewer than half of the children (45.65%) engaged in physical activity for 30–60 minutes daily, and only a minority (13.04%) participated for more than 90 minutes each day (see Table 3).

Table 2. Physical Activities Selected by Children Based on Personal Preference

Activity	Total		Comparison between gender			
	Frequency (n=443)	Percentage	Gender	Frequency	Percentage	Sig.
Hiking	208	46.95	Boy (n=243)	108	51.92%	0.245
			Girl (n=200)	100	48.08%	
Running	192	43.34	Boy (n=243)	114	59.38%	0.094
			Girl (n=200)	78	40.62%	
Climbing	50	11.29	Boy (n=243)	25	50.00%	0.465
			Girl (n=200)	25	50.00%	
Skipping	206	46.50	Boy (n=243)	118	57.28%	0.339
			Girl (n=200)	88	42.72%	
Basketball	147	33.18	Boy (n=243)	101	68.71%	0.000**
			Girl (n=200)	46	31.29%	
Football	68	15.35	Boy (n=243)	48	70.59%	0.004**
			Girl (n=200)	20	29.41%	
Throwing	44	9.93	Boy (n=243)	27	61.36%	0.362
			Girl (n=200)	17	38.64%	
Baseball	1	0.23	Boy (n=243)	1	100.00%	0.365
			Girl (n=200)	0	0.00%	
Tennis	4	0.9	Boy (n=243)	3	75.00%	0.417
			Girl (n=200)	1	25.00%	
Hip-Hop Dance	5	1.13	Boy (n=243)	3	60.00%	0.817
			Girl (n=200)	2	40.00%	
Latin Dance	3	0.68	Boy (n=243)	0	0.00%	0.083
			Girl (n=200)	3	100.00%	
Swimming	9	2.03	Boy (n=243)	4	44.44%	0.527
			Girl (n=200)	5	55.56%	
Kung Fu	3	0.68	Boy (n=243)	1	33.33%	0.453
			Girl (n=200)	2	66.67%	
Taekwondo	2	0.45	Boy (n=243)	0	0.00%	0.158
			Girl (n=200)	2	100.00%	
Gymnastics	20	4.51	Boy (n=243)	6	30.00%	0.029*
			Girl (n=200)	14	70.00%	
Yoga	10	2.26	Boy (n=243)	2	20.00%	0.036*
			Girl (n=200)	8	80.00%	
Balance Bike	100	22.57	Boy (n=243)	64	64.00%	0.034*
			Girl (n=200)	36	36.00%	
Skateboard	5–6	5–6	Boy (n=243)	41	44.09%	0.022*
			Girl (n=200)	52	55.91%	
Roller Skating	63	14.22	Boy (n=243)	26	41.27%	0.021*
			Girl (n=200)	37	58.73%	

* p<0.05, ** p<0.01

Table 3. Children's Exercise Frequency, Duration, and Activity Types at Home and in Preschool

Exercise			Frequency	Percentage
Home	Frequency of exercise	Never	10	2.26%
		Every 5-6 days	103	23.25%
		Every 2-3 days	157	35.44%
		Every day	109	24.60%
		Multiple times a day	64	14.45%
	Duration of exercise	< 10 minutes	26	5.87%
		11-20 minutes	162	36.57%
		21–30 minutes	184	41.53%
		31-60 minutes	57	12.87%
		> 60 minutes	14	3.16%
Preschool	Form of Exercise	Fully Teacher-led	2	4.35%
		Teacher-led > Free-play	11	23.91%
		Teacher-led = Free-play	26	56.52%
		Teacher-led < Free-play	7	15.22%
		Fully Free-play	0	0%
	Duration of exercise	< 10 minutes	2	4.35%
		11-30 minutes	17	36.96%
		31-60 minutes	21	45.65%
		61-90 minutes	0	0%
		> 90 minutes	6	13.04%

Physical Activity Barriers

As shown in Table 4, teachers identified several key barriers to preschool physical activity during the non-restricted period. The most reported barriers included bad weather (58.70%), insufficient available facilities and venues (45.65%), concerns about injury during physical activity (45.65%), lack of activity equipment and materials (43.48%), limited time (43.48%), and the inability to effectively plan physical activities (43.48%). Similarly, parents reported their own set of perceived barriers to facilitating physical activity at home. These included insufficient facilities and venues (46.28%), lack of equipment or materials (17.61%), difficulty in planning physical activities (16.06%), concerns about their child getting injured (5.42%), and frequent illness among children (1.58%).

Responsibility and Attitude

Most of both teachers (80.40%) and parents (88.03%) agreed that responsibility for supporting children's physical activity during the restriction period should be shared between preschool and family (Table 5). A smaller proportion of teachers (8.7%) believed that preschools should bear greater responsibility, while a minority of parents (4.74%) felt that families should take on more of the burden.

Regarding interactive physical activity methods during restriction periods, both teachers (32.26%) and parents (37.25%) preferred communication via chat groups such as WeChat or WhatsApp. Teachers showed a stronger preference for online news platforms (e.g., websites or official accounts), with 41.94% favouring this method compared to 23.48% of parents. Conversely, livestreaming platforms (e.g.,

Table 4. Physical Activity Barriers Encountered at Preschool and Home

			Teacher (n=46)		Parent (n=443)	
No	**Physical Activity Barriers**	Response	Frequency	Percentage	Frequency	Percentage
1	Bad weather	YES	27	58.70%	NA	NA
		NO	19	41.30%	NA	NA
2	Insufficient available facilities and venues	YES	21	45.65%	205	46.28%
		NO	25	54.35%	238	53.72%
3	Worry about getting injured	YES	21	45.65%	24	5.42%
		NO	25	54.35%	419	94.58%
4	Lack of activity equipment	YES	20	43.48%	78	17.61%
		NO	26	56.52%	365	82.39%
5	Inadequate time	YES	20	43.48%	263	59.37%
		NO	26	56.52%	180	40.63%
6	Inability to plan physical activities	YES	20	43.48%	71	16.03%
		NO	26	56.52%	372	83.97%
7	Getting sick	YES	13	28.26%	7	1.58%
		NO	33	71.74%	436	98.42%
8	Poor motor skills	YES	12	26.09%	130	29.35%
		NO	34	73.91%	313	70.65%
9	Unfamiliar in organizing physical activity	YES	11	23.91%	NA	NA
		NO	35	76.09%	NA	NA
10	Not wanting to participate	YES	8	17.39%	29	6.55%
		NO	38	82.61%	414	93.45%
11	Lack of physical strength and energy	YES	8	17.39%	13	2.39%
		NO	38	82.61%	430	97.27%
12	Lack of a physical activity atmosphere	YES	7	15.22%	76	17.16%
		NO	39	84.78%	367	82.84%
13	Economic pressures	YES	NA	NA	15	3.39%
		NO	NA	NA	428	96.61%

TikTok or Zoom) were preferred by 36.34% of parents, compared to 25.81% of teachers.

In summary, under normal conditions, children engaged in physical activity both at preschool and with their families, reflecting the shared responsibility between teachers and parents. During periods of restriction, it is essential to offer diverse modes of physical activity delivery while considering the practical realities faced by both parents and educators to enable effective and sustainable online collaboration.

Discussion

The National Association for Sport and Physical Education (NASPE) recommends that preschoolers (ages 3–5) engage in at least 120 minutes of physical activity daily. However, this study's findings indicate that preschoolers fall significantly short of this benchmark. Fewer than half of the preschoolers engaged in 30–60 minutes of physical activity per day at school, while parents typically participated in family physical activities with their children 2–3 days per week. This shortfall becomes even more pronounced during periods of global restriction, such as those experienced during the COVID-19 pandemic, when

Table 5. Perceived Responsibilities and Preferred Interaction Methods of Teachers and Parents

	Responsibility and Interaction form		**Frequency**	**Percentage**
Teacher (n=46)	Who should hold greater responsibility for promoting children's physical activity: preschools or parents?	Preschool only	1	2.17%
		Preschools should take more responsibility than the parents	4	8.70%
		Responsibility should be equally shared between preschool and parents	37	80.43%
		Home should take more responsibility than preschool	4	8.70%
		Parents only	0	0.00%
	Which online platform or interaction format is most appropriate for promoting physical activity among children?	Online news platforms (e.g., official websites, educational blogs, WeChat public accounts)	17	36.96%
		Chat groups (e.g., WeChat, WhatsApp)	16	34.78%
		Live streaming platforms (e.g., TikTok, Zoom, YouTube Live)	13	28.26%
Parent (n=443)	Who should hold greater responsibility for promoting children's physical activity: preschools or parents?	Preschool only	3	0.68%
		Preschools should take more responsibility than the parents	29	6.55%
		Responsibility should be equally shared between preschool and parents	390	88.04%
		Home should take more responsibility than preschool	21	4.74%
		Parents only	0	0.00%
	Which online platform or interaction format is most appropriate for promoting physical activity among children?	Online news platforms (e.g., official websites, educational blogs, WeChat public accounts)	109	24.60%
		Chat groups (e.g., WeChat, WhatsApp)	169	38.15%
		Live streaming platforms (e.g., TikTok, Zoom, YouTube Live)	165	37.25%

opportunities for physical activity are further reduced.

Previous studies have primarily explored family–school collaboration through technology-mediated (Mukhtar et al., 2020) and family-supported (Clarke et al., 2021) approaches. However, these studies have mainly focused on general education and have failed to address the unique requirements of physical activity. This gap means that issues such as declines in sleep quality during restrictions (Aguilar-Farias et al., 2021), increased difficulties in emotion regulation (Alonso-Martínez et al., 2021), and obstacles in the development of fundamental movement skills (Abe et al., 2022) are not fundamentally resolved. These findings highlight an urgent need for targeted interventions and collaborative strategies, particularly between families and schools, to promote adequate physical activity among preschoolers, especially during periods of restricted movement and access to structured play environments.

This study found that teachers' and parents' sense of responsibility significantly influences the frequency and duration of preschool children's participation in physical activities. Teachers who demonstrate a stronger sense of responsibility are more likely to implement teacher-led physical activity sessions. In contrast, parents with higher perceived responsibility tend to engage in family-based physical activities more frequently and for longer durations. These findings suggest that when teachers and parents actively embrace their roles in promoting physical activity, they can effectively guide and support preschool children in achieving adequate levels of physical activity, thereby contributing to children's physical health and overall development. However, this heightened sense of responsibility also means that teachers and parents may encounter more challenges in promoting physical activity. They are often the ones who must recognise and proactively address barriers that hinder children's participation.

From the research, bad weather conditions and time constraints emerge as primary barriers influencing both school and family-based physical activity (Table 4). Additionally, significant correlations exist among various obstacles to physical activities. In practice, some of these issues can be mitigated through creative and flexible approaches. For example, adverse weather can be addressed by providing suitable indoor activity spaces. Limited facilities and venues can be compensated for through equipment substitutions that still encourage movement. The absence of standard activity equipment can be overcome by modifying teaching strategies to utilise existing space and materials efficiently. Likewise, limited time can be counterbalanced with short, frequent activity sessions using available resources. It appears that possessing adequate knowledge of physical skills can resolve most obstacles to physical activities. Indeed, research data indicate a significant correlation between the lack of physical skills and major obstacles such as inadequate sports facilities and equipment, underscoring the importance of physical skill knowledge in preschool physical activities. Ensuring the acquisition of appropriate skills, knowledge, and facilities is crucial for promoting physical activity among preschool children during restrictions (Walker et al., 2022). Moreover, educators acknowledge that insufficient training limits their ability to provide opportunities for physical activity (Coleman & Dyment, 2013).

What types of sports skills and knowledge are more essential for teachers and parents to possess? Based on the study's findings, parents should acquire a set of versatile, broadly applicable sports skills and knowledge, including hiking, running, skipping, and others. In addition, the study revealed gender-related preferences in children's activity choices. Families with boys may benefit from placing greater emphasis on sports such as basketball, football, and balance biking, while families

with girls may consider encouraging gymnastics, yoga, and roller skating. These activities align more closely with their interests and engagement patterns. Parents generally reported participating in family physical activities for approximately 30 minutes per session, once every 1–2 days. For some parents managing multiple family responsibilities, the frequency and duration of family physical interactions were slightly higher. Based on these findings, it is advisable to promote a realistic, sustainable activity schedule that aligns with family routines, such as 30-minute sessions three times per week, to support consistent engagement in physical activity at home.

To ensure preschoolers engage in adequate physical activity during periods of restriction, online teaching can be an effective tool for fostering family–school collaboration. Research findings indicate that parents most frequently engage through online chat groups and livestreaming platforms, while teachers prefer online chat groups and official accounts (e.g., school websites or educational social media channels). Given these preferences, it is recommended to adopt a multi-platform approach to accommodate the diverse needs and habits of both parents and teachers, thereby enhancing the effectiveness of online collaboration. A proposed online physical activity schedule could include: livestreamed physical activity sessions (approximately 30 minutes) held once per week (e.g., Tuesdays at 7:00 p.m.); interactive online chat group discussions (approximately 30 minutes) once per week (e.g., Thursdays at 7:00 p.m.), and weekly articles and instructional videos shared through official school accounts, featuring parent–child physical activity content and guided lesson plans. This structured and flexible approach can help maintain children's physical activity levels while supporting consistent communication and shared responsibility between families and schools. In addition, Wilhelmsen and Sørensen (2019) proposed that conditions for promoting family–school collaboration include continuous systemic communication, trust in the capabilities of school personnel, and joint problem-solving and professional cooperation.

Conclusion

The critical importance of collaboration between families and schools in promoting physical activity among preschoolers globally, particularly during challenging times such as the COVID-19 pandemic. By understanding children's preferences and collectively addressing barriers, both parents and educators can enhance engagement and create a supportive environment for regular physical activity. Strengthening family-school partnerships not only reinforces family bonds but also provides organisational support for implementing diverse, interactive, and age-appropriate activities. Moreover, the use of interactive platforms and adaptability to evolving circumstances further enhances the effectiveness of physical activity interventions. This coordinated effort contributes to improved physical health, emotional well-being, and the overall development of young children. Ultimately, this collaborative model underscores the importance of synergy between home and school environments in fostering healthy, active lifestyles, laying a strong foundation for the holistic development of preschoolers.

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Disclosure of potential conflicts of interest
The authors have no competing interests to declare that are relevant to the content of this article.

Ethical endorsement
This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Quanzhou Normal University (June 2021/No.QZSYLL 202106)

Informed Consent
Informed consent was obtained from all individual participants included in the study.

Data Availability
All data has been provided to Baidu Baidu Netdisk, accessible through the link: https://pan.baidu.com/s/1xWMw3eJkCZxabUifQwKOIw?pwd=66w9

Code Availability
The code used in this study is available upon request from the corresponding author. We are committed to transparency and reprehensibility in research, and we encourage fellow researchers to contact us for access to the code supporting our findings.

Author Contributions
Conceptualisation, methodology, data curation, formal analysis, writing and editing Li Y.; validation and supervision, Ler HY.; visualisation and administration, Su L. Interpreting and editing the results Wee EH. All authors have read and agreed to the published version of the manuscript.

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INTERNATIONAL SPORTS STUDIES

REVIEW

Re-examining Athletes' Stress-Burnout Relationship: A Systematic Review and Meta-Analysis

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Abstract

To re-examine the impact of athletes' stress on burnout by extending the previous meta-analytic review conducted by Lin et al. (2022) and by investigating the additional moderators, including athletes' age, gender, sports experience, training load, athletic level, and region, within the stress-burnout relationship. Studies published between 2001 and April 2025 from five online academic databases were collected following PRISMA guidelines (Page et al., 2021) and evaluated using the 14 evaluation questions (Kmet et al., 2004). Fifty-nine eligible studies with 15,370 athletes were identified. The meta-analysis employing a random-effects model indicated a medium-to-large association between stress and burnout ($r = 0.478$, $p < .05$). Furthermore, athletes' stress-burnout relationship showed different patterns according to age, sports experience, training load, athletic level, and region. The athletes' stress-burnout association was confirmed, with variations across demographic, sport-specific, and cultural-regional factors. These findings highlight the need for tailored prevention programmes that integrate psychological strategies, coaching practices, and recovery monitoring to mitigate training-induced burnout across different developmental stages and cultural contexts.

Introduction

The pursuit of sporting excellence requires substantial physical, psychological, and emotional investment, yet this commitment often leads to burnout. Defined as emotional and physical exhaustion, reduced accomplishment, and sport devaluation (Raedeke & Smith, 2001), burnout typically emerges when prolonged stress from training demands, performance pressure, identity issues, and lack of control is not offset by adequate recovery. Athlete burnout is increasingly recognised as a serious issue with consequences extending beyond temporary fatigue or disengagement. It has been linked to declines in mental and physical health, including heightened symptoms of depression, anxiety, and sleep disturbances, as well as reduced life satisfaction and well-being (Glandorf et al., 2024; Glandorf et al., 2025). These outcomes can accumulate over time, hindering recovery, impairing performance, and undermining long-term development. Burnout also threatens athletes' career sustainability, being associated with diminished motivation, training withdrawal, and higher dropout rates (Cresswell & Eklund, 2005; Isoard-Gautheur et al., 2016). The urgency of addressing this issue is heightened by early specialisation, intensified competition schedules, and rising performance expectations, which increase the risk of

chronic stress and psychological exhaustion (Dišlere et al., 2025; Madigan et al., 2022). Collectively, these findings underscore the need to view athlete burnout as a multidimensional health and career risk that requires proactive, systematic investigation.

Burnout develops as a chronic stress process when athletes perceive an imbalance between situational demands and available coping resources (Smith, 1986). In his cognitive-affective model, Smith (1986) outlined four stages: (a) situational demands, such as intense training, competition pressure, and external expectations, which create high stress when seen as overwhelming; (b) cognitive appraisal, where burnout risk increases if athletes interpret these demands as threatening and doubt their ability to cope; (c) physiological responses, including fatigue, sleep problems, and anxiety, which undermine recovery and performance; and (d) behavioural responses, where accumulated strain leads to reduced performance, withdrawal from training, or even sport dropout. Several empirical studies have applied Smith's (1986) model to examine how stress contributes to burnout among athletes and under what conditions this occurs. Perceptual factors, including negative thinking and perceived distress, have been shown to mediate the stress-burnout relationship (Chang et al., 2017; Chyi et al., 2018). These findings highlight the nuanced roles of stress perceptions and emphasise that athletes' cognitive appraisal and coping confidence critically shape their vulnerability to burnout.

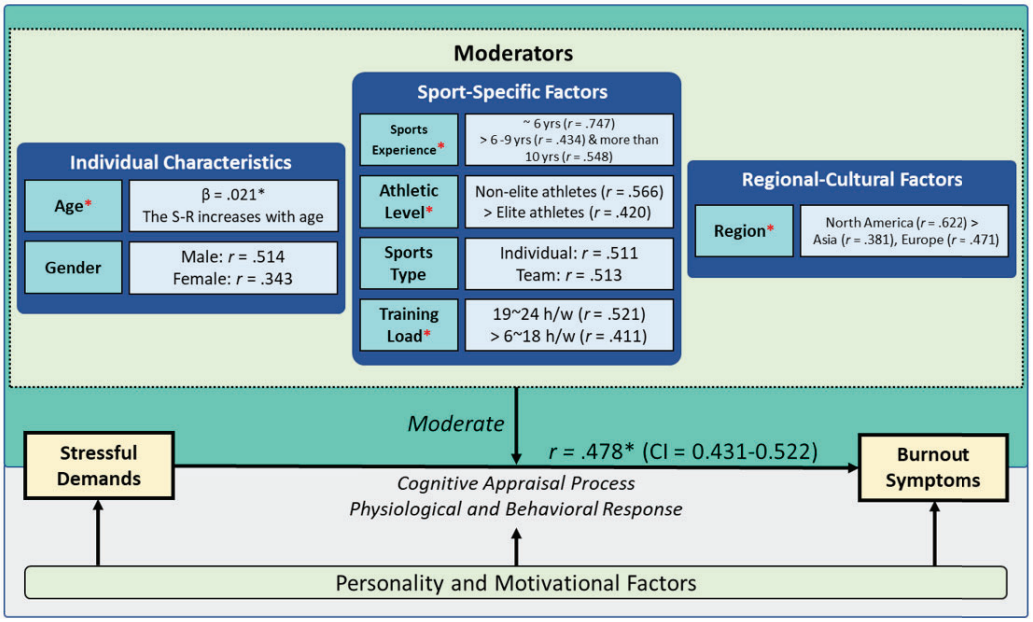
On the other hand, in line with the interactive nature of the cognitive-affective model, Lu et al. (2016) introduced a conjunctive moderation approach demonstrating that individual and environmental factors jointly buffer stress effects and found that athletes with greater resilience and stronger perceived social support from coaches exhibited lower burnout, even under high-stress conditions. Similarly, Wagstaff et al. (2018) confirmed resilience as a protective factor, showing its buffering role in the relationship between organisational stressors and burnout among both athletes and coaches. Hilpisch et al. (2024) further identified strong associations among burnout symptoms, effort-reward imbalance, emotional strain, and role conflict in elite athletes, while adequate social support and sporting success mitigated these effects. Complementing these findings, Shipherd et al. (2024) emphasised the role of cognitive appraisal, reporting that athletes with a negative stress mindset, perceiving stress as harmful, were more likely to experience burnout and consider sport withdrawal. Collectively, these studies underscore the significance of resilience, social support, and stress appraisal in shaping how and when stress translates into burnout, highlighting the critical interplay between personal and contextual resources in determining athletes' vulnerability.

Recently, Lin et al. (2022) conducted a systematic review and meta-analysis to quantify the relationship between athlete stress and burnout across multiple studies from 2001 to 2021. Their findings confirmed a strong association between athletes' stress and burnout (r = .505) and demonstrated that age and athletic level moderate this association. However, their scope of moderators was limited, leaving other potentially influential factors untested. Gender, sports experience, training load, sport type, and regional background may each contribute to systematic variation in the stress-burnout relationship. Training load has long been considered a central risk factor, as excessive weekly hours may increase stress responses and elevate the likelihood of exhaustion (Smith, 1986; Hamlin et al., 2019; Woods et al., 2025). At the same time, athletes with greater experience may have developed coping skills that allow them to buffer or reinterpret stressors more effectively (Crocker & Graham, 1995), whereas less experienced athletes often

remain more vulnerable to burnout (Dišlere et al., 2025). Gender also remains salient, as males and females often perceive and appraise environmental demands differently (Gill, 2020), and longitudinal evidence suggests that female athletes show higher baseline burnout trajectories than their male peers (Saarinen et al., 2025). Social context further shapes outcomes, with team-sport athletes typically reporting greater perceived social support, which is linked to reduced distress and lower risks of depression and anxiety (Pluhar et al., 2019; Reardon & Hitchcock, 2024). Finally, cultural values influence cognition and emotion, as collectivist versus individualistic orientations alter stress expression and coping strategies (Atkinson & Gim, 1989; Sun et al., 2004; Ma et al., 2025). Together, these findings indicate that heterogeneity in effect sizes across studies can be expected, highlighting the need to examine how demographic, sport-specific, and cultural moderators jointly shape the stress-burnout relationship. Despite its potential to influence the stress-burnout relationship, no meta-analysis to date has examined how these factors might moderate this relationship. Addressing this gap, the present study extends earlier reviews and provides novel insights into the mechanisms underlying variability in the stress-burnout association.

The purposes of our study were twofold. First, we aimed to extend Lin et al.'s (2022) work by examining the relationship between athletes' stress and burnout using a more comprehensive, updated meta-analytic approach. Second, as illustrated in Figure 1, we refined the cognitive-affective model of athletic burnout (Smith, 1986) by investigating the potential moderating roles of individual characteristics (i.e., age and gender), sport-specific factors (i.e., training load, athletic level, sport type, and sports experience), and regional-cultural factors (i.e., geographic region) on this relationship.

Figure 1. Extended model of the stress-burnout relationship for athletes and the moderating effects



Note. "yrs" refers to years, and "h/w" refers to hours per week. The lower part of the figure represents the core components of the cognitive-affective model of athletic burnout (Smith, 1986), while the upper part illustrates the moderating factors examined in the present meta-analysis.
*p <.05.

We hypothesised that there would be a significant relationship between athletes' stress and burnout, and that the variables would moderate this association (Dišlere et al., 2025; Madigan et al., 2022). Collectively, these findings underscore the need to view athlete burnout as a multidimensional health and career risk that requires proactive, systematic investigation.

Methods and Materials

This review was not pre-registered (e.g., in PROSPERO), as some academic journals do not require prospective registration as part of the submission process. Nevertheless, the study was conducted in accordance with established guidelines. We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist (Page et al., 2021) to conduct the study. The detailed procedures are as follows:

Search strategy

A comprehensive search strategy was carefully designed to select eligible studies of athletes' stress and burnout, including diverse stress measures such as global perceived stress, general life stress, sport-specific stress, and burnout measures such as the Athlete Burnout Questionnaire (Raedeke & Smith, 2001) and the Shirom-Melamed Burnout Measure [SMBM] (Lerman et al., 1999). Five academic databases were searched: EBSCO, ProQuest, PubMed, OVID, and Web of Science (WOS). In addition, Google Scholar was used in a supplementary manner to trace reference lists and citations of eligible articles, ensuring that potentially relevant studies not indexed in major databases were not missed. All searches were limited to results from 2001 to April 2025. We used the following keywords, and Boolean operators (OR and AND) were added to combine them; they are: (1) burnout, (2) stress OR distress OR pressure, and (3) athlete* OR sport* OR player*. Only peer-reviewed publications available in English were included.

Eligibility criteria

In the first phase of this review, two authors employed the same methodology to search for relevant articles. In addition, the reference lists of selected papers were traced, and Google Scholar was used to identify further potentially relevant articles. In the second phase, two authors independently evaluated each article's title, abstract, and full text to determine its relevance to the athletes' stress-burnout relationship. Differences during article screening and coding were resolved through discussion between the two authors, and a third author was consulted to make the final decision when the disagreement remained. Thus, the included criteria of the articles were: (1) the topic or abstract of articles included life stress, general life stress, sport-specific stress, burnout, athletes/players, or sport, and presented the information about the associations between general life-stress or sport-specific stress and burnout; (2) the article had reported the sample size; (3) the participants were athletes; and (4) the article was published through peer-review, and (5) the study was in English. The exclusion criteria were as follows: (1) the study was not related to athletes' stress and burnout; (2) the study was only a literature or review; (3) the samples investigated were not athletes; and (4) the study abstract was not in English.

Accordingly, initial searches yielded 1,193 articles from online databases, and an additional 13 articles were obtained from Google Scholar. After removing duplicates, 350 articles remained. Next, the authors assessed the title, abstract, and full text of each identified study to determine its relevance to the review. The full texts of 92 articles were obtained and assessed. During the third stage of screening, articles were excluded based on the following criteria: (1) the study was not related to burnout or life-stress or sport-stress; (2) the full texts were not in English; (3) the data presented in the

results could not differentiate athletes and non-athletes; (4) the stress/burnout-related data were not presented in the results; (5) the study was not a quantitative analysis; (6) the samples were not athletes; (7) the scale used to measure stress was not suitable. Furthermore, four additional studies were identified through reference list tracing and were included after applying the same selection procedures. In total, 48 studies from Lin et al. (2022) and 12 newly identified studies (eight via databases and four via other methods) were included, yielding 60 studies for analysis (Figure 2).

Article quality assessment

We adopted the 14 evaluation questions proposed by Kmet et al. (2004) for quality assessment, including sample size, number of genders, demographic characteristics of the sample, statistical method, reliability and validity of the measurement, and conceptualisation of measurement in line with the topic. The sum of all these criteria scores would be the article assessment's total score. Furthermore, the study's quality was classified as high, low, or unclear based on the score. A sport psychology peer expert independently coded article quality using the same criteria, and only studies rated as moderate or higher were retained (Table 1). One low-quality study (score = 13, 59%) was excluded, resulting in 59 studies included in the final analysis.

Figure 2. PRISMA Flow Chart of the Studies Included in the Systematic Review and Meta-Analysis

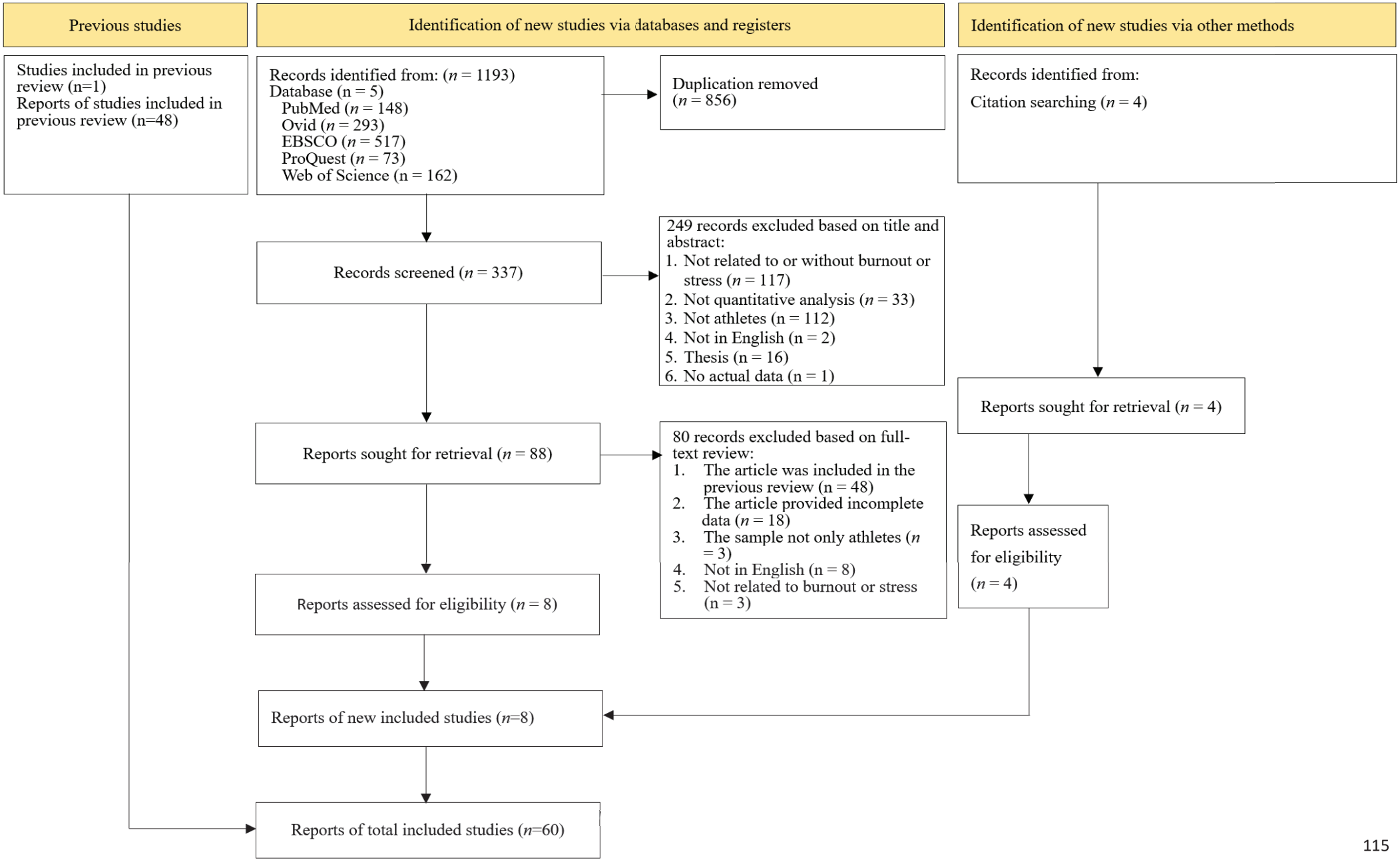


Table 1. Quality Assessment of the Included Studies

NO	Author(s)	Score items (Yes [2]/partial [1]/no [0])														Quality assessment (at least moderate quality 60%=17)
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	
1	Raedeke & Smith (2001)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
2	Raedeke & Smith (2004)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
3	Black & Smith (2007)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes		yes	no	yes	yes	18
4	Grobbelaar et al. (2010)	yes	yes	yes	yes	n/a	n/a	n/a	yes	partial	yes	yes	no	yes	yes	19
5	Main et al. (2010)	yes	yes	yes	yes	n/a	n/a	n/a	partial	partial	yes	yes	no	yes	yes	18
6	Smith et al. (2010)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
7	Gustafsson et al. (2011)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
8	Gustafsson & Skoog (2012)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
9	Lu et al. (2012)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
10	Gustafsson et al. (2013)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
11	Raedeke et al. (2013)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	partial	19
12	DeFreese & Smith (2014)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
13	Martinent et al. (2014)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	partial	19
14	Nafian et al. (2014)	yes	yes	yes	partial	n/a	n/a	n/a	partial	yes	yes	partial	no	no	no	13
15	Dubuc-Charbonneau & Durand-Bush (2015)	yes	yes	yes	yes	no	no	no	yes	yes	yes	yes	no	yes	yes	20
16	Gustafsson et al. (2015)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
17	Martinent & Decret (2015a)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
18	Martinent & Decret (2015b)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	partial	19
19	Moen, Federici, & Abrahamsen (2015)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
20	Moen, Abrahamsen, & Furrer (2015)	yes	yes	yes	yes	no	no	no	yes	yes	yes	yes	no	yes	partial	19
21	Wang et al. (2015)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	partial	19
22	Chiu et al. (2016)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
23	De Francisco et al. (2016)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	partial	19
24	Lu et al. (2016)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
25	Chang et al., (2017)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
26	Frank, et al. (2017)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
27	Gustafsson et al. (2017)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
28	Lee et al. (2017)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
29	Chyi et al., (2018)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
30	Garinger et al., (2018)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
31	Gerber, Best, & et al. (2018)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
32	Gerber, Colledge, & et al. (2018)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20

33	Gerber, Gustafsson, & et al. (2018)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
34	Liu et al., (2018)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
35	Lu et al., (2018)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
36	Martinent et al. (2018)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
37	Gabana et al. (2019)	yes	yes	yes	yes	no	no	no	yes	yes	yes	yes	no	yes	yes	20
38	Moen et al. (2019)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
39	Raanes et al., (2019)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
40	Åkesdotter et al. (2020)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
41	Chiou, et al. (2020)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
42	Dobson, et al. (2020)	yes	yes	yes	yes	n/a	n/a	n/a	yes	partial	yes	yes	no	yes	yes	19
43	Nixdorf, et al. (2020)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
44	Vaughan et al. (2020)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
45	Fagundes et al. (2021)	yes	yes	yes	yes	n/a	n/a	n/a	yes	partial	yes	yes	no	yes	yes	19
46	Wu et al., (2021)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
47	Daumiller et al. (2022)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
48	Glandorf et al. (2022)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
49	Liu et al., (2022)	yes	yes	yes	yes	no	no	no	yes	yes	yes	yes	no	yes	yes	20
50	Martinent et al. (2022)	yes	yes	yes	yes	no	no	no	yes	yes	yes	yes	no	yes	yes	20
51	Olsson et al. (2022)	yes	yes	yes	yes	no	no	no	yes	yes	yes	yes	no	yes	yes	20
52	Woods et al. (2022)	yes	yes	yes	yes	n/a	n/a	n/a	yes	yes	yes	yes	no	yes	yes	20
53	Wu et al. (2022)	yes	yes	yes	yes	no	no	no	yes	yes	yes	yes	no	yes	yes	20
54	Gerber et al. (2023)	yes	yes	yes	yes	no	no	no	yes	yes	yes	yes	no	yes	yes	20
55	Malele & Noorbhai (2023)	yes	yes	yes	yes	n/a	n/a	n/a	partial	yes	yes	yes	no	yes	yes	19
56	Yang et. al. (2023)	yes	yes	yes	yes	no	no	no	yes	yes	yes	yes	no	yes	yes	20
57	Woods et al. (2023)	yes	yes	yes	yes	no	no	no	yes	yes	yes	yes	no	yes	yes	20
58	Gao & Wang (2024)	yes	yes	yes	yes	no	no	no	yes	yes	yes	yes	no	yes	yes	20
59	Levillain et al. (2024)	yes	yes	yes	yes	no	no	no	yes	yes	yes	yes	no	yes	yes	20
60	Yu et al. (2025)	yes	yes	yes	yes	no	no	no	yes	yes	yes	yes	no	yes	yes	20

Note. **A**: Is the question/objective sufficiently described? **B**: Is the study design evident and appropriate? Is the method of subject or comparison group selection, as well as the source of information and input variables, described and appropriate? Are the subject (and comparison group, if applicable) characteristics sufficiently described? **E**: Was the interventional and random allocation possible? Was it described? **F**: Was interventional and blinding of investigators possible? Was it reported? **G**: Was interventional and blinding of subjects possible? Was it reported? **H**: Outcome and (if applicable) exposure measure(s) well defined and robust to measurement/misclassification bias? Means of assessment reported? **I**: Is the sample size appropriate? J: Are the analytic methods described and justified as appropriate? K: Is some estimate of variance reported for the main results? **L**: Controlled for confounding? M: Are the results reported in sufficient detail?; **N**: Conclusions supported by the results?

Data extraction

We extracted the study characteristics (author's name, year of publication) and participant characteristics (sample size, mean age, athletic level, training experience, sport type, and gender) for each study. Additionally, we obtained measurements of global perceived stress and burnout, including the mean, standard deviation, and correlation coefficient. Inter-rater reliability (ICC) was examined across 60 included studies, with two authors achieving high agreement (ICC (2, 1) = .98). Coding disagreements were rare; in only one case, one author suggested inclusion while the other noted that school burnout should be included in student-athlete populations. After consulting a third reviewer, all authors agreed to exclude this non-sport-specific burnout data.

Moderator coding

To explore potential sources of heterogeneity, seven moderators were selected based on theoretical and empirical evidence: age, gender, sports experience, athletic level, sport type, training load, and athletes' regional background. Specifically, gender was defined as biological sex (male or female), supported by evidence that gender differences influence stress perception and coping responses (Gill, 2020; Saarinen et al., 2025). Age was measured as chronological age, reflecting developmental changes in stress-burnout trajectories. Sports experience was operationalised as years of sport participation and classified into three groups (<6 years, 6–9 years, ≥10 years) following the developmental model of sport participation (Côté et al., 2007). Empirical findings suggest that greater experience enhances coping resources, whereas less experience is associated with greater vulnerability to burnout (Crocker & Graham, 1995; Dišlere et al., 2025). Athletic level was defined as elite (national or international competitors) versus non-elite, reflecting differences in competitive demands and stress exposure. Sport type was categorised as team versus individual sports, consistent with findings that team contexts provide more social support, which buffers against psychological distress (Pluhar et al., 2019; Reardon & Hitchcock, 2024). Training load was defined as weekly training hours. Consistent with the NCAA (2016), which sets 20 hours per week as the upper limit for student-athletes' countable athletically related activities, and considering the reported ranges across studies, we classified training load into two categories: 6–18 hours and 19–24 hours per week. This classification also assumed six weekly training sessions with integer-hour durations, aligning with the practical structure of training schedules. Training load has long been considered a central risk factor, as excessive weekly hours can elevate stress responses and increase the likelihood of exhaustion (Smith, 1986; Hamlin et al., 2019; Woods et al., 2025). Finally, regional classification was based on cultural-geographic background, acknowledging that cultural norms shape cognition, emotion, and stress appraisal. Research has shown that collectivist versus individualistic orientations lead to different stress expression and coping strategies (Atkinson & Gim, 1989; Sun et al., 2004; Ma et al., 2025). A summary of moderator definitions and classifications is presented in Table 2.

Table 2. The definition and categorisation of moderator

Moderator	Definition	Categories
Gender	Biological sex	Male / Female
Age*	Chronological age / years from birth	Continuous variable
Sports experience*	Years of sport participation	< 6 years / 6–9 years / 10 years and above
Athletic level*	Classification of athletes based on their competitive experience	Elite (national or international competitor) / non-elite (others)
Sports type	Type of sport participation	Team / Individual
Training load*	Weekly training hours	6–18 hours / 19–24 hours
Region*	Continent	Asia / Europe / North America

Note. *p <.05 in the moderation test.

Statistical analysis

We used Comprehensive Meta-Analysis (CMA) version 2.0 to analyse the stress-burnout relationship across studies and to conduct the estimation of overall effect sizes, test for heterogeneity, and conduct moderator analyses. The Q-statistic was used to examine whether the actual effect size varied between studies when a random-effects model was applied (Field & Gillett, 2010). This test examines whether the variability across studies exceeds what would be expected by chance. A significant Q value reflects heterogeneity between samples. Higgins et al. (2003) reported that I^2 indicates different levels of heterogeneity: 25% (low), 50% (moderate), and 75% (high). I^2 represents the percentage of total variation across studies that is due to heterogeneity rather than random error. Therefore, I^2 statistics were used to interpret the magnitude of heterogeneity for significant Q values. A random-effects model was applied throughout the analysis, as it accounts for expected heterogeneity across studies, particularly when I^2 values were high. Furthermore, τ^2 was estimated as the between-study variance to quantify the absolute amount of heterogeneity across studies. Prediction intervals (PI) were also calculated to indicate the expected range of true effects in future studies. In addition, sensitivity analysis was performed by omitting individual studies to examine whether the overall results changed substantially when any single study was removed, thereby testing the stability of the meta-analysis.

In meta-analytic studies, publication bias frequently arises from the exclusion of unpublished or non-significant studies. To assess potential publication bias, we employed two methodological approaches: the Fail-safe number (N, Nf.s) analysis (Field & Gillett, 2010) and funnel plot examination (Verhagen & Ferreira, 2014), where a large fail-safe number indicates that many unpublished studies with null results would be needed to overturn the observed effect, suggesting robust findings. Funnel plots provide a visual inspection of distribution symmetry, where asymmetry may indicate potential publication bias. We also employed the Begg test (Begg & Mazumdar, 1994) and the Egger regression (Egger et al., 1997) to assess publication bias, which formally evaluate funnel plot asymmetry and provide statistical evidence of potential bias.

Regarding the moderation test, age (a continuous variable) was tested using meta-regression (a meta-analytic method testing how continuous study-level variables explain effect size variation), whereas the other categorical moderators were examined using subgroup analysis (a method that compares pooled effect sizes

across predefined study subgroups to assess between-group differences).

Effect sizes were calculated within the *r* family of measures, representing the strength of association between two variables on a numeric scale (Kline, 2004; Rosenthal, 1991). When reported, correlation and sample size values, means (*M*s) and standard deviations (*SD*s), or Fisher's *Z* values were entered directly. If correlation coefficients were unavailable, data were converted to r values using established formulas (see Formula 1; Borenstein et al., 2009; Chang, 2021). Because the variance of correlation coefficients changes with their magnitude, Fisher's *r*-to-*Z* transformation was applied for standardisation prior to pooling (see Formula 2), and combined estimates were subsequently weighted and aggregated (see Formula 3) before being back-transformed to *r* values (see Formula 4) for interpretation. According to Cohen (1988), *r* values of .10, .30, and .50 indicate small, medium, and large effect sizes, respectively. Forest plots were used to present effect sizes and 95% confidence intervals (CIs), where significance was inferred if the CI did not include zero at $p < .05$ (Verhagen & Ferreira, 2014). Forest plots also illustrated the distribution of effect sizes across studies (Marks-Anglin et al., 2021). Each study contributed a single effect size representing the stress–burnout association to avoid overweighting multi-effect studies.

The formulas used for effect-size transformations were as follows:

Formula 1. Conversion from *M* and *SD* to *r*.

$$d = \frac{M_2 - M_1}{\sqrt{\frac{(n_1-1)SD_1^2+(n_2-1)SD_2^2}{(n_1+n_2)}}}, r = \frac{d}{\sqrt{d^2+\frac{(n_1+n_2)^2}{n_1 \times n_2}}}$$

Formula 2. *r* to Fisher's *Z*.

$$Zr_i = \frac{1}{2} Ln\left(\frac{1+r_i}{1-r_i}\right), Var_{(Zr)} = \frac{1}{n-3}$$

Formula 3. Combining Fisher's *Z*.

$$Zr_{combined} = \frac{\sum w_i Z r_i}{\sum w_i}, \quad w_i = \frac{1}{Var(Z_{ri})}$$

Formula 4. Back-transforming Fisher's *Z* to *r*.

$$r_{combined} = \frac{e^{2zcombined} - 1}{e^{2zcombined} + 1}$$

Results

Description of study characteristics

Fifty-nine studies were included; most studies were conducted in Europe ($n = 31$) and Asia ($n = 16$). At the country level, Taiwan conducted the most studies ($n = 10$), followed by Sweden ($n = 7$), the United States ($n = 7$), France ($n = 6$), Norway ($n = 4$), Switzerland ($n = 4$), Germany ($n = 3$), the UK ($n = 3$), and other countries. Most samples included both male and female athletes, whereas four studies focused exclusively on males and one on females.

Regarding training experience, 27 studies involved athletes with 6–9 years of participation, and only two studies reported more than 10 years of training. As for training load, 26 studies did not specify the duration of participation. The training load was mainly between 6 and 24 hours per week. Additionally, most studies' samples included individual and team sports, with 12 studies focusing on individual sports athletes. Furthermore, considering the study design of the included articles, longitudinal studies were fewer in number than cross-sectional studies, with 14 and 45 articles, respectively. With respect to research design, cross-sectional studies predominated ($n = 45$), compared with longitudinal studies ($n = 14$) and intervention studies ($n = 4$). One mixed-method study combined cross-sectional data and physiological testing. In total, 20 studies collected data using online questionnaires or web-based measurements.

As for measures, most studies used the Athletes Burnout Questionnaire (Raedeke & Smith, 2001) to assess athlete burnout (56), while four studies employed the Shirom-Melamed Burnout Measure (Lerman et al., 1999) (see Table 3). As stress measures, 29 studies used Cohen et

al.'s (1983) Perceived Stress Scale (PSS); Eight studies used the Recovery-Stress Questionnaire for Athletes (REST-Q; Kellmann & Kallus, 2001); Five studies employed the Depression Anxiety Stress Scales-21 (DASS-21; Lovibond & Lovibond, 1995); Ten studies used the College Student-Athletes' Life Stress Scale (CSALSS; Lu et al., 2012); and one study used the organisational stressor indicator for sport performers (OSI-SP; Arnold et al., 2013).

Detailed characteristics of the 59 included studies are presented in Supplementary Appendix A.

Sensitivity analysis

Sensitivity analysis determines the robustness of the results of each study. We removed one study at a time from the analysis to assess the change in the overall effect size when that article was excluded. Our sensitivity analysis revealed that the exclusion of individual studies led to I^2 values ranging from 92.946 to 94.297, showing little change compared with the overall analysis I^2 value of 94.197, indicating that the meta-analysis was generally robust.

Table 3. The measures that were used in the 59 included articles

Item		N	Measurements$_{(n)}$
Burnout		60	ABQ (56); SMBM (4)
Stress		61	
	LS	32	PSS (21); CSALSS (3); DASS (3); TICS (2); BSI (1); RESTQ (1); SCI (1)
	Both LS and SS	16	RESTQ (6); CSALSS (7); SSPEHS (1); PSS (2)
	SS	13	PSS (in a sports setting, 6); RESTQ-S (1); DASS (in a sports setting, 2); ARSS (2); OSI-SP (1); APSQ (1)

Note. 1. For burnout measures: ABQ: Athletes Burnout Questionnaire; SMBM: Shirom-Melamed Burnout Measure; 2. For stress measures: PSS: Perceived Stress Scale; CSALSS: College Student–Athletes' Life Stress Scale; DASS: Depression Anxiety Stress Scales; TICS: Trier Inventory of Chronic Stress; BSI: Behavioral Symptom Inventory; RESTQ: Recovery-Stress Questionnaire for Athletes; SCI: Stress and Coping Inventory; SSPEHS: Stress Scale for Physical Education High School Student SS: Acute Recovery and Stress Scale; OSI-SP: Organizational Stressor Indicator for Sports Performers; APSQ: Athlete Psychological Strain Questionnaire. 3. LS: General life stress; SS: Sport-specific stress.

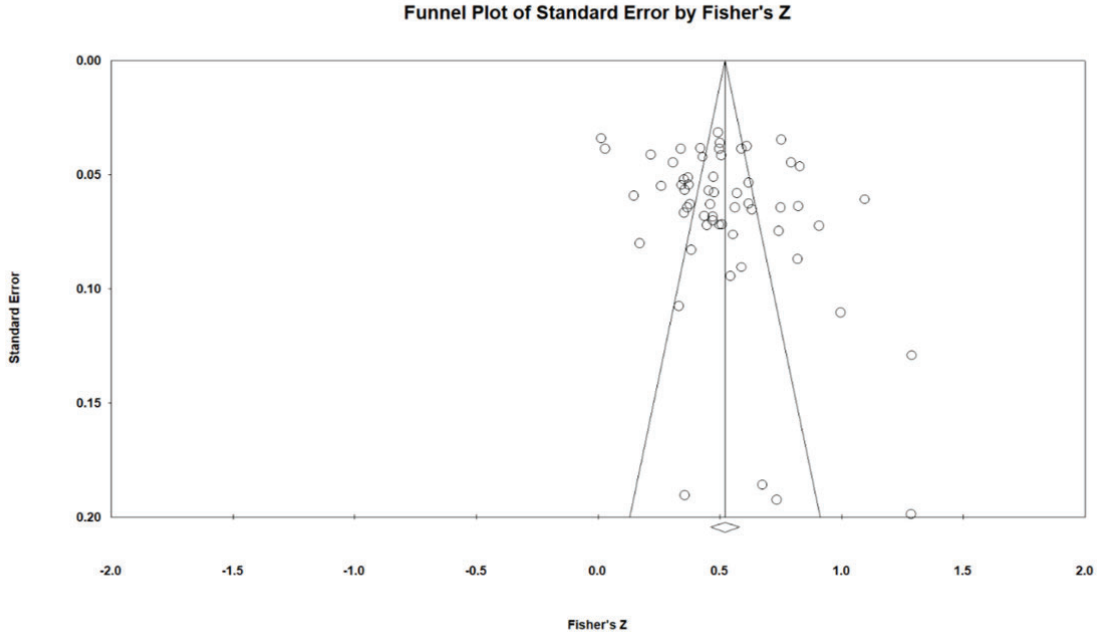
Heterogeneity analysis

A heterogeneity analysis was conducted on the 59 included studies. The test of heterogeneity yielded $Q(58) = 999.55$, $p < .001$, indicating substantial variability among effect sizes. Furthermore, the I^2 value was 94.20%, suggesting a high degree of heterogeneity across studies. Therefore, a random-effects model was adopted. Moreover, the between-study variance was $\tau^2 = 0.048$ ($\tau = 0.220$), implying a wide dispersion of actual effects, and an approximate PI ranged from 0.050 to 0.910.

Publication bias

The funnel plot spread evenly on both sides of the average (see Figure 3); thus, there should be no publication bias. Additionally, the Fail-safe Number test yielded a Z-value of 65.814 ($p < .001$), and the Nf.s was 6,468, indicating a very large effect size, which suggests a slight publication bias, as noted by Rosenthal (1991). Furthermore, the Begg and Mazumdar rank correlation test yielded Kendall's tau $b = .167$ ($p = .060$), indicating no publication bias (Begg & Mazumdar, 1994).

Figure 3. Funnel Plot of the 59 included studies



Moreover, we also examined the Egger's *t* test, which revealed Egger bias = 3.084 (95% CI = 0.0.4 to 6.134) ($p < .05$), which indicating a publication bias (Egger et al., 1997). However, Jin et al. (2015, p. 348) indicated that Egger's test might commit a type I error when there is heterogeneity. Therefore, because of the high heterogeneity in the included studies, we adopted the Fail-safe Number test and Kendall's tau and concluded that the results are unlikely to be explained by missing or unpublished studies in the included studies. We further conducted a trim-and-fill analysis using the Duval and Tweedie (2000) procedure under a random-effects model. The analysis suggested that no studies were missing, and the adjusted effect size was identical to the observed effect size. This indicates that the stress-burnout association is robust to potential publication bias.

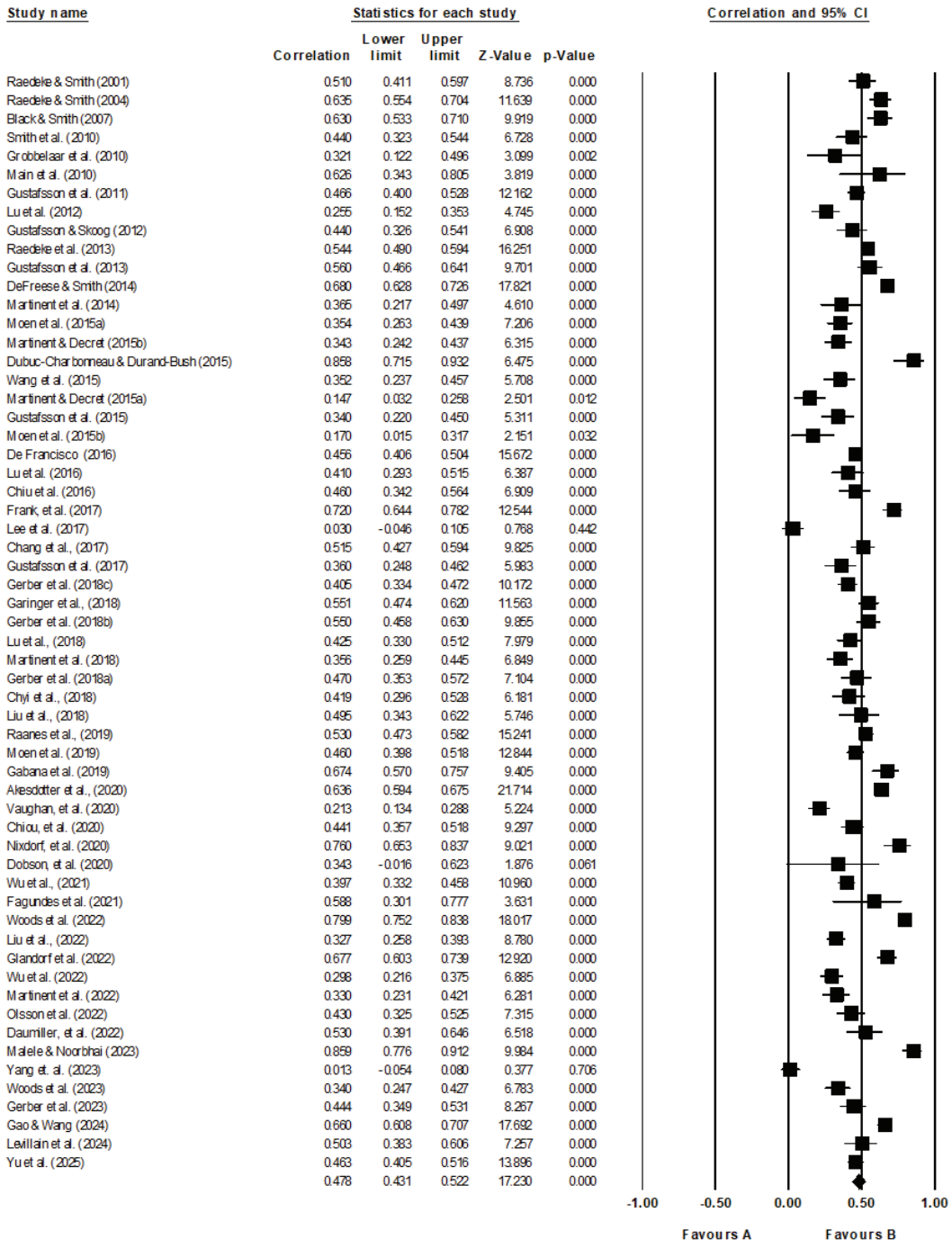
Effects of athletes' stress on burnout

A summary of the random-effects meta-analysis is presented in Figure 4, accompanied by a forest plot. The results of the meta-analysis revealed a strong association between athletes' stress and burnout ($r = 0.478$, CI = 0.431 to 0.522, $p < .05$; $\tau^2 = 0.048$, PI = [0.077, 0.746]) across all 59 studies. According to Cohen's (1988) suggestion, the stress-burnout effect size is considered large.

Moderation analysis

Based on the heterogeneous conditions of the 59 included studies, we examined the moderating effects of the stress-burnout relationship by seven moderators: age, gender, sports experience, training load, athletic level, region of athletes, and sports type.

Figure 4. Forest plot of the association between athletes' stress and burnout

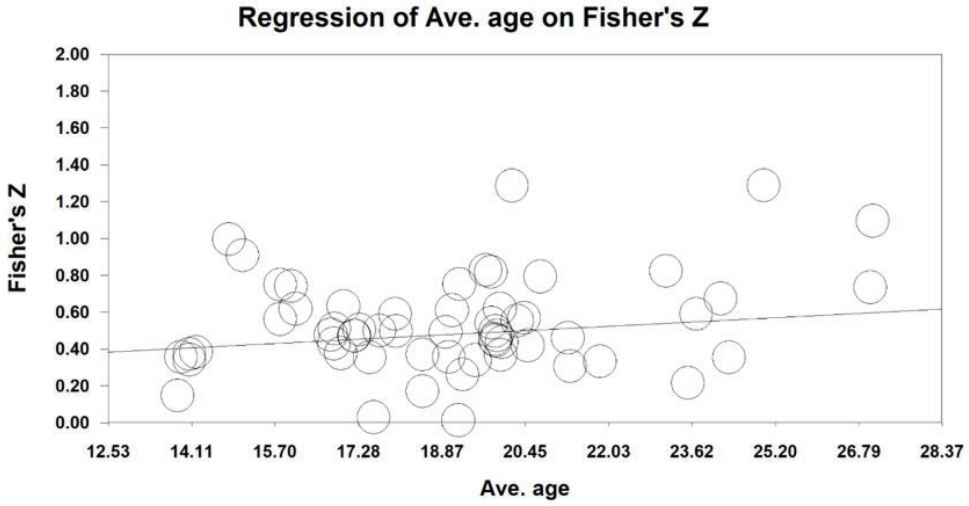


Note. 1. N = 59 studies; the relationship between athletes' stress and burnout was significantly positive with an effect size of r = .478 (CI = 0.431 to 0.522). 2. Moen et al. (2015a) = Moen, Federici, & Abrahamsen (2015); Moen et al. (2015b) = Moen, Abrahamsen, & Furrer (2015).

The moderating effect of age. Because the included 59 studies report diverse continuous numbers on age, we use a meta-regression to examine the effect of age on the stress-burnout relationship. The result of meta-regression, as illustrated in Figure 5, indicated that older athletes tend to show a stronger link between stress and burnout than younger athletes (β=.021, 95% CI = .001 to .041, p < .05, τ^2 = 0.048, PI = [-0.395, 0.430]).

gender. The result showed that the relationship between stress and burnout was similar for male and female athletes (*r* = .514 for male, 95% CI = -.006 to .815, k = 4, τ^2 = 0.328, PI = [-0.976, 0.998]; *r* = .343 for female, 95% CI = -.016 to .623, k = 1, τ^2 and PI were not estimated; *p* > .05; see Figure 6). However, the female subgroup (1 study) cannot contribute to heterogeneity estimation, and the male subgroup was also only four studies; additional studies are needed to clarify the sources of the gender

Figure 5. Age as moderator: Meta-Regression of age on stress and burnout

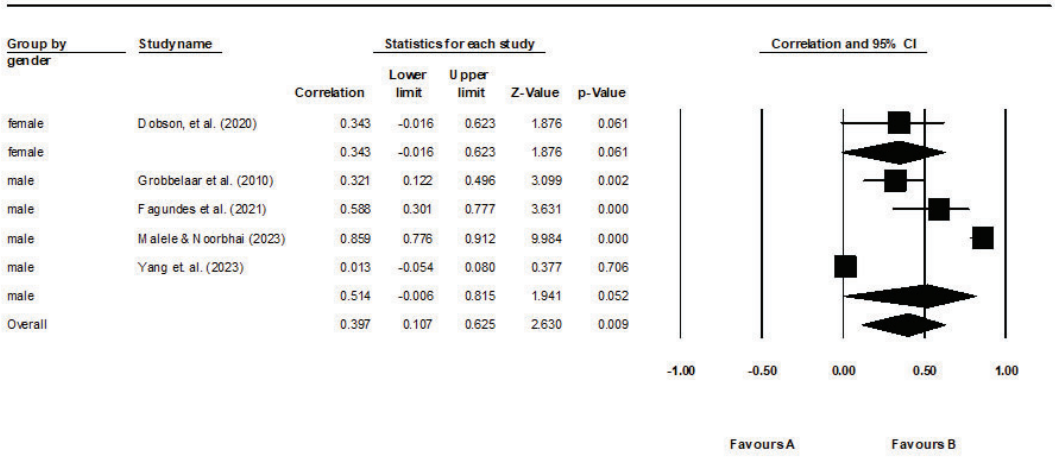


Note. N = 59 studies; the meta-regression coefficient (β) was .021, 95% CI = .001 to .041 (p < .05), indicating that age has a moderating effect; as age increases, the effect size of the stress-burnout relationship also increases.

The moderating effect of gender. According to the data on athletes' gender from the included studies, only four studies had all male athletes, and one study had all female athletes. Most of the studies (*n* = 54) collected data from both genders and reported a single result. Thus, five studies were applied to test the moderating effect of

variability. Given the very limited number of single-gender studies, statistical power was low, and the null moderation effect should be interpreted with caution.

Figure 6. Meta-analysis of studies investigating the stress-burnout effect (grouped by gender)

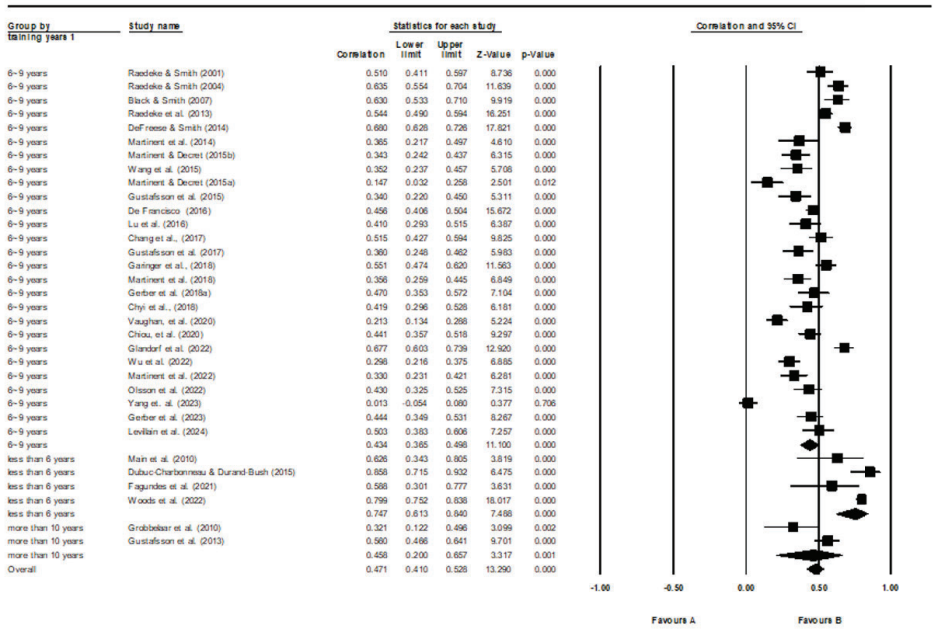


Note. N = 5 studies (only five of fifty-nine studies reported gender-specific results, so the moderation analysis used just these five.). The correlations between stress and burnout within the male and female groups demonstrated medium to high effect sizes (r = .514 for male, 95% CI = -.006–.815; r = .343 for female, 95% CI = -.016–.623), but no moderating effect on stress-burnout relationship (p > .05).

The moderating effect of sports experiences. Of the 59 included studies, 33 reported the athletes' sports experiences by year. Results showed that the training year moderated the stress-burnout relationship. Specifically, the athletes who had trained for less than 6 years (r = .747, 95% CI = .613 to .840, k = 4, τ^2 = 0.042, PI = [-0.954, 0.999]; see Figure 7) had a significantly higher effect than the 6- to 9-year group (r = .434, 95% CI = .365 to .498, k = 27, τ^2 = 0.028, PI = [0.110, 0.675]) and the more than 10-year group (r = .458, 95% CI = .200 to .657; k = 2, τ^2 = 0.037, PI was not estimated, p = .001).

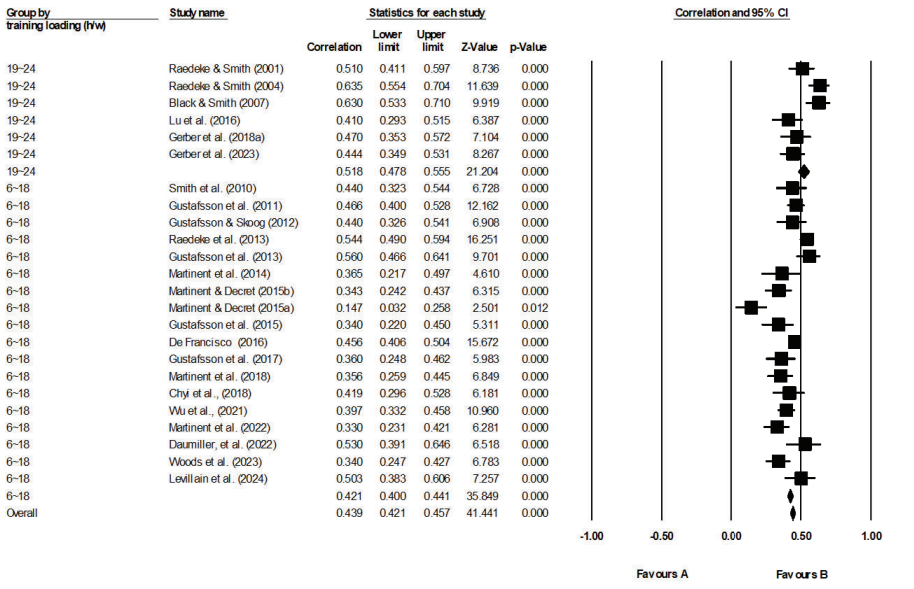
The moderating effect of training load. Among the included studies, 24 studies reported the athletes' training load. The results showed that training load (hours per week, h/w) had significant moderating effects on the stress-burnout relationship with the following correlations: r of 6~18 hours/w was = .411 (95% CI = .365 - .455, p < .05, k = 18, τ^2 = 0.010, PI = [0.214, 0.576]); 19~24 h/w r = .521 (95% CI = .439 - 0.595, p < .05, k = 6, τ^2 = 0.013, PI = [0.226, 0.730]; see Figure 8). Specifically, the 19~24 h/w group showed a stronger association between stress and burnout than the 6~18 h/w group (Q = 5.310, p = .021).

Figure 7. Meta-analysis of studies investigating the stress-burnout effect (grouped by training years of athletes)



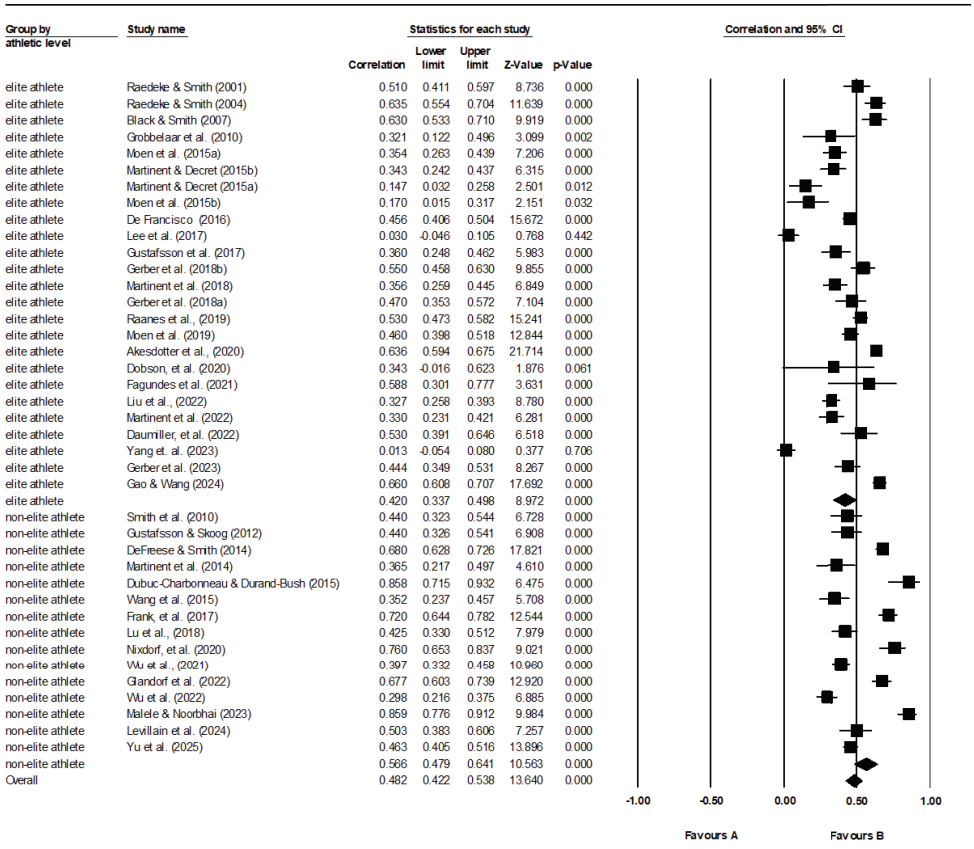
Note. 1. N = 33 studies; the correlation between stress and burnout among athletes with less than six years of training experience (r = .747, 95% CI = .613–.840) was significantly higher than that observed in athletes with six to nine years of training (r = .434, 95% CI = .365–.498) and those with more than ten years of training (r = .458, 95% CI = .200–.657; Q = 13.675, p = .001). These findings indicate that the relationship between stress and burnout is negatively moderated by the duration of athletes' training experience. 2.

Figure 8. Meta-analysis of studies investigating the stress-burnout effect (grouped by training hours per week)



Note. 1. N = 24 studies; the correlation of group of 19–24 h/w (r = .521, 95% CI = .439–.595) was higher than 6–18 hours/w group (r = .411, 95% CI = .365–.455; Q = 5.310, p = .021), the results showed that training load (hours per week, h/w) had significant positive moderating effects on the stress-burnout relationship. 2.

Figure 9. Meta-analysis of studies investigating the stress-burnout effect (grouped by athletic level)



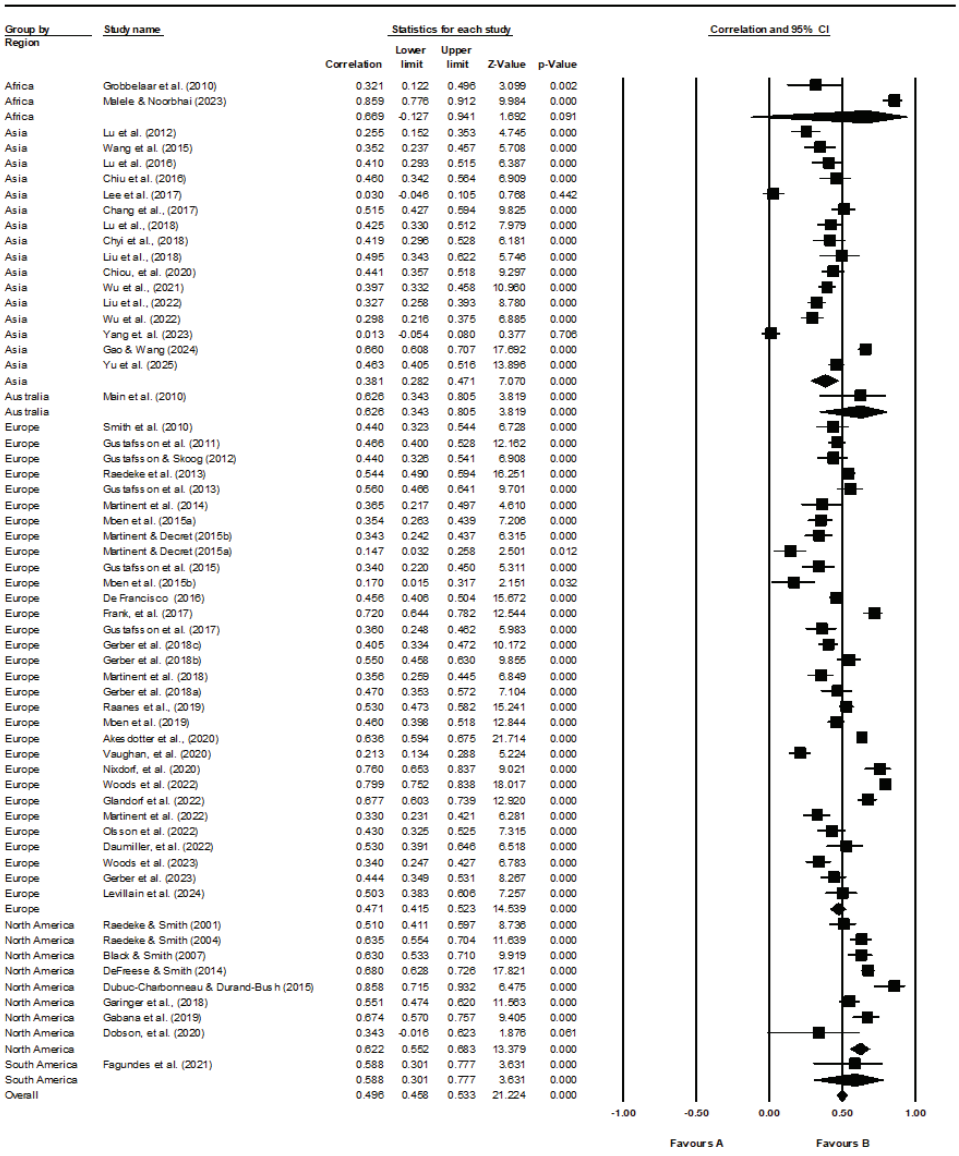
Group by athletic level	Study name	Correlation	Lower limit	Upper limit	Z-Value	p-Value
elite athlete	Raedeke & Smith (2001)	0.510	0.411	0.597	8.736	0.000
elite athlete	Raedeke & Smith (2004)	0.635	0.554	0.704	11.639	0.000
elite athlete	Black & Smith (2007)	0.630	0.533	0.710	9.919	0.000
elite athlete	Grobbelaar et al. (2010)	0.321	0.122	0.496	3.099	0.002
elite athlete	Moen et al. (2015a)	0.354	0.263	0.439	7.206	0.000
elite athlete	Martinent & Decret (2015b)	0.343	0.242	0.437	6.315	0.000
elite athlete	Martinent & Decret (2015a)	0.147	0.032	0.258	2.501	0.012
elite athlete	Moen et al. (2015b)	0.170	0.015	0.317	2.151	0.032
elite athlete	De Francisco (2016)	0.456	0.406	0.504	15.672	0.000
elite athlete	Lee et al. (2017)	0.030	-0.046	0.105	0.768	0.442
elite athlete	Gustafsson et al. (2017)	0.360	0.248	0.462	5.983	0.000
elite athlete	Gerber et al. (2018b)	0.550	0.458	0.630	9.855	0.000
elite athlete	Martinent et al. (2018)	0.356	0.259	0.445	6.849	0.000
elite athlete	Gerber et al. (2018a)	0.470	0.353	0.572	7.104	0.000
elite athlete	Raanes et al., (2019)	0.530	0.473	0.582	15.241	0.000
elite athlete	Moen et al. (2019)	0.460	0.398	0.518	12.844	0.000
elite athlete	Akesdotter et al., (2020)	0.636	0.594	0.675	21.714	0.000
elite athlete	Dobson, et al. (2020)	0.343	-0.016	0.623	1.876	0.061
elite athlete	Fagundes et al. (2021)	0.588	0.301	0.777	3.631	0.000
elite athlete	Liu et al., (2022)	0.327	0.258	0.393	8.780	0.000
elite athlete	Martinent et al. (2022)	0.330	0.231	0.421	6.281	0.000
elite athlete	Daumiller, et al. (2022)	0.530	0.391	0.646	6.518	0.000
elite athlete	Yang et. al. (2023)	0.013	-0.054	0.080	0.377	0.706
elite athlete	Gerber et al. (2023)	0.444	0.349	0.531	8.267	0.000
elite athlete	Gao & Wang (2024)	0.660	0.608	0.707	17.692	0.000
elite athlete		0.420	0.337	0.498	8.972	0.000
non-elite athlete	Smith et al. (2010)	0.440	0.323	0.544	6.728	0.000
non-elite athlete	Gustafsson & Skoog (2012)	0.440	0.326	0.541	6.908	0.000
non-elite athlete	DeFreese & Smith (2014)	0.680	0.628	0.726	17.821	0.000
non-elite athlete	Martinent et al. (2014)	0.365	0.217	0.497	4.610	0.000
non-elite athlete	Dubuc-Charbonneau & Durand-Bush (2015)	0.858	0.715	0.932	6.475	0.000
non-elite athlete	Wang et al. (2015)	0.352	0.237	0.457	5.708	0.000
non-elite athlete	Frank, et al. (2017)	0.720	0.644	0.782	12.544	0.000
non-elite athlete	Lu et al., (2018)	0.425	0.330	0.512	7.979	0.000
non-elite athlete	Nixdorf, et al. (2020)	0.760	0.653	0.837	9.021	0.000
non-elite athlete	Wu et al., (2021)	0.397	0.332	0.458	10.960	0.000
non-elite athlete	Glandorf et al. (2022)	0.677	0.603	0.739	12.920	0.000
non-elite athlete	Wu et al. (2022)	0.298	0.216	0.375	6.885	0.000
non-elite athlete	Malele & Noorbhai (2023)	0.859	0.776	0.912	9.984	0.000
non-elite athlete	Levillain et al. (2024)	0.503	0.383	0.606	7.257	0.000
non-elite athlete	Yu et al. (2025)	0.463	0.405	0.516	13.896	0.000
non-elite athlete		0.566	0.479	0.641	10.563	0.000
Overall		0.482	0.422	0.538	13.640	0.000

Note. 1. N = 40 studies; the correlation coefficient of the non-elite group (r = .566, 95% CI = .479–.641) was significantly higher than the elite group (r = .420, 95% CI = .337–.498; Q = 6.018, p = .014), which indicates that the athletes' athletic level moderated the stress-burnout relationship. 2. Moen et al. (2015a) = Moen, Federici, & Abrahamsen (2015); Moen et al. (2015b) = Moen, Abrahamsen, & Furrer (2015).

The moderating effect of region on athletes.

Athletes' region showed a moderating effect on the stress-burnout relationship (Q = 20.528, p = .001; see Figure 10). The correlation for athletes from North America (r = .622, 95% CI = .552 - .683, k = 8, τ^2 = 0.016, PI = [0.114, 0.872]) was significantly higher than that for Asia (r = .381, 95% CI = .282 - .471, k = 16, τ^2 = 0.048, PI = [-0.084,0.710]) and Europe (r = .471, 95% CI = .415 - .523, k = 31, τ^2 = 0.035, PI = [0.121, 0.717]). Thus, it is concluded that the region of athletes moderated the relationships between stress and burnout.

Figure 10. Meta-analysis of studies investigating the stress-burnout effect (grouped by region of athletes)

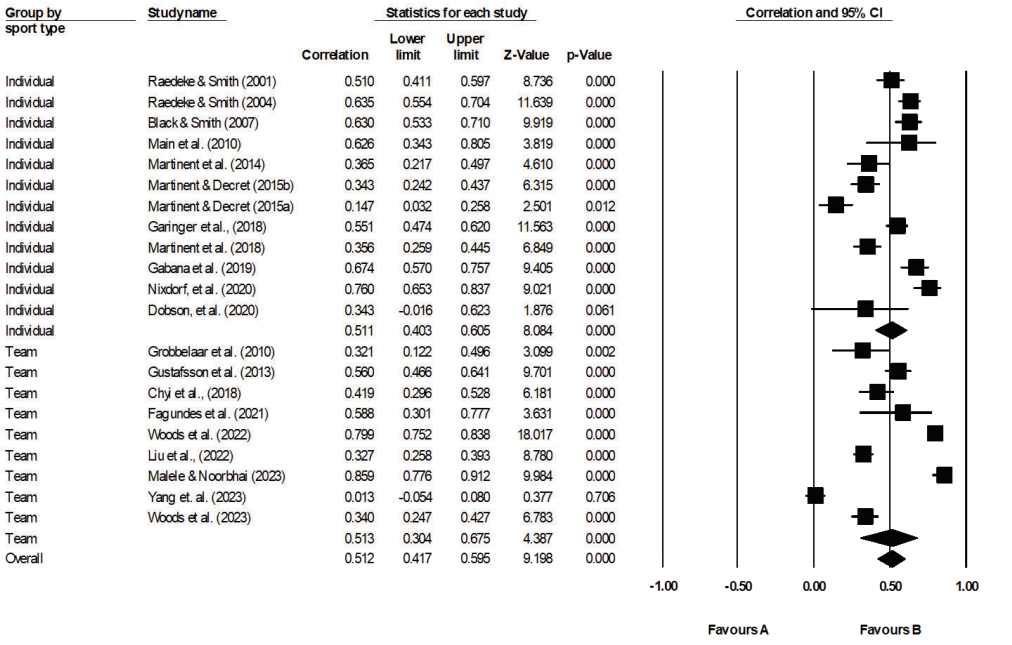


Group by Region	Study name	Correlation	Lower limit	Upper limit	Z-Value	p-Value
Africa	Grobbelaar et al. (2010)	0.321	0.122	0.496	3.099	0.002
Africa	Malele & Noorbhai (2023)	0.859	0.776	0.912	9.984	0.000
Africa		0.669	-0.127	0.941	1.692	0.091
Asia	Lu et al. (2012)	0.255	0.152	0.353	4.745	0.000
Asia	Wang et al. (2015)	0.352	0.237	0.457	5.708	0.000
Asia	Lu et al. (2016)	0.410	0.293	0.515	6.387	0.000
Asia	Chiu et al. (2016)	0.460	0.342	0.564	6.909	0.000
Asia	Lee et al. (2017)	0.030	-0.046	0.105	0.768	0.442
Asia	Chang et al., (2017)	0.515	0.427	0.594	9.825	0.000
Asia	Lu et al., (2018)	0.425	0.330	0.512	7.979	0.000
Asia	Chyi et al., (2018)	0.419	0.296	0.528	6.181	0.000
Asia	Liu et al., (2018)	0.495	0.343	0.622	5.746	0.000
Asia	Chiou, et al. (2020)	0.441	0.357	0.518	9.297	0.000
Asia	Wu et al., (2021)	0.397	0.332	0.458	10.960	0.000
Asia	Liu et al., (2022)	0.327	0.258	0.393	8.780	0.000
Asia	Wu et al. (2022)	0.298	0.216	0.375	6.885	0.000
Asia	Yang et. al. (2023)	0.013	-0.054	0.080	0.377	0.706
Asia	Gao & Wang (2024)	0.660	0.608	0.707	17.692	0.000
Asia	Yu et al. (2025)	0.463	0.405	0.516	13.896	0.000
Asia		0.381	0.282	0.471	7.070	0.000
Australia	Main et al. (2010)	0.626	0.343	0.805	3.819	0.000
Australia		0.626	0.343	0.805	3.819	0.000
Europe	Smith et al. (2010)	0.440	0.323	0.544	6.728	0.000
Europe	Gustafsson et al. (2011)	0.466	0.400	0.528	12.162	0.000
Europe	Gustafsson & Skoog (2012)	0.440	0.326	0.541	6.908	0.000
Europe	Raedeke et al. (2013)	0.544	0.490	0.594	16.251	0.000
Europe	Gustafsson et al. (2013)	0.560	0.466	0.641	9.701	0.000
Europe	Martinent et al. (2014)	0.365	0.217	0.497	4.610	0.000
Europe	Moen et al. (2015a)	0.354	0.263	0.439	7.206	0.000
Europe	Martinent & Decret (2015b)	0.343	0.242	0.437	6.315	0.000
Europe	Martinent & Decret (2015a)	0.147	0.032	0.258	2.501	0.012
Europe	Gustafsson et al. (2015)	0.340	0.220	0.450	5.311	0.000
Europe	Moen et al. (2015b)	0.170	0.015	0.317	2.151	0.032
Europe	De Francisco (2016)	0.456	0.406	0.504	15.672	0.000
Europe	Frank, et al. (2017)	0.720	0.644	0.782	12.544	0.000
Europe	Gustafsson et al. (2017)	0.360	0.248	0.462	5.983	0.000
Europe	Gerber et al. (2018c)	0.405	0.334	0.472	10.172	0.000
Europe	Gerber et al. (2018b)	0.550	0.458	0.630	9.855	0.000
Europe	Martinent et al. (2018)	0.356	0.259	0.445	6.849	0.000
Europe	Gerber et al. (2018a)	0.470	0.353	0.572	7.104	0.000
Europe	Raanes et al., (2019)	0.530	0.473	0.582	15.241	0.000
Europe	Moen et al. (2019)	0.460	0.398	0.518	12.844	0.000
Europe	Akes dotter et al., (2020)	0.636	0.594	0.675	21.714	0.000
Europe	Vaughan, et al. (2020)	0.213	0.134	0.288	5.224	0.000
Europe	Nixdorf, et al. (2020)	0.760	0.653	0.837	9.021	0.000
Europe	Woods et al. (2022)	0.799	0.752	0.838	18.017	0.000
Europe	Glandorf et al. (2022)	0.677	0.603	0.739	12.920	0.000
Europe	Martinent et al. (2022)	0.330	0.231	0.421	6.281	0.000
Europe	Olsson et al. (2022)	0.430	0.325	0.525	7.315	0.000
Europe	Daumiller, et al. (2022)	0.530	0.391	0.646	6.518	0.000
Europe	Woods et al. (2023)	0.340	0.247	0.427	6.783	0.000
Europe	Gerber et al. (2023)	0.444	0.349	0.531	8.267	0.000
Europe	Levillain et al. (2024)	0.503	0.383	0.606	7.257	0.000
Europe		0.471	0.415	0.523	14.539	0.000
North America	Raedeke & Smith (2001)	0.510	0.411	0.597	8.736	0.000
North America	Raedeke & Smith (2004)	0.635	0.554	0.704	11.639	0.000
North America	Black & Smith (2007)	0.630	0.533	0.710	9.919	0.000
North America	DeFreese & Smith (2014)	0.680	0.628	0.726	17.821	0.000
North America	Dubuc-Charbonneau & Durand-Bush (2015)	0.858	0.715	0.932	6.475	0.000
North America	Garinger et al., (2018)	0.551	0.474	0.620	11.563	0.000
North America	Gabana et al. (2019)	0.674	0.570	0.757	9.405	0.000
North America	Dobson, et al. (2020)	0.343	-0.016	0.623	1.876	0.061
North America		0.622	0.552	0.683	13.379	0.000
South America	Fagundes et al. (2021)	0.588	0.301	0.777	3.631	0.000
South America		0.588	0.301	0.777	3.631	0.000
Overall		0.496	0.458	0.533	21.224	0.000

Note. 1. N = 59 studies; the correlation for athletes from North America (r = .622, 95% CI = .552–.683) was significantly greater than that for Asia (r = .381, 95% CI = .282–.471) and Europe (r = .471, 95% CI = .415–.523). This finding indicated that the region of athletes moderates the relationships between stress and burnout (Q = 20.528, p = .001). 2. Moen et al. (2015a) = Moen, Federici, & Abrahamsen (2015); Moen et al. (2015b) = Moen, Abrahamsen, & Furrer (2015).

The moderating effect of sport type. Of all 59 studies, 12 sampled individual sports while nine recruited team athletes. The result revealed that whether athletes competed in individual or team sports did not change the strength of the stress-burnout relationship (r for individual sport = .511, 95% CI = .403 - .605, k = 12, τ^2 = 0.050, PI = [0.042, 0.795]; r for team sport = .513, 95% CI = .304 - .675, k = 9, τ^2 = 0.142, PI = [-0.359, 0.907]; p > .05; see Figure 11).

Figure 11. Meta-analysis of studies investigating the stress-burnout effect (grouped by sport type)



Group by sport type	Studyname	Correlation	Lower limit	Upper limit	Z-Value	p-Value
Individual	Raedeke & Smith (2001)	0.510	0.411	0.597	8.736	0.000
Individual	Raedeke & Smith (2004)	0.635	0.554	0.704	11.639	0.000
Individual	Black & Smith (2007)	0.630	0.533	0.710	9.919	0.000
Individual	Main et al. (2010)	0.626	0.343	0.805	3.819	0.000
Individual	Martinent et al. (2014)	0.365	0.217	0.497	4.610	0.000
Individual	Martinent & Decret (2015b)	0.343	0.242	0.437	6.315	0.000
Individual	Martinent & Decret (2015a)	0.147	0.032	0.258	2.501	0.012
Individual	Garinger et al., (2018)	0.551	0.474	0.620	11.563	0.000
Individual	Martinent et al. (2018)	0.356	0.259	0.445	6.849	0.000
Individual	Gabana et al. (2019)	0.674	0.570	0.757	9.405	0.000
Individual	Nixdorf, et al. (2020)	0.760	0.653	0.837	9.021	0.000
Individual	Dobson, et al. (2020)	0.343	-0.016	0.623	1.876	0.061
Individual		0.511	0.403	0.605	8.084	0.000
Team	Grobbelaar et al. (2010)	0.321	0.122	0.496	3.099	0.002
Team	Gustafsson et al. (2013)	0.560	0.466	0.641	9.701	0.000
Team	Chyl et al., (2018)	0.419	0.296	0.528	6.181	0.000
Team	Fagundes et al. (2021)	0.588	0.301	0.777	3.631	0.000
Team	Woods et al. (2022)	0.799	0.752	0.838	18.017	0.000
Team	Liu et al., (2022)	0.327	0.258	0.393	8.780	0.000
Team	Malele & Noorbhai (2023)	0.859	0.776	0.912	9.984	0.000
Team	Yang et. al. (2023)	0.013	-0.054	0.080	0.377	0.706
Team	Woods et al. (2023)	0.340	0.247	0.427	6.783	0.000
Team		0.513	0.304	0.675	4.387	0.000
Overall		0.512	0.417	0.595	9.198	0.000

Note. N = 19 studies; the sport type showed no moderating effect on the stress-burnout relationship (individual sport: r = .511, 95% CI = .403–.605; team sport: r = .513, 95% CI = .304–.675; Q < 0.001, p = .990).

Overall, our findings confirmed that age, sports experience, training load, athletic level, and region significantly moderated the relationship between stress and burnout, whereas gender and sport type did not.

Discussion

This meta-analysis of 59 studies involving 15,370 athletes confirms a positive correlation between stress and burnout in athletes (r = .478). In addition to the moderating effects of age and athletic level on the stress-burnout relationship reported by Lin et al. (2022), the present meta-analysis newly identified significant moderators, including sports experience (i.e., training years), training load, and geographical region (see Figure 1). The initial findings provide several theoretical implications for researchers.

Theoretical implications

Our study is consistent with Smith's (1986) cognitive-affective model of athletic burnout, which posits that burnout arises from perceived stress derived from athletes' cognitive appraisal of environmental demands and personal coping resources. Individual and contextual factors such as age, gender, training experience, training load, athletic level, cultural background, and sport type may influence this appraisal. By including these moderators in a meta-analysis, the present review provides updated evidence on how stress is associated with burnout in athletes.

We did not find moderating effects of gender and sport type. The null result for gender may reflect the limited number of single-sex samples, with only four studies including all male athletes and one including all female athletes. The very small pool of single-gender studies constrains the reliability of the analysis, and

additional research with adequately powered designs is needed to draw firmer conclusions. The lack of a moderating effect of sport type also contradicts our initial hypothesis. Previous research indicated that team sports foster cohesion and social support, which can buffer psychological distress (Reardon & Hitchcock, 2024). Sarkar and Fletcher (2014) also showed that team-sport athletes often rely on teammates and coaches for resilience. Based on this, we expected team athletes to show lower burnout risk, but our data did not support this expectation. Whether the stress-burnout link is too strong to be moderated by sport type or whether other psychosocial factors override this effect requires further study. Overall, these findings indicate that contextual and developmental moderators, such as training load and region, are more influential than demographic variables, such as gender or sport type.

Age as the moderator

The moderating effect of age on the stress-burnout relationship supports Lin et al.'s (2022) study. Several factors may explain this pattern. First, older athletes often face heightened performance expectations from coaches, teammates, media, and sponsors, perceiving failure as more consequential for their careers and reputations (Gustafsson et al., 2011). Second, ageing brings greater awareness of physical decline, slower recovery, and increased risk of injury. Finally, concerns about career longevity and post-sport transition (e.g., identity loss, financial security, social roles) add psychological strain (Lavallee & Robinson, 2007). Together, these pressures make older athletes more vulnerable to burnout.

Sports experience as the moderator

The analysis showed that less experienced athletes had a stronger stress-burnout relationship. This can be explained by their limited coping resources. Inexperienced athletes often lack effective strategies and may rely on avoidance, denial, or wishful thinking, which are less successful in managing stress (Nicholls & Polman, 2007). They also tend to view competition as threatening rather than challenging, adopting emotion-focused coping such as venting or disengagement, which increases anxiety and reduces performance (Anshel & Wells, 2000). In contrast, experienced athletes are better able to routinise preparation, manage anxiety, and appraise stress as controllable, thereby maintaining performance (Hanton et al., 2005). In general, these results suggest that novice athletes are more vulnerable to burnout, highlighting the need for coping-skills training early in their careers.

Training load as the moderator

The analysis revealed that training load significantly moderated the stress-burnout relationship. Heavy or excessive training, particularly without sufficient recovery, greatly increases the risk of burnout. Kellmann and Kallus (2001) showed that chronic stress not balanced by recovery leads to overtraining and burnout. Similarly, Gustafsson et al. (2011) found that high training volume was strongly associated with emotional exhaustion, especially among athletes with obsessive passion. Periodised training is designed to improve physical capacity through planned high-intensity sessions (Bompa & Buzzichelli, 2019). However, when poorly managed, it can lead to overtraining, mood disturbances, fatigue, performance decline, and eventually burnout (Meeusen et al., 2013; Morgan et al., 1998). These findings emphasise the importance of monitoring training loads and integrating recovery strategies to protect athletes from burnout.

Athletic level as the moderator

Our analysis showed that non-elite athletes had a stronger stress-burnout relationship than elite athletes. This finding is noteworthy, as elite athletes typically face greater external demands yet may still report lower levels of burnout. Although elite athletes often encounter intense

competition, media pressure, and organisational stress (Kristiansen et al., 2010), they also tend to possess superior coping skills and resilience that mitigate the effects of stress (Gustafsson et al., 2011). A recent review further highlighted that elite athletes frequently use a variety of problem-focused and emotion-regulation strategies to handle stress effectively (Nuetzel, 2023). In contrast, non-elite athletes may lack comparable coping resources, making them more susceptible to burnout. These results suggest that support programmes should target non-elite athletes, who may need additional psychological and social resources to manage stress. Nevertheless, the correlation between stress and burnout in elite and non-elite athletes merits further investigation.

Region as the moderator

As expected, the region significantly moderated the stress-burnout relationship. This is a novel contribution, as no previous studies have compared this link across cultures. In Asia, athletes are influenced by Confucian traditions that emphasise collectivism, filial piety, respect for authority, and emotional restraint (Li et al., 2004). These cultural values may encourage emotional suppression, altering how stress is expressed and managed. In contrast, American athletes often face high pressure to win and secure scholarships, as well as constant media scrutiny (Reardon & Factor, 2010). According to the conservation of resources theory (Hobfoll, 1989), access to external resources such as institutional and social support can buffer stress. European athletes benefit from mixed cultural influences and stronger welfare systems that provide structural support (Kristiansen et al., 2012). Collectivist traditions in both Asia and Europe may also facilitate social support, thereby reducing burnout risk (di Luzio et al., 2020; Shannon et al., 2022). However, regional differences may partly reflect unmeasured confounders, such as socioeconomic resources, institutional support systems, or the distribution of sport types, rather than purely cultural effects. Recent studies also emphasise that contextual factors, institutional structures, and sport-specific resources vary across regions and may influence burnout outcomes (Ma et al., 2025; Dišlere et al., 2025). Therefore, the regional moderation results should be interpreted with caution.

In general, our results highlight the importance of accounting for contextual and demographic moderators in future research. We encourage longitudinal and multi-level designs to examine how psychological variables, such as perfectionism, coping styles, and mental toughness, interact with stress and burnout across different sporting and cultural contexts (Kuettel & Larsen, 2020; Madigan et al., 2022).

Strengths of the study

Several strengths of this research need further discussion. First, by incorporating more recent literature (up to April 2025) and examining additional moderators such as age, gender, sports experiences, training load, athletic level, region of athletes, and sports type, we updated previous reviews (e.g., Lin et al., 2022). The meta-analysis synthesised data from 59 studies, encompassing 15,370 athletes, providing strong statistical power and increasing the generalisability of the findings across different populations, sports, and contexts. Furthermore, we followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist (Page et al., 2021) to conduct the study and examine all necessary analyses, including quality of included studies, heterogeneity, publication bias, and sensitivity tests, before formal meta-analysis, which makes this review more legitimate and reliable.

Limitations and future directions

This study has several limitations that should be noted. First, only peer-reviewed articles published in English were included, potentially excluding relevant studies

written in other languages or from the grey literature. Although publication bias tests indicated little evidence of bias, this restriction could still reduce the scope of the review. Second, the predominance of cross-sectional designs (45 of 59 studies) constrains causal inference regarding the stress-burnout relationship. The use of diverse stress and burnout measures across studies may also introduce inconsistencies in effect sizes. Additionally, several studies lacked detailed reporting of moderators such as training load, sport type, and athletic level, which weakened subgroup analyses and restricted more fine-grained recommendations. Future research should therefore adopt longitudinal and experimental designs, employ more consistent measurement tools, and ensure complete reporting of moderator variables. Expanding the cultural scope of research is also essential, as cultural norms, values, and support systems may shape the stress-burnout dynamic (e.g., Keriven & Owoeye, 2025). Cross-cultural comparisons would deepen understanding of burnout development and inform context-specific interventions tailored to different sporting environments and cultural contexts.

Practical implications

Preventing training-induced burnout requires a comprehensive, proactive approach that integrates psychological strategies, coaching practices, and environmental support. The overall stress-burnout association was large (r = .478), underscoring the need to treat burnout prevention as a high-priority concern across sporting contexts. The present findings indicate that older, more experienced athletes who train with higher loads, compete at elite levels, and are based in the Americas show a stronger association between stress and burnout. This pattern suggests that prevention programmes should be tailored according to developmental stage, training demands, and cultural background. Older and long-tenured athletes may accumulate psychological strain over time. This aligns with the theory of allostatic load (McEwen & Stellar, 1993), which posits that prolonged stress exposure without adequate recovery increases emotional exhaustion and physiological dysregulation (Gerber et al., 2018a). Given that athletes with longer sport experience demonstrated a stronger stress-burnout relationship (≥10 years: r = .502 vs. <6 years: r = .436), targeted recovery strategies should be emphasised for long-tenured athletes. For example, national-level athletes preparing for major competitions could benefit from scheduled psychological recovery phases, such as short breaks from competition or structured off-season rest periods, to reduce accumulated stress.

Heavy training loads also increase the risk of burnout, especially when recovery is inadequate. An imbalance between training stress and rest might lead to overtraining symptoms and emotional fatigue (Meeusen et al., 2013). Tools such as the RESTQ-Sport enable stress-recovery profiling, allowing coaches to adjust training plans as needed (Kellmann & Beckmann, 2018). In line with this, our moderation analysis revealed a stronger association under higher training loads (19–24 hours/week: r = .521) compared with moderate training loads (6–18 hours/week: r = .411), underscoring the need for ongoing monitoring for athletes exceeding approximately 19 hours weekly. In practice, this could involve weekly stress-recovery monitoring sheets or mobile apps during training camps to flag athletes who require reduced load or additional recovery strategies. Furthermore, athletes at higher competition levels might be especially vulnerable to performance-related pressure. Mindfulness-based and cognitive-behavioural interventions have demonstrated efficacy in reducing burnout symptoms in youth athletes (Wilczyńska et al., 2022). Interestingly, our findings indicated that non-elite athletes displayed a stronger stress–burnout association (r = .566) than elite athletes (r = .420), suggesting that prevention programs should

also prioritise non-elite groups, who may lack the advanced coping skills and systemic support available to elite counterparts. Applied to elite training environments, mindfulness sessions could be integrated into daily warm-ups or recovery routines to help athletes regulate emotions during high-pressure tournaments.

Coaching behaviours also significantly influence athlete motivation and emotional health. Autonomy-supportive coaching satisfies athletes' basic psychological needs and fosters intrinsic motivation (Deci & Ryan, 2000). Empirical work showed that basic need satisfaction and social support were associated with lower burnout levels (Shannon et al., 2021), and that coaches trained in autonomy-supportive strategies reduced burnout and increased intrinsic motivation among youth football players (Langan et al., 2015). For example, a football coach who provides athletes with choices in training drills, explains the rationale for training intensity, and encourages player input may create an environment that prevents emotional exhaustion and fosters motivation. Such approaches may be particularly effective in contexts where our analyses showed medium-to-large effect sizes (r values around .45–.50), highlighting the substantial role of the coach–athlete dynamic in modulating burnout risk.

Given the stronger stress-burnout association found among athletes from the Americas, cultural pressures such as scholarship competition and media scrutiny may intensify emotional demands (Reardon & Factor, 2010). Addressing these contextual stressors through supportive team climates is essential. Social support from significant others plays an important role in athletes' wellbeing (Chen et al., 2023) and remains one of the most effective buffers against burnout (DeFreese et al., 2015). Consistent with this, athletes from North America exhibited the strongest association (r = .622), compared with Europe (r = .471) and Asia (r = .381). These magnitudes highlight the need for regionally tailored strategies, such as mentorship programs and family-inclusive workshops, in high-pressure cultural contexts. Practical strategies include mentorship programs where senior athletes support younger teammates, family-inclusive workshops to build communication, and regular team-building sessions that reinforce collective identity. Moreover, athletes in collectivist cultures might benefit from social coping and group-based interventions (Chan & Hagger, 2012; Kim et al., 2008).

In conclusion, interventions to prevent burnout should be developmentally and contextually appropriate, combining psychological skills training, autonomy-supportive coaching, and systemic support structures. Embedding these approaches into daily training routines and competition environments, such as by monitoring training loads, implementing recovery protocols, providing athlete-centred coaching, and fostering team cohesion, can protect athletes from burnout and sustain long-term performance and wellbeing.

Conclusion

To fill the gap of earlier reviews of the athletes' stress-burnout relationship, we conducted a systematic review and meta-analysis. We found a strong association between stress and burnout, and that age, sports experience, training load, athletic level, and region moderate this association. The findings update current knowledge of the relationship between athletes' stress and burnout and provide a comprehensive picture of its variations. We suggest that sports professionals provide athletes with appropriate stress management programs during their daily training. By doing so, we can prevent the negative consequences of youth sports participation and enhance their psychological well-being.

Ethics statement

This research is a secondary analysis of published studies. All included articles were peer-reviewed and assumed to meet the ethical standards of their respective institutions.

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Data Availability Statement

All data analysed in this review were obtained from published studies. The extracted datasets and analytic code are available from the corresponding author upon reasonable request.

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Appendix A. Characteristics of Included Studies

NO	Author(s)	Country	N of Sample/ Ave. Age/ athletic level/ sports experiences	Study design/ main analysis approach	Study purpose about stress-burnout	Main findings of the relationship between S and B	Measurement of Burnout	Measurement of Stress
1	Raedeke & Smith (2001)	USA	244/ 15.8 ± 1.3/ elite level/ 8.0 ± 2.9 years	Quantitative research/ psychometrics	To develop a psychometrically sound measurement of athlete burnout.	Stress correlated positively with burnout.	ABQ (Raedeke & Smith, 2001)	PSS (Cohen et al., 1983)
2	Raedeke & Smith (2004)	USA	244/ 15.8 ± 1.3/ elite level/ 8.0 ± 2.9 years	Quantitative research/ psychometrics	To examine whether coping behaviors and satisfaction with social support (a) have indirect stress-mediated relationships with burnout or (b) disjunctively or conjunctively moderate the relationship between perceived stress and burnout. To examine stress as a mediator or moderator between variables and burnout.	Stress correlated positively with burnout.	ABQ (Raedeke & Smith, 2001)	PSS (Cohen et al., 1983)
3	Black & Smith (2007)	USA	182/ 16.0 ± 1.6/ elite level/ 7.30 years	Quantitative research/ psychometrics	Coakley's (1992) perspective on athlete burnout among adolescents posits that a narrow identity and local opportunity to exert control over one's sports experience contribute to athlete burnout.	Life stress correlated positively with burnout.	ABQ (Rakede & Smith, 2001)	PSS (Cohen et al., 1983)/
4	Grobbelaar et al. (2010)	South Africa	41/ 21.87± 1.39/ elite level /13.76 years	Quantitative research/ psychometrics/ longitudinal - 5 months	To compare the recovery stress, burnout, and mood state scores of elite student rugby players based on their playing position, experience level, and starting status.	1. Experienced players exhibited significantly different life stress levels, but there was no significant difference in burnout.	ABQ (Raedeke & Smith, 2001)	RESTQ-52 sport (Kellmann & Kallus, 2001)

NO	Author(s)	Country	N of Sample/ Ave. Age/ athletic level/ sports experiences	Study design/ main analysis approach	Study purpose about stress-burnout	Main findings of the relationship between S and B	Measurement of Burnout	Measurement of Stress
5	Main et al. (2010)	Australia	30/ male=27.1± 9.1, female=27.4± 6.6/ -/ 5.20 years	Quantitative research/ psychometrics/ longitudinal - 45 weeks	To determine whether exposure to stressors had a significant effect on the experience of various negative health outcomes.	2. Different positions had significant differences in Sport-Specific Stress and Burnout (Backline players > Forwards). Life stress had a longitudinal effect on the burnout.	ABQ (Raedeke & Smith, 2001)	PSS-10 (Cohen et. al., 1983)/ LS
6	Smith et al. (2010)	Sweden	206/ 17.2± 1.0/ not elite level/ -	Quantitative research/ psychometrics	To examine the association between perceptions of the peer-created motivational climate and athlete burnout in adolescent athletes while controlling perceived stress.	Higher perceived life stress is associated with higher scores on burnout.	ABQ (Raedeke & Smith, 2001)/ DV	PSS (Cohen et al., 1983)/ IV-predictor
7	Gustafsson et al. (2011)	Sweden	258/ 17.3± 1.0/ -/ -	Quantitative research/ psychometrics	To examine whether harmonious passion and obsessive passion pose equal risks for burnout and stress.	Athletes with a Harmonious passion were significantly negatively correlated with burnout and life stress; athletes with obsessive passion were significantly positively correlated with burnout and perceived life stress.	ABQ (Rakede & Smith, 2001)/ DV	PSS (Cohen et al, 1983)/ DV
8	Gustafsson & Skoog (2012)	Sweden	217/ 17.21± 0.95/ not elite level/ -	Quantitative research/ psychometrics	To investigate whether stress serves as a mediator of the relationship between optimism and burnout symptoms in athletes.	Life stress was significantly related to burnout. The more stressful the athletes perceived the situation to be, the higher the degree of burnout; the	ABQ (Raedeke & Smith, 2001,2009)/ DV	PSS (Cohen et al., 1983)/ / mediator

NO	Author(s)	Country	N of Sample/ Ave. Age/ athletic level/ sports experiences	Study design/ main analysis approach	Study purpose about stress-burnout	Main findings of the relationship between S and B	Measurement of Burnout	Measurement of Stress
						lower the sense of accomplishment, the greater burnout perceived.		
9	Lu et al. (2012)	Taiwan	334/ 19.26± 1.42/ not elite level/ -	Quantitative research/ psychometrics	To develop a reliable and valid measurement assessing college student-athletes' life stress.	Most subscales of the 24-item CSALSS had low to moderate positive associations with the three dimensions of burnout.	ABQ-11 (Raedeke & Smith, 2001; revised by Lu et al., 2006)	CSALSS, (Lu et al., 2012)
10	Gustafsson et al. (2013)	Sweden	238/ 17.0± 0.9/ not elite level/ 10.72 years	Quantitative research/ psychometrics	To examine whether stress mediated the relationship between trait hope and burnout in elite junior soccer players.	Life stress was positively correlated with burnout. And the associations between stress and burnout were strong.	ABQ (Raedeke & Smith, 2001)/ DV	PSS (Cohen et. al., 1983)/ mediator
11	Raedeke et al. (2013)	Spanish	302/ 19.06 ± 3.88/ -/ 6.95 years	Quantitative research/ psychometric	To evaluate construct validity evidence associated with the Spanish version of ABQ and related to stress.	The correlations between burnout and related markers of ill-being, including sports stress, anxiety, and depression, were low to moderate. These findings suggest that burnout and related markers of ill-being are distinct yet related constructs.	ABQ (Raedeke & Smith, 2001,2009)	DASS-21 -Spanish version (Bados, et al., 2005)
12	DeFreese & Smith (2014)	USA	465/ 19.7± 2.3/ not elite level/ 8.10 years	Quantitative research/ psychometric/ longitudinal-4 time point of the competitive season	To examine perceived social support and negative social interactions as potential moderators of temporal stress burnout.	Life stress was positively temporally associated with burnout.	ABQ (Raedeke & Smith, 2009)/ DV	PSS (Cohen et. al., 1983)/ IV

NO	Author(s)	Country	N of Sample/ Ave. Age/ athletic level/ sports experiences	Study design/ main analysis approach	Study purpose about stress-burnout	Main findings of the relationship between S and B	Measurement of Burnout	Measurement of Stress
13	Martinent et al. (2014)	France	148/ 14.2± 2.1/ not elite level/ 6.50 years	Quantitative research/ psychometric	Test the original 19-factor and the new 14-factor structure of the Recovery-Stress Questionnaire for Athletes, and examine the correlation between RESTQ-Sport and burnout.	Both sport stress and life stress subscales were correlated positively with burnout.	ABQ-French v (Isoard et al., 2010)/ IV	RESTQ-sport-French version (Martinet, 2014)/ DV
14	Dubuc-Charbonneau & Durand-Bush (2015)	Canada	8 / 20.2 / not elite level/ 2.00 years	Mixed methods design/ psychometric/intervention - 2 months	To ssess the impact of a person-centered, feel-based self-regulation intervention on stress and burnout. [intervention: self-regulation]	Life stress and burnout levels significantly decreased as the intervention progressed.	ABQ (Raedeke & Smith, 2001) / DV	PSS (Cohen et al., 1983) / DV
15	Gustafsson et al. (2015)	Sweden	233/ 17.5± 1.08/ -/ 8.00 years	Quantitative research/ psychometric	To examine whether the relationship mediates stress between mindfulness and stress.	A moderate association was found between perceived life stress and burnout.	ABQ (Raedeke & Smith, 2001)/ DV	PSS (Cohen et al., 1983) / mediator
16	Martinent & Decret (2015a)	France	141/ 13.85± 2.04/ elite level/6.18 years	Quantitative research/ psychometric/ longitudinal – 6~8 months	To examine whether athletes from different motivational profiles differ in terms of stress and burnout.	Athletes from the moderate profile of motivation have experienced higher levels of burnout, and life and sport-specific stress	ABQ-French v (Isoard et al., 2010)/ DV	RESTQ-French v (Martinet et al., 2014)/ DV
17	Martinent & Decret (2015b)	France	147/ 13.91± 2.03/ elite level/ 6.23 years	Quantitative research/ psychometric/ longitudinal – 6~8 months	TO examine whether young athletes from distinct coping profiles differ in their responses to daily stressors in terms of burnout and stress.	Different coping profile athletes had a significant difference in both types of stress and burnout (DgOC & DtOC profile > TOC profile, low coping profile)	ABQ-French version (Isoard-Gautheur et al., 2010)/ DV	RESTQ-Sport -French version (Martinent et al., 2014)/ DV

NO	Author(s)	Country	N of Sample/ Ave. Age/ athletic level/ sports experiences	Study design/ main analysis approach	Study purpose about stress-burnout	Main findings of the relationship between S and B	Measurement of Burnout	Measurement of Stress
18	Moen, Federici, & Abrahamsen (2015)	Norway	382/ 18.5/ elite level / -	Quantitative research/ psychometric	To investigate the impact of mindfulness on stress and athlete burnout.	Life stress was positively correlated with burnout.	ABQ- reduced version from Raedeke & Smith, 2009/ DV	PSS-14 (Cohen, 1983)/ IV /mediator
19	Moen, Abrahamsen, & Furrer (2015)	Norway	77/ 18.5(16~20)/ elite level / -	Quantitative research/ psychometric/ intervention	To investigate the effects of a 12-week mindfulness intervention on perceived stress and athlete burnout among junior elite athletes in sports. [intervention: mindfulness]	Life stress was positively correlated with burnout.	ABQ (Raedeke & Smith, 2009)/ DV	PSS-14 (Cohen et al., 1983)/ DV
20	Wang et al. (2015)	Taiwan	244/ 19.98± 1.37/ not elite level / 8.91 years	Quantitative research/ psychometric	To examine whether social support has life stress-mediated influences on athletes' burnout.	Both daily life stress and sports life stress are significantly associated with athlete burnout.	ABQ (translated by (Lu et al., 2006; Raedeke & Smith, 2001)/ DV	CSALSS (Lu et al., 2012)/ mediator
21	Chiu et al. (2016)	Taiwan	196 (study 2)/ 19.88± 1.35/ -/ -	Quantitative research/ psychometric	To examine the measurement invariance of the PSS between athletes and non-athletes, and assess the construct validity and reliability in sports contexts.	Both sports stress and life stress were positively related to burnout.	ABQ (Raedeke & Smith, 2001)/ DV	CSALSS (Lu et al., 2012)
22	De Francisco et al. (2016)	Spanish	453/ 13~29/ elite level / 7.23 years	Quantitative research/ Structural psychometric	To investigate the relationship among perceived stress, burnout, and depression in athletes.	Sports stress has a direct, positive effect on burnout.	ABQ (Rakede & Smith, 2001, 2009)	DASS-21-Spanish version (Bados et al., 2005)/
23	Lu et al. (2016)	Taiwan	218/ 20.0± 1.3/ -/ 9.10 years	Quantitative research/ psychometric	To examine the conjunctive effects of athletes' resilience and coaches' social support on	Both Sport stress and life stress had a significantly positive relationship with burnout.	ABQ (Raedeke & Smith, 2001)/ DV	CSALSS, (Lu et al., 2012)/ IV

NO	Author(s)	Country	N of Sample/ Ave. Age/ athletic level/ sports experiences	Study design/ main analysis approach	Study purpose about stress-burnout	Main findings of the relationship between S and B	Measurement of Burnout	Measurement of Stress
					the relationship between life stress and burnout.			
24	Chang et al. (2017)	Taiwan	300 / 20.43 ± 1.68 / -/ 9.83 ± 3.42 y	Quantitative research/ psychometric	To examine the mediating role of negative thoughts on the stress-burnout relationship.	Sport stress and life stress are both significantly correlated with burnout.	ABQ (Raedeke & Smith, 2001) / DV	CSALSS, (Lu et al., 2012)/ IV
25	Frank et al. (2017)	Germany	194 / 15.08 ± 1.95 / not elite level / -	Quantitative research/ psychometric	To assess burnout and depression along with stress measurements.	Life stress was positively associated with burnout.	ABQ (Raedeke & Smith, 2001) / DV	TICS (Schulz et al., 2004) / IV
26	Gustafsson et al. (2017)	Sweden	255/ 16.95± 0.86/ elite level / 8.80 years	Quantitative research/ psychometric	To investigate the fear of failure in highly competitive junior athletes and its association with psychological stress and burnout.	Life stress was positively correlated with burnout.	ABQ (Raedeke & Smith, 2001)/ DV	PSS (Cohen et al., 1983)/ DV
27	Lee et al. (2017)	Korea	332/ 17.57± 0.62/ elite level / -	Quantitative research/ psychometric	To test the structural relationships between stress and burnout in student-athletes	Sports stress and life stress were both significantly positively correlated with burnout.	ABQ (Raedeke & Smith, 2001)/ mediator	Stress scale for PEHS (Lee et al., 2014)/IV
28	Chyi et al. (2018)	Taiwan	195 / 19.89 ± 1.34 / -/ 7.56 ± 2.83 years	Quantitative research/ psychometric	To xamine the relationships among athletes' life stress, perceived stress, and burnout, and investigate the mediating or moderating role of perceived stress on the life stress–burnout relationship.	1. Athlete burnout showed a higher correlation with sport-specific life stress compared to general-life stress and perceived distress. But burnout negatively correlated with counter-stress. 2. Sport-specific stress and general-life stress positively predicted perceived distress and burnout. And perceived	ABQ (Raedeke & Smith, 2001) / DV	1. PSS (Cohen et al., 1983) /IV /mediator 2. CSALSS (Lu et al., 2012)/ IV/mediator

NO	Author(s)	Country	N of Sample/ Ave. Age/ athletic level/ sports experiences	Study design/ main analysis approach	Study purpose about stress-burnout	Main findings of the relationship between S and B	Measurement of Burnout	Measurement of Stress
						distress positively predicted burnout.		
29	Garinger et al. (2018)	USA	351 / 19.97 ± 1.47 /-/ 7.00 years	Quantitative research/ psychometric	To examine the influence of perfectionistic strivings and concerns on burnout and perceived stress as a mediator of this relationship in players	Life stress was positively correlated with burnout.	ABQ (Raedeke & Smith, 2001) / DV	PSS (Cohen et. al., 1983) / mediator
30	Gerber, Best, & et al. (2018)	Switzerland	197 / 16.83 ± 1.40 / elite level/ 7.79 ± 3.07 years	Quantitative research/ psychometric/ longitudinal – 6 months	To examine the psychometric properties of a German version of the ABQ and its usefulness as a screening tool to detect clinically relevant burnout symptoms such as stress.	Life stress was positively correlated with burnout, as measured by ABQ and SMBM.	1. ABQ (Raedeke & Smith, 2001) / DV 2. SMBM (Lerman et al., 1999) / DV	PSS (Cohen et al., 1983) / DV
31	Gerber, Colledge, & et al. (2018)	Switzerland	257 (sample 3) / 16.82 ± 1.44 / elite level / -	Quantitative research/ psychometric	To examine the psychometric properties of the SMBM in three independent samples of adolescents (sample 3 were athletes)	Life stress was positively correlated with burnout.	SMBM (Lerman et al., 1999) / DV	PSS (Cohen et al., 1983) / IV
32	Gerber, Gustafsson, & et al. (2018)	Switzerland	257 / 16.82 ± 1.44 / n/a	Quantitative research/ psychometric/ longitudinal – 6 months	To examine the presence of clinically relevant symptoms of burnout and the potential interaction between perceived stress and burnout symptoms.	Higher life stress scores were associated with higher levels of burnout.	SMBM (Lerman, et al., 1999) / DV	PSS-10 (Cohen, 1983) / IV
33	Liu et al. (2018)	Taiwan	115 / 19.83 ± 1.28 / -/ -	Quantitative research/ psychometric	To translate the Organisational Stressor Indicator for Sports Performers (OSI-SP) into Chinese and examine the relationships among OSI-SP subscales, the College Student-Athlete Life Stress Scale, and	Life stress was significantly correlated with burnout.	ABQ (Raedeke & Smith, 2001) / DV	CSALSS, (Lu et al., 2012)

NO	Author(s)	Country	N of Sample/ Ave. Age/ athletic level/ sports experiences	Study design/ main analysis approach	Study purpose about stress-burnout	Main findings of the relationship between S and B	Measurement of Burnout	Measurement of Stress
					burnout among Taiwanese athletes.			
34	Lu et al. (2018)	Taiwan	312 (study 4) / 19.87 ± 1.54/ not elite level/ -	Quantitative research/ psychometric	To examine the relationships among AMES subscales, life stress in college student-athletes, and burnout.	Both sport stress and life stress were significantly positively correlated with burnout.	ABQ (Raedeke & Smith, 2001) / DV	CSALSS, (Lu et al., 2012)/ DV
35	Martinent et al. (2018)	France	159 / 14.07 ± 2.13 / elite level/ 6.36 years	Quantitative research/ psychometric/ longitudinal – 6 years	To examine the prognostic relevance of burnout, perceived stress, and other variables.	Athletes' performance was weakly correlated to stress and moderately correlated to burnout.	ABQ (French version, Isoard-Gautheur et al., 2010) / DV	RESTQ (French version, Martinent et al., 2014)/ IV
36	Gabana et al. (2019)	USA	51 /19.8 ± 1.2 / -/ -	Quantitative research/ psychometric/ intervention – gratitude attitude	To explore the psychological distress and athlete burnout after an intervention of the Attitude of Gratitude workshop.	Significant time affects psychological distress and burnout; both stress and burnout decreased as time went on.	ABQ (Radeke & Smith, 2001)/ DV	BSI-18 (Derogatis, 2001) / DV
37	Moen et al. (2019)	Norway	670 / 18.00/ elite level / -	Quantitative research/ psychometric	To investigate associations between perceived stress, athlete burnout, and other variables.	Life stress was positively associated with burnout.	ABQ (Raedeke & Smith, 2004) / DV	PSS-14 (Cohen et al., 1983) / IV
38	Raanes et al. (2019)	Norway	670 / 17.98 ± 0.89 / elite level/ -	Quantitative research/psychometrics	To examine how perceived stress and other variables are associated with athlete burnout.	Stress was positively associated with burnout.	ABQ (Raedeke & Smith, 2001, 2009) / DV	PSS (Cohen et al., 1983) / DV
39	Åkesdotter et al. (2020)	Sweden	333 / 19.2 / elite level/ -	Quantitative research/ psychometric	To investigate if sport-specific instruments (PSS & burnout) could indicate clinical levels of psychiatric symptoms.	Both life stress and burnout were significantly different by sex (Female > Male).	ABQ (Raedeke & Smith, 2009 / DV	PSS-4 (Warttig et al., 2013) / IV

NO	Author(s)	Country	N of Sample/ Ave. Age/ athletic level/ sports experiences	Study design/ main analysis approach	Study purpose about stress-burnout	Main findings of the relationship between S and B	Measurement of Burnout	Measurement of Stress
40	Chiou et al. (2020)	Taiwan	1. 230(Study 1) / 19.92 ± 1.59 / -/6.46 years 2. 159 (study 2)/ 20.2 ± 2.04 / -/ 9.20 years	Quantitative research/ psychometric	To examine the moderating effects of athletic mental energy on the athletes' life stress–-burnout relationship.	Both results showed that life stress and sports stress were positively associated with burnout.	ABQ (Raedeke & Smith, 2001) / IV	CSALSS, (Lu et al., 2012)/ IV
41	Dobson et al. (2020)	USA	13 / 19 ± 1.0 / elite level/ -	Quantitative research/ Experimental Approach/ longitudinal – 6 months	To use psychological stress and burnout to investigate the impact of overload training and tapering in female swimmers.	Both sport stress and life stress and burnout levels were increased by training loading.	ABQ (Raedeke & Smith, 2001) / DV	RESTQ-52 sport (Kellmann & Kallus, 2001)/ DV
42	Nixdorf et al. (2020)	Germany	85 / 14.82 ± 2.26 / not elite level/ -	Quantitative research/ psychometric/ longitudinal – 6 months	To Assess possible vulnerabilities in a training and preparation phase; stressors (chronic stress) and burnout were assessed during a competitive season.	A high level of chronic stress was relevant to burnout	ABQ (German version, Ziemainz et al., 2004) / DV	TICS (Schulz et al., 2004)/ IV
43	Vaughan et al. (2020)	UK	589 / 23.54 ± 9.38 / partial elite level/ 8.82 years	Quantitative research/ psychometric/ questionnaire developed	To assess the correlation between DASS-21 subscales and athlete burnout.	Life stress was positively associated with burnout.	ABQ (Raedeke & Smith, 2001)	DASS-21 (Lovibond & Lovibond, 1995)
44	Fagundes et al. (2021)	Brazil	32 / 24.16 ± 4.58 / elite level/ 4.82 years	Quantitative research/ psychometric	To examine whether the stress of overtraining predicts athletes' burnout	Life stress was positively associated with burnout.	ABQ (Brazilian version, Guedes & Souza, 2016) / DV	RESTQ-76 sport (Kellmann & Kallus, 2001)/IV
45	Wu et al. (2021)	China	685 / 20.5 ± 1.5 / not elite level/ -	Quantitative research/ psychometric	To examine the association of motivation with psychological distress and burnout.	Life stress was positively associated with burnout.	ABQ (Raedeke & Smith, 2001) / DV	DASS-21 (Lovibond & Lovibond, 1995)/ DV

NO	Author(s)	Country	N of Sample/ Ave. Age/ athletic level/ sports experiences	Study design/ main analysis approach	Study purpose about stress-burnout	Main findings of the relationship between S and B	Measurement of Burnout	Measurement of Stress
46	Daumiller, et al. (2022)	Germany	125 / 23.7 ± 4.0 / elite level/ -	Quantitative research/ psychometric	To examine the effects of achievement goals on athlete burnout levels and psychosomatic stress symptoms.	Life stress was positively associated with burnout.	ABQ-D (German version, Ziemainz et al., 2004)	SCI (Satow, 2012)
47	Glandorf et al. (2022)	UK	N=95 / 23.12± 6.87/ not elite level/ 8 years	Quantitative research/ psychometric/ longitudinal – 3~12 weeks	To test whether team identification predicts athlete burnout through a serial mediation of perceived support and stress.	Life stress was positively associated with burnout.	ABQ (Raedeke & Smith, 2001)/DV	PSS (Cohen et al., 1983)/ Mediator
48	Liu et al. (2022)	China	672 / 19.5 ± 0.5 / elite level/ -	Quantitative research / psychometric	To evaluate the mediating role of stress between psychological distress and athletic burnout during the COVID-19 pandemic.	Life stress was positively associated with burnout.	ABQ (Raedeke & Smith, 2001) / DV	PSS-10 (Cohen, 1983) / IV-mediator
49	Martinent et al. (2022)	French	159 / 14.07 / elite level/ 6.36 years	Quantitative research/ psychometric/ longitudinal – 3 months	To explore the role of stress in athlete burnout symptoms, considering both individual and contextual factors (such as training group).	Sports stress was positively associated with burnout; however, stress did not significantly predict burnout when other factors were considered.	ABQ (French version, Isoard-Gautheur et al., 2010) / DV	RESTQ-Sport (Martinent et al., 2014) / IV
50	Olsson et al. (2022)	UK	256 / 21.26 ± 4.73 / -/ 8.38 ± 4.56 years	Quantitative research / psychometric	To examine the relationships between perfectionism, perceived stress, and athlete burnout, explicitly testing whether perceived stress mediates the perfectionism-burnout relationship	Perceived stress was positively related to athlete burnout.	ABQ (Raedeke & Smith, 2001)/DV	PSS (Cohen et al., 1983)/ Mediator

NO	Author(s)	Country	N of Sample/ Ave. Age/ athletic level/ sports experiences	Study design/ main analysis approach	Study purpose about stress-burnout	Main findings of the relationship between S and B	Measurement of Burnout	Measurement of Stress
51	Woods et al. (2022)	Ireland	N=92 / 27.05 ± 7.56 y / partial elite level/ 5.50 years	Quantitative research/ psychometric/ longitudinal – 14 months	To compare levels of burnout and stress reported by Gaelic games athletes before and after the COVID-19 suspension period, and examine how athletes utilized and perceived this period.	Perceived stress was positively related to athlete burnout.	ABQ (Raedeke & Smith, 2001)/DV	PSS-10 (Cohen et al., 1994)/ LS (perceived daily-life stress)/ IV
52	Wu et al. (2022)	China	506 / 21.3 y / not elite level/ 8.9 ± 3.60 years	Quantitative research/Correlational study with conditional process analysis	To investigate how resilience affects the relationships between organizational stressors and burnout.	Organizational stressors were positively related to athlete burnout.	ABQ (Raedeke & Smith, 2001)/DV	OSI-SP (Arnold et al., 2013)/ IV
53	Gerber et al. (2023)	Swiss	135 / 16.76 ± 1.36 / elite level/ 8.27 years.	Quantitative research/ psychometric/ longitudinal – 10 months	To examine the predictive value of stress states for burnout symptoms.	Sports stress was positively associated with burnout.	SMBM (Lerman Y, et al., 1999) / DV	ARSS (Hitzschke B et al., 2015)/ IV
54	Malele & Noorbhai (2023)	South Africa	63 / 24 ± 5 / not elite level/ -	Quantitative research/ psychometric	To investigate the prevalence of mental health symptoms (stress, burnout) among cricket players during COVID-19	Stress at a moderate level, and burnout at a low level.	ABQ (Raedeke & Smith, 2001)/ DV	DASS-21 (Lovibond & Lovibond, 1995) / DV
55	Yang et. al. (2023)	Taiwan	428 / 19.18 / elite level/ 9.21 years	Quantitative research/ psychometric	To explore the influences of athletes' psychological capital on their life stress and burnout.	Life stress was positively associated with burnout.	ABQ (Chinese version, Lu et al., 2006)	CSALSS, (Lu et al., 2012)/ IV
56	Woods et al. (2023)	Ireland	370 / 24.32 ± 5.95 / partial elite level/ -	Quantitative research / psychometric	To assess the utility of the stress perspective and identify key predictors of burnout in athletes.	Perceived stress was positively related to athlete burnout.	ABQ (Raedeke & Smith, 2001)/ DV	PSS-10 (Cohen & Williamson, 1988)/ IV

NO	Author(s)	Country	N of Sample/ Ave. Age/ athletic level/ sports experiences	Study design/ main analysis approach	Study purpose about stress-burnout	Main findings of the relationship between S and B	Measurement of Burnout	Measurement of Stress
57	Gao & Wang (2024)	China	501 / 20.74 ± 2.51 / elite level/ -	Quantitative research / psychometric	To explore the relationship and influencing pathways between mental health indicators (including stress) and athlete burnout among Chinese competitive athletes.	Perceived stress was positively related to athlete burnout.	ABQ (Raedeke & Smith, 2001)/DV	APSQ (Rice et al., 2020)/ /IV
58	Levillain et al. (2024)	France	175 / 20.30 ± 3.75 / not elite level / 9.55 ± 5.04 years	Quantitative research / psychometric	To explore the relationships between stress, burnout, and other variables.	Perceived stress was positively related to athlete burnout.	ABQ-S (Isoard-Gautheur et al., 2018)/ DV	SRSS (Kellmann et al., 2016)/IV
59	Yu et al. (2025)	China	344 / 17.68 ± 3.8 / not elite level/ -	Quantitative research / psychometric	To examine the relationships among perceived stress, athlete burnout, and other variables.	Perceived stress was positively related to athlete burnout.	ABQ (Raedeke & Smith, 2001)/DV	PSS (Cohen et al., 1983)

Note. ABQ- Athletes Burnout Questionnaire; MBI- Maslach Burnout Inventory; SMBM: Shirom-Melamed Burnout Measure; PSS- Perceived Stress Scale; CSALSS- College Student–Athletes' Life Stress Scale; REST-Q- Recovery-Stress Questionnaire for Athletes; DASS- Depression Anxiety Stress Scales; TICS- Trier Inventory of Chronic Stress; Stress scale for PEHS- stress scale for physical education high school students; SCI- Stress and Coping Inventory. ABQ–E: perceived emotional and physical exhaustion; ABQ–D: devaluation of sports participation; ABQ–RA: a reduced sense of athletic accomplishment; IPA: Through interpretive phenomenological analysis; ARSS: Acute Recovery and Stress Scale; APSQ: Athlete Psychological Strain Questionnaire.

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INTERNATIONAL SPORTS STUDIES

REVIEW

Studying Baduanjin Qigong: A Bibliometric Analysis of Research Trends and Future Prospects

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Abstract

Baduanjin, a traditional Chinese Qigong exercise, has gained increasing scholarly attention for its post-COVID-19 health benefits. This study presents a bibliometric analysis to map research trends, identify influential contributors, and highlight future directions in Baduanjin research. The analysis is based on Scopus-indexed publications from 1982 to 2025, with a total of 525 documents included. The field has expanded rapidly since 2015, with a notable surge after 2021. Zheng G is identified as the most productive author, while Medicine (United States) emerges as the leading publication source. China remains the dominant contributor and central hub of collaboration, particularly with the United States, Malaysia, the United Kingdom, and Canada. Key research hotspots include mental health and well-being, rehabilitation and chronic diseases, traditional Chinese medicine and holistic health, ageing and physical function, and pulmonary rehabilitation. The conceptual structure map reveals Baduanjin's multidisciplinary nature, integrating mental, physical, and therapeutic dimensions. Future research should enhance international collaboration, standardise methodologies, expand its scope among young adults and women, and further explore its role in preventative healthcare and education.

Keywords:
good health and well-being, quality education, qigong, gender equality, Health, psychological well-being

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Introduction

Baduanjin, a traditional Chinese qigong exercise, has been practised for over a thousand years and is recognised for its health benefits; also known as the "Eight Pieces of Brocade," its origins date back to the Northern Song Dynasty, where it was developed as a structured health practice rooted in ancient Chinese customs and medical theories (Wen et al., 2024).

Rooted in Traditional Chinese Medicine (TCM) (Guan et al., 2023) and Qigong, Baduanjin integrates physical movements, mental focus, and controlled breathing, embodying both therapeutic and meditative components to promote holistic health (Chen et al., 2024; Zhou et al., 2024). Research attention has rapidly increased, particularly during the COVID-19 pandemic (Reitinger et al., 2021). Practice involves a series of gentle movements and breathing exercises that promote relaxation

and balance. As a low-cost, accessible, and effective health intervention, Baduanjin has been widely promoted for its benefits in physical fitness, mental well-being, and chronic disease management (Chen et al., 2023; Li et al., 2014; Zou et al., 2017).

In China, higher education institutions have increasingly integrated Baduanjin into university programmes, recognising its physical and mental health benefits as part of physical education curricula and health promotion initiatives (Wen et al., 2024; Zhang & Jiang, 2023). Studies have demonstrated that Baduanjin can significantly reduce symptoms of anxiety, depression, and stress while also enhancing physical fitness and body composition among college students (Jiang et al., 2024). Among university students, it serves as an accessible intervention for reducing stress and anxiety, particularly in high-risk groups such as medical students (Zhang et al., 2024). Its contribution to enhancing balance and coordination further reinforces its integration into university sports and wellness initiatives, providing a holistic approach to student well-being. Empirical research highlights the effectiveness of Baduanjin interventions in academic settings. A study at Huanghe Science and Technology College found that students experienced notable reductions in anxiety and depression scores after a two-month Baduanjin intervention (Zhang & Bayasgalan, 2024). Additionally, a 16-week Baduanjin programme for female college students significantly improved physical fitness parameters, including vital capacity, grip strength, and endurance, alongside mental health benefits (Zhao et al., 2024). These results substantiate the viability of Baduanjin as a feasible and economically accessible form of physical exercise that can be implemented in higher education institutions to promote physical and psychological well-being.

While research has highlighted its potential in therapy in any global academic context, Baduanjin has attracted increasing research attention on several fronts, particularly medicine, sports training, and psychology (Sun et al., 2022; Zheng et al., 2019; Zou et al., 2024). Current studies have shown the efficacy of Baduanjin in cardiovascular health, stress reduction, and chronic disease management. Hence, it has been incorporated into rehabilitation programmes, elderly care, and treatment management (Li et al., 2024). The progress in publishing traditional Chinese exercises like Baduanjin has been steady, especially in stroke rehabilitation and musculoskeletal disorders (Tan et al., 2024). Baduanjin has shown significant health benefits for general recovery in different populations. It has been effective at easing mood disorders in perimenopausal women, with 63.64% of studies reporting positive effects on mental health (Liu et al., 2024). The combination of Baduanjin with resistance training has helped reduce anxiety and depression in patients suffering from haematological malignancies (Shen et al., 2024). Studies on how Baduanjin improves cognitive function, especially in older people, have linked it to improved brain connectivity and increased grey matter volume (Zhao, 2024). It has been demonstrated to be a safe exercise and an effective means of curbing depression and anxiety during the COVID-19 pandemic (Huang et al., 2024). Studies also suggest it may be a potential intervention for weight management, especially in obese and overweight populations (Gao et al., 2024).

Although there is increasing interest in Baduanjin, key research gaps, emerging themes, and influential works remain underexplored. To the best of our knowledge, this is the first study to conduct a comprehensive bibliometric analysis in Baduanjin, systematically examining its current status and providing insights into its future directions. Building on this, this study aims to bridge this research gap through comprehensive bibliometric analysis, which provides a structured overview, identifying research gaps and promoting a unified understanding of Baduanjin's health benefits.

Research Questions:
1. What are the global trends in Baduanjin research?
2. Which authors, institutions, and countries significantly influence Baduanjin research?
3. What are the key research hotspots and potential future research directions?

Methods and Materials

Bibliometric analysis is an increasingly popular and thorough technique for examining and assessing massive amounts of scientific data and is becoming more common in scientific research (Passas, 2024). Bibliometric analyses have been applied to map the state of the arts in various fields (İri & Ünal, 2024; Oliveira et al., 2019). It can effectively summarise research trends and avenues for future study on Traditional Chinese Exercises (TCEs) (Li et al., 2024). In this context, bibliometric analysis emerges as an essential tool, generating insights into the research landscape, identifying trends, and highlighting gaps in the literature (Choudhri et al., 2015). Recent reviews highlighted the use of Baduanjin in traditional Chinese Medicine (McGee, 2020) and its extensive clinical research (Zhou et al., 2020).

Search Strategy

We systematically retrieved literature in the Scopus database for bibliometric analysis of Baduanjin. The Scopus was used because of its comprehensive coverage of multidisciplinary work and quality-assured indexing of scholarly publications (Maridueña et al., 2024; Velasco-López et al., 2023). This database has extensive coverage of peer-reviewed literature, including journals, and conference proceedings, providing a sound basis for bibliometric analysis, including health sciences (Vieira & Gomes, 2009), sports science (Lei & Yu, 2012) and physical activity (Khatra et al., 2021; Zhang et al., 2022).

Using Boolean operators (Aromataris & Riitano, 2014; Carcassi & Sbardolini, 2023), the search strategy systematically combined the Baduanjin-related keywords and their synonyms to ascertain whether relevant studies exist. These are often used within search queries to refine results, combining keywords with AND, OR, and NOT to enhance the precision of information retrieval (Jakobovic et al., 2021). The specific search terms included: TITLE-ABS-KEY (("Baduanjin" OR "Ba Duan Jin" OR "Eight Brocades" OR "Eight-Section Brocade" OR "Eight Silken Movements" OR "Eight Pieces of Brocade" OR "Eight-Section Exercise" OR "Eight Silken Exercises" OR "Brocade Exercise" OR "Eight-section Brocade" OR "Baduanjin exercise" OR "Eight Pieces of Silk" OR "Eight Treasures" OR "Eight Movements" OR "Ba Duan Jin Qigong" OR "Eight Silken Weaving")). The search strategy on February 7, 2025, covered articles published between 1982 and 2024. The initial search returned 607 documents. We included only articles (405), review papers (150), conference papers (33), and book chapters (6), yielding a total of 594 publications after filtering by document type. After that, we excluded 69 documents not in English, resulting in a final analysis dataset of 525 records. The flow diagram of the search strategy, adapted from Zakaria et al. (2020), is illustrated in Figure 1.

Despite the robust methodology employed in this bibliometric analysis, certain limitations should be acknowledged. One limitation is the exclusive use of the Scopus database, which, while comprehensive, may exclude relevant studies indexed in other databases such as Web of Science or PubMed. Secondly, the inclusion criteria restricted the analysis to articles written in English, potentially omitting valuable contributions in different languages and limiting the diversity of perspectives.

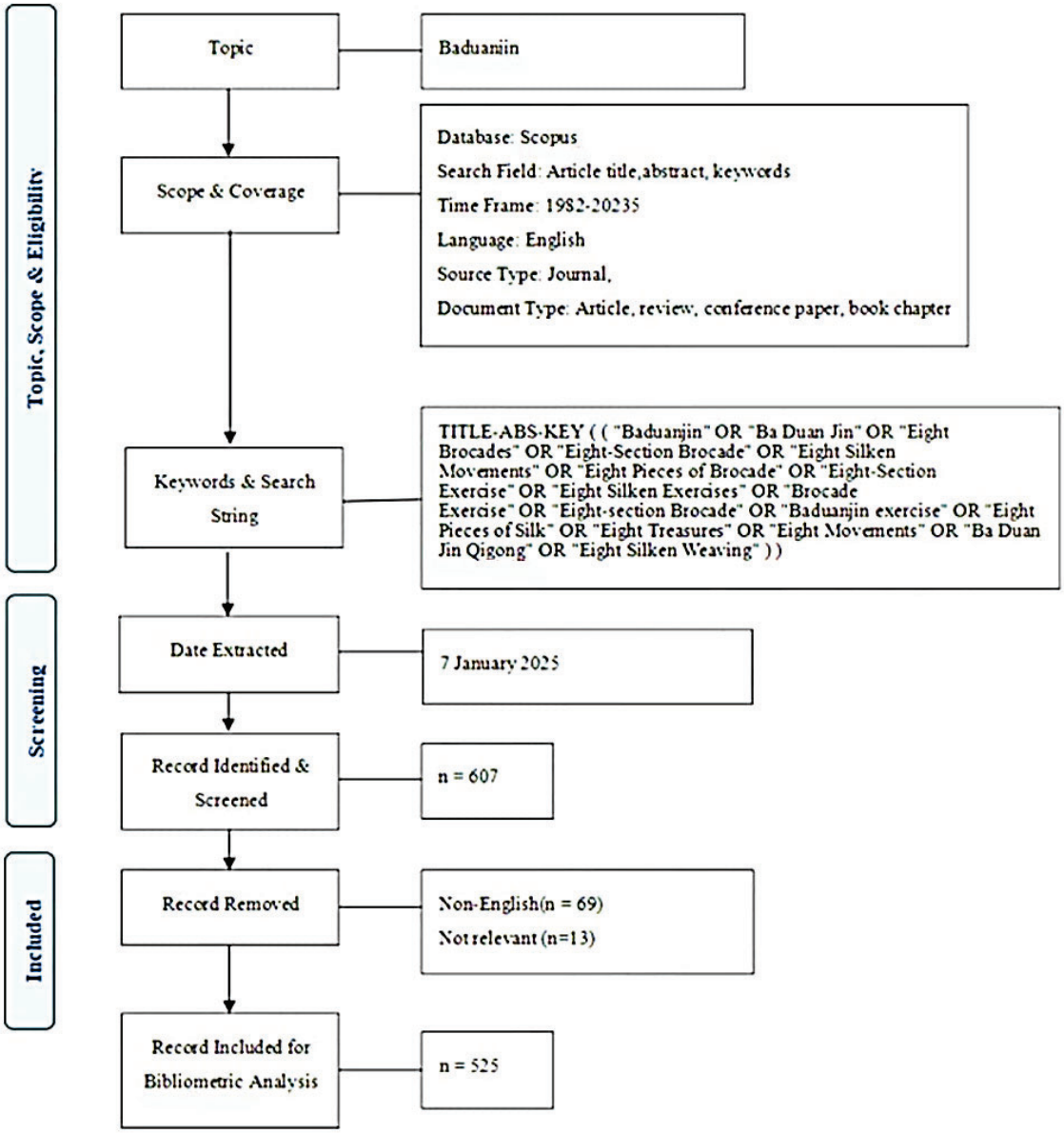

Figure 1. Flow Diagram of the Search Strategy

Lastly, the study's reliance on quantitative metrics, such as citation counts, may overlook the qualitative significance of certain works, potentially biasing the interpretation of research trends.

Data Analysis

Two tools, VOSviewer (version 1.6.20) (Eck & Waltman, 2009) and Biblioshiny, were used to analyse current trends, contributing indicators, and future directions of Baduanjin-related research. Biblioshiny is a web-based application that serves as an interface for the R package Bibliometrix, designed to facilitate bibliometric analysis (Tomaszewski, 2023). Biblioshiny was used to generate descriptive statistics analyse and visualise key bibliometric indicators, including annual publication trends, annual scientific production, authors' production over time, sources, countries, collaboration patterns, and the conceptual structure map. (Moral-Muñoz et al., 2020; Nizaruddin et al., 2024).

On the other hand, the co-occurrence network was specifically analysed and visualised using VOSviewer, allowing for a

detailed exploration of the relationships between keywords and concepts. VOSviewer is free software developed by Leiden University for constructing and visualising bibliometric networks, known for its capability to create network-based maps for bibliometric analysis (Husaeni, 2023; Kirby, 2023) (www.vosviewer.com). It provides a graphical representation that helps understand the structure and dynamics of scientific research fields (Arruda et al., 2022).

Results

Annual Publication

Scientific reporting on Baduanjin research has shown an increase over the last few decades. As shown in Figure 2, research on Baduanjin has evolved gradually since the 1980s, but has expanded since 2015. The number of publications rose sharply after 2020, peaking in 2024. This upward trajectory reflects the increasing academic and clinical interest in Baduanjin as a multidisciplinary health practice.

Main contributors

Author:

The authorship analysis, as observed in Figure 3, reveals the most prolific individuals in Baduanjin studies. In the number of publications, Zheng G led with 30, followed by Chen X in second place with 25. Other notable contributors include Wang Y, with 23 publications, and Zhang Y and Liu J, with 22 publications each. The coloured timeline illustrates the chronological consecutive releases of these publications over time, with a notable group of other leading authors who have established themselves in the field. The larger and darker bubbles represent years of research activity that make a bigger contribution to academia. In the case of co-authorship, the fractional contribution score denotes the actual degree of impact made by every researcher. Zheng G has the highest fractional contribution at 4.78, followed by Wang J at 3.94, Wang Y at 3.46, and Zhang Y at 4.19.

Source:

Analysis of the publication sources (see Figure 4) indicates the following foremost journals publishing Baduanjin research. These include, in order of production, Medicine, Evidence-Based Complementary and Alternative Medicine, BMJ Open, and Frontiers in Public Health. Also of significance are BMC Complementary Medicine and Therapies, International Journal of Environmental Research and Public Health, and Trials in Clinical Research.

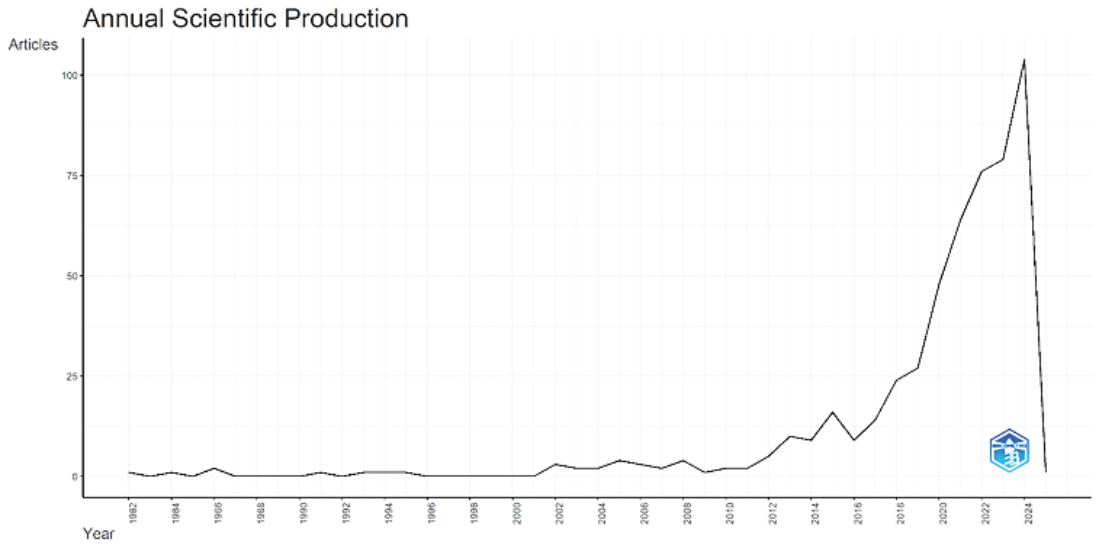

Figure 2. Annual scientific production

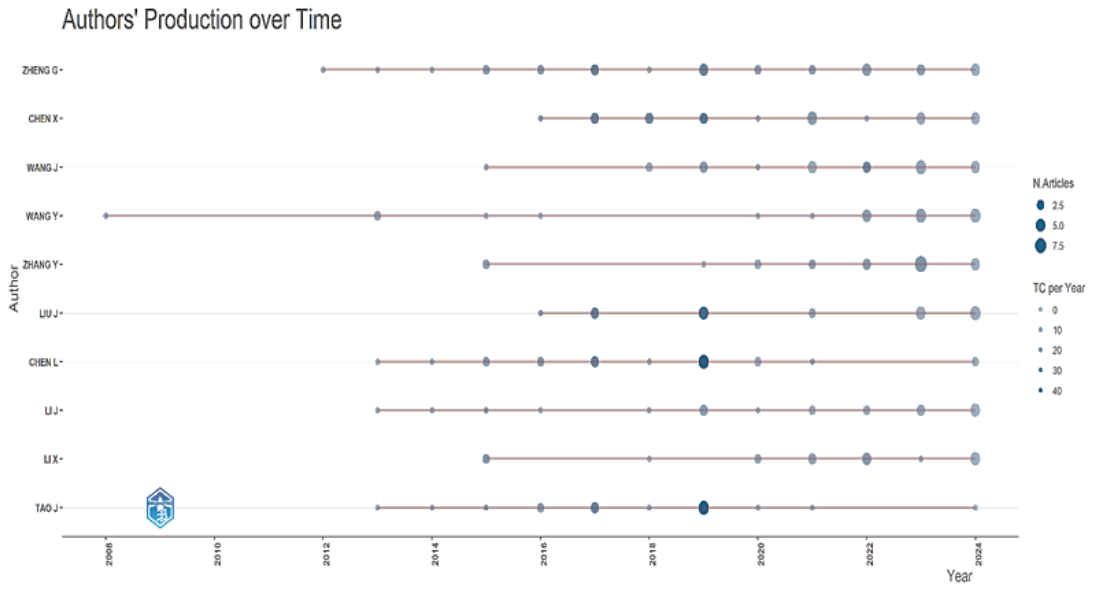

Figure 3. Authors' Production over Time

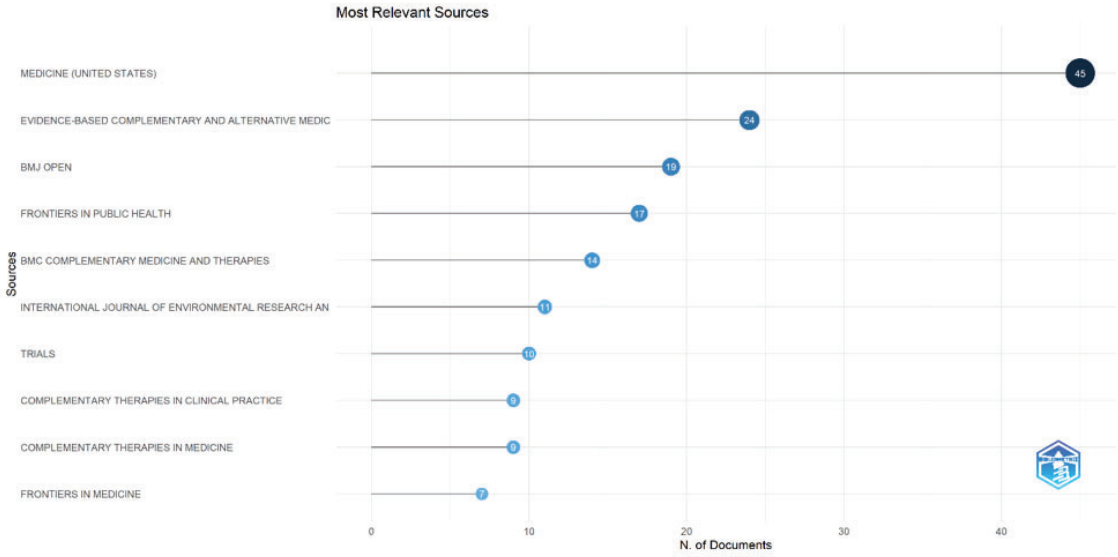

Figure 4. Most Relevant Sources

The sources point to complementary and alternative medicine journals, public health journals, and journals targeting clinical practice as the predominant publishers of Baduanjin, suggesting its interdisciplinary base and healthcare relevance.

Countries:

According to Figure 5, China (including Hong Kong) remains the central hub of Baduanjin research, contributing over two-thirds of the total publications (372). The United States, Malaysia, Canada, and Australia also demonstrate notable participation, indicating emerging international collaboration. Most publications from China (Hong Kong) are single-country or SCPs (299 articles, accounting for 80.38%), implying that many of these works have been done in their home countries. On the other hand, 73 articles (19.62%) show that many of these collaborations are Multiple-Country Publications, MCPs, which reflect growing international research collaborations.

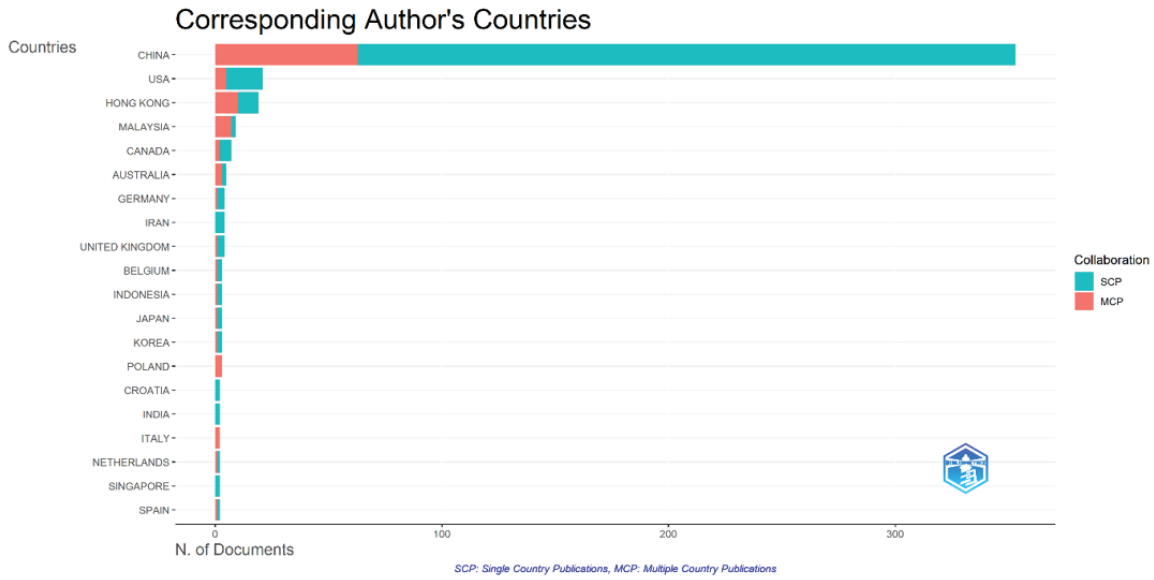

Figure 5. Corresponding authors' Countries

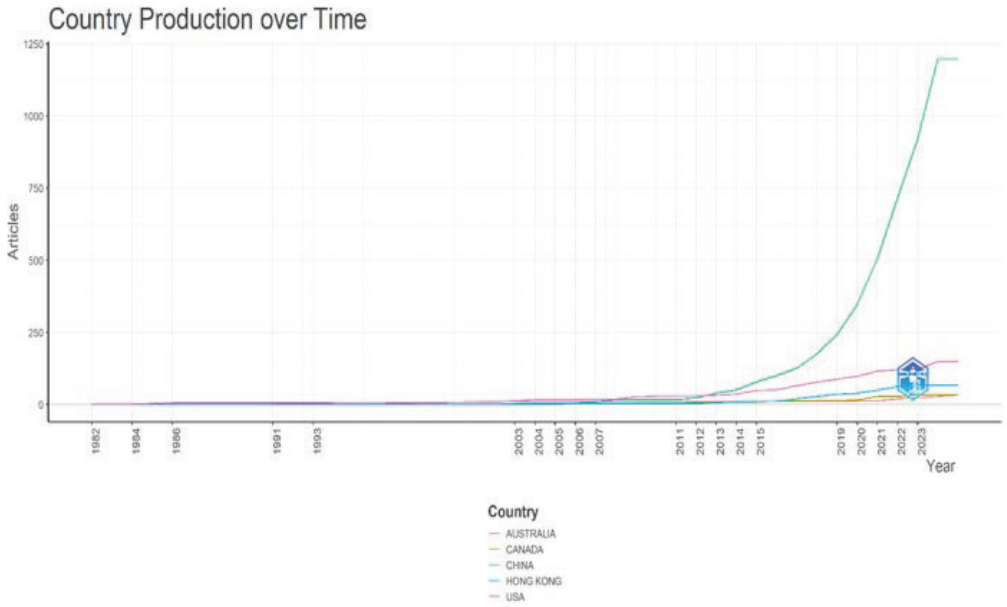

Figure 6. Country production over time

According to Figure 6, country-wise publication trends on Baduanjin research reflect different growth patterns from the major contributors. Research output has grown exponentially in China and Hong Kong since 2015. In 2024, the overall publications reached 1,266. The rate of growth can be noticed from 2016 (China: 101, Hong Kong: 11) through 2020 (China: 348, Hong Kong: 40), followed by a very rapid increase in recent years (China: 921 in 2023, Hong Kong: 67). The USA has shown a fluctuating upward trajectory, reaching its highest publication figure of 149 in 2024 and 2025. Research output in that country increased from 49 articles in 2015 to 116 in 2021. In comparison, Australia and Canada have portrayed relatively stable growth paths, but also in a more moderate manner. Australia oscillates between producing about 11 and 34 articles annually, slightly increasing in 2024 (28) and 2025 (34). Canada's research output has gradually increased, reaching its peak at 35 articles in 2025 after rising from 14 articles in 2018 to 28 in 2021.

Figure 7. Country collaboration map

As demonstrated in Figure 7, the collaboration network illustrates international research partnerships with China (including Hong Kong), which serves as the central hub of collaboration, aligning with several countries in Asia, North America, and Europe. The predominant collaboration occurs between China (including Hong Kong) and the United States, comprising for 57 studies (including co-publishing 38 from China and 19 from Hong Kong). Other significant collaborations involve China (including Hong Kong), Malaysia, the United Kingdom, and Canada; Australia and Germany are also involved, with fewer partnerships. The map highlights that China, including Hong Kong, plays the most central role in collaborations, while international partnerships remain limited, as a sizable chunk of studies are still Single Country Publications (SCP) and not Multiple Country Collaborations (MCC).

Trend:

In the study of Baduanjin, as reflected in Figures 8a and 8b, VOSviewer network visualisation describes the co-occurrence relationships between prominent terms in detail. In this network, each node represents a specific keyword, and the size of the node corresponds to its popularity in academic literature. The lines connecting the nodes show the strength of their co-occurrence relationships, with different colours signifying clusters of thematically related subjects, facilitating an intuitive understanding of the research landscape. The central and widespread terms suggest that "Baduanjin" is the most popular term, appearing 134 times with a total link strength of 254. From here, it gets its most central position in the research domain. Other terminology includes "Baduanjin exercise" (49 occurrences, strength of 83) and "Baduanjin Qigong" (8 occurrences, strength of 11), all denoting variations in the terminology used to refer to the practice. Another frequently occurring linked term is "Qigong" (42 occurrences, strength of 90), further reinforcing its close association with Baduanjin.

The thematic cluster analysis identifies several key domains in Baduanjin's research. Mental Health and Well-being (Red Cluster): Keywords like "depression" (26 occurrences, 62 link strength), "anxiety" (15 occurrences, 47 link strength), "quality of life" (28 occurrences, 59 link strength) indicate that psychological health benefits are receiving considerable research attention in Baduanjin. This cluster encompasses studies of Baduanjin, which are offered in conjunction with other therapies to improve mental health and quality of life.

Rehabilitation and Chronic Diseases (Green Cluster): The increasing application of evidence-based methodologies in Baduanjin research is reflected in keywords such as "meta-analysis" (54 occurrences, 147 link strength), "systematic review" (42 occurrences, 129 link strength), and "randomised controlled trial" (28 occurrences, 58 link strength). Additionally, the terms "cardiac rehabilitation" (10 occurrences, 26 link strength), "chronic heart failure" (10 occurrences, 18 link strength), and "stroke" (7 occurrences, 21 link strength) indicate that Baduanjin is being investigated as a therapeutic intervention for cardiovascular and chronic disease management.

Traditional Chinese Medicine and Holistic Health (Yellow Cluster): The relationship between Baduanjin and TCM is underscored by keywords such as "traditional Chinese medicine" (13 occurrences, 31 link strength), "Tai Chi" (24 occurrences, 69 link strength), and "traditional Chinese exercise" (20 occurrences, 51 link strength). This suggests that, while modern clinical research on Baduanjin is expanding, the historical and cultural roots of the practice continue to be a key focus of academic interest.

Ageing and Physical Function (Blue Cluster): Ageing and motion studies are illuminated by terms such as "older adults" (20 occurrences, 43 link strength), "physical function" (5 occurrences, 12 link strength), and "cognitive function" (5 occurrences, 11 link strength). These studies reveal that Baduanjin is being increasingly studied and applied among elderly populations, particularly for its cognitive and physical benefits.

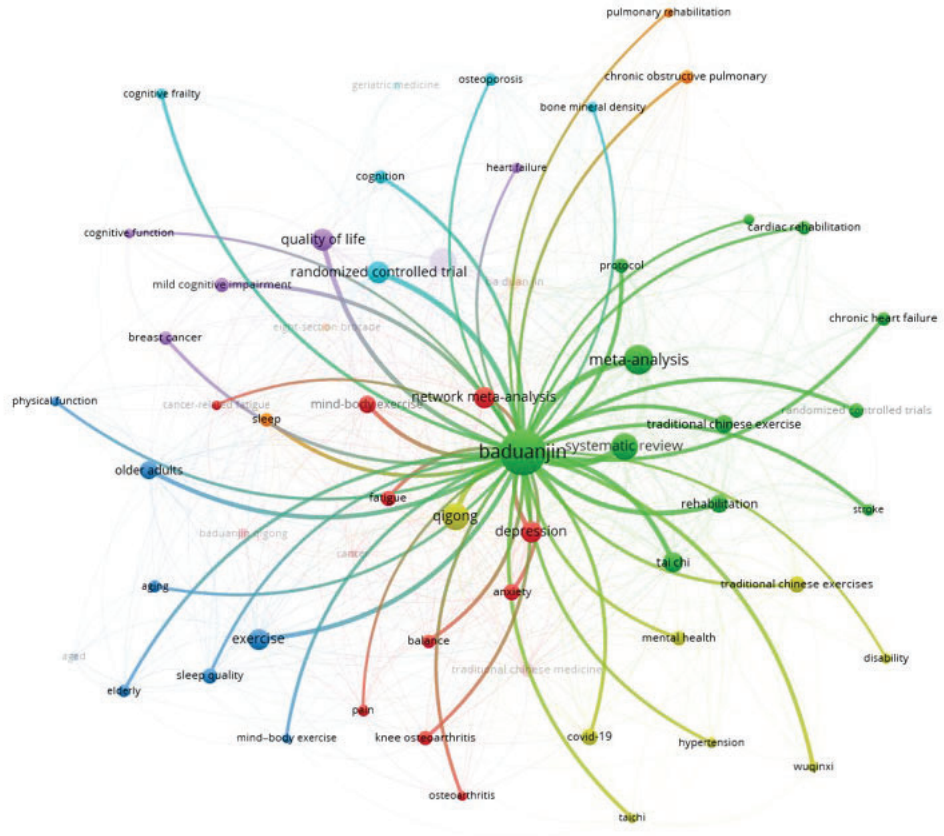

Figure 8a. Co-occurrence Network

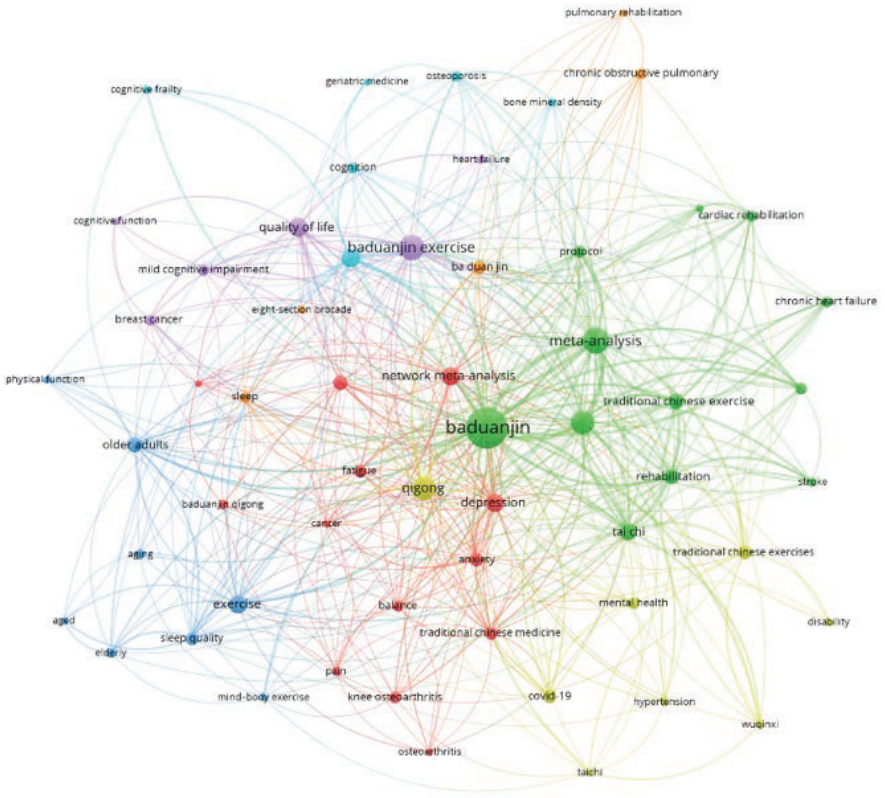

Figure 8b. Co-occurrence Network

Pulmonary and Chronic Conditions (Orange Cluster): Emerging research trends in respiratory and chronic conditions are reflected in keywords such as "pulmonary rehabilitation" and "chronic obstructive pulmonary disease". This suggests an increased interest in Baduanjin's support for pulmonary rehabilitation and respiratory health management.

The Conceptual Structure Map (Figure 9), constructed using Multiple Correspondence Analysis (MCA), presents the central research themes and relationships among the Baduanjin-related studies. A significant mapping area categorisation sheds light on the keywords, showing diverse but interrelated research areas that reflect various aspects of Baduanjin research, which remains multidimensional.

"Central inside the map are 'Baduanjin,' 'Qigong,' and 'exercise' that is coupled with terms like 'mental health,' 'psychology,' and 'physical activity'," proving Baduanjin is essentially explored for its effects on mental as well as physical health. The connection with terms like 'anxiety,' 'depression,' 'cognition,' and 'quality of life' demonstrates a high emphasis on the psychological and cognitive benefits of Baduanjin, emphasising its meaning as an adjunct treatment method for mental disorders.

The names "randomised controlled trial," "systematic review," "clinical effectiveness," and "therapy" located in the areas adjacent to the central cluster indicate a trend toward empirical validation and evidence-based research. These terms suggest that Baduanjin is typically studied within a clinical trial framework, describing its endeavours to establish efficacy within preventive and therapeutic settings. It's also worth noting that the association with "Chinese medicine," "Tai Chi," and "traditional therapy" emphasises the deep rooting of Baduanjin in Traditional Chinese

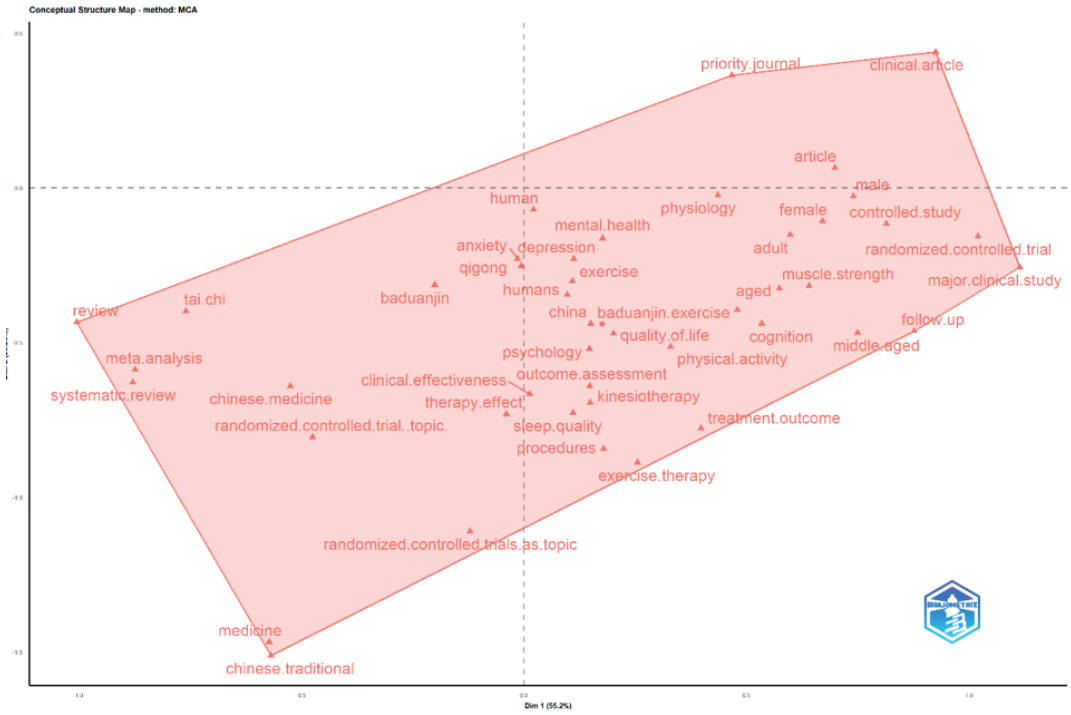

Figure 9. The Conceptual Structure Map

Medicine (TCM). Although modern clinical methodologies are increasingly used to study its effects, the practice is still deeply rooted in traditional healing approaches.

Situated at the upper right area of the map are terms like "clinical article," "priority journal," and "randomised controlled trial," indicating that a segment of the literature is concerned with publishing Baduanjin-related studies in top-tier academic journals as evidence of credibility and growing acceptance in the scientific discourse.

The research framework that Baduanjin potentially represents is notionally defined by a multidisciplinary perspective, where various but interrelated domains like mental health, physical rehabilitation, traditional Chinese medicine, and clinical research come together. The overview manifests the fact that there is an ongoing academic interest in Baduanjin while representing its integration into health practices where traditionalism meets modern medicine.

Notably, in the conceptual structure map, "young adults" and "female" occupy distinct but closely related positions, highlighting the research focus on age and gender-specific dimensions. "Young adults" are primarily associated with mental health, quality of life, and exercise therapy. At the same time, "female" is closely linked to clinical trials, evidence-based medicine, and interventions addressing both physical and psychological health.

For young adults, their position on the map near "exercise," "mental health," "quality of life," and "depression" underscores a research emphasis on improving mental well-being and life satisfaction through mind-body interventions like Baduanjin. The connection to "exercise" emphasises the pivotal role of physical activity in mental health interventions, while proximity to "depression" and "quality of life" highlights the focus on alleviating depressive symptoms and enhancing emotional resilience in younger populations. These trends reflect the increasing recognition of young adults as a key target group for mental health promotion and the potential of Baduanjin as a cost-effective and

integratedintervention for this demographic.

For females, their placement near "clinical article," "randomised controlled trial," and "priority journal" underscores their significance in high-quality empirical research. This positioning suggests that women are frequently the focus of studies exploring the dual benefits of Baduanjin for physical rehabilitation and psychological well-being. The proximity to "mental health" and "physical activity" further indicates that research involving women often evaluates the integration of traditional health practices into clinical and therapeutic contexts. This gender-sensitive approach highlights the importance of addressing women's unique health challenges through culturally adaptive and scientifically validated interventions.

Together, the positions of "young adults" and "female" reveal a nuanced understanding of the role of Baduanjin in addressing diverse health needs across age and gender dimensions, emphasising its versatility as a health practice.

Discussion

This bibliometric analysis of Baduanjin research portrays its evolution as an integrative health practice, straddling the realms of traditional and modern medicine. Findings reveal its multidisciplinary nature, covering mental health, physical rehabilitation, chronic disease management, and Traditional Chinese Medicine.

Expanding Evidence-Based Research

The increase in randomised controlled trials, systematic reviews, and meta-analyses has directed a shift toward evidence-based medicine. Baduanjin is part of therapeutic schemes for chronic heart failure, stroke, and cardiac rehabilitation, serving as an example of its movement from traditional practice to scientific validation. Nevertheless, methodological inconsistencies, heterogeneous designs of studies, and lack of validation through large-scale, long-term follow-up trials limit the acceptance of it in mainstream medicine. To provide robust evidence, future research needs to standardise further intervention guidelines, multi-centre clinical trials, and objective biomedical and neuroimaging assessment.

Integration of Traditional and Modern Medicine

Despite a growing body of scientifically credible support, Baduanjin remains deeply rooted in TCM, as shown by its association with "Traditional Chinese Medicine," "Tai Chi," and "traditional therapy." Such dual identity presents opportunities and challenges: with its cultural foundation, it has a rich basis for health applications, yet it faces slow integration into global healthcare systems. Interdisciplinary collaboration will blend TCM principles with modern biomedical research, creating a structured and well-accepted health intervention.

Expanding Target Populations Beyond the Elderly

Traditionally, Baduanjin's research has focused on older populations, particularly in fall prevention, mobility improvement, and cognitive function enhancement. However, analyses through the Conceptual Structure Map and VOSviewer have shown a shift toward young adults, women, and working professionals, with growing attention to stress management, mental health, and workplace well-being. In China, Baduanjin is the foremost intervention for student health and psychological resilience in university contexts. Many universities have included Baduanjin practice in their PE curriculum, mental health programmes, or USAC activities to help students ameliorate academic stress, develop emotional resilience, and improve physical health. This expansion exemplifies Baduanjin's preventive and health-promoting role among younger populations and showcases its realisable integration into global education systems. Future research

should highlight population-based interventions to ensure widespread adaptation across demographics. Comparison with other mind-body interventions, Tai Chi, yoga, and physiotherapy can clarify the therapeutic benefits of Baduanjin.

Applications in Preventive Medicine and Public Health

Contrasting research on Baduanjin indicates its promise in ageing, cognitive function, and pulmonary rehabilitation. Keywords such as "pulmonary rehabilitation" and "chronic obstructive pulmonary disease" indicate growing academic interest in its role in respiratory health and post-COVID rehabilitation. Future studies should explore its expansion into primary healthcare, corporate wellness programmes, and community-based interventions. With its low cost and accessibility, Baduanjin can be a scalable public health strategy, particularly in countries where cost-effective solutions remain underexplored.

Global Research Venture

Baduanjin's research remains heavily concentrated in China, limiting its utility and relevance for international collaboration. North America, Europe and Australia have done little to amalgamate practice into efficient healthcare systems. Research in this area requires, in the future, close collaborative work between countries to widen participant populations and diversify methodologies, more interdisciplinary collaborations that will integrate various forms of traditional medicine with modern biomedical sciences, and flexible and aggressive international funding strategies to support multinational studies and mega-scale clinical trials. Increased international efforts are needed to transform Baduanjin from a local practice into a globally accepted health intervention.

Baduanjin's research has gained significant academic acceptance in clinical practice and mental health, physical rehabilitation and chronic disease control, which promises broad application. Though it has gained wide acceptance, issues such as methodological standardisation, international collaboration, and population diversity remain unresolved as continuing areas for research. Future research should ensure more excellent evidence, expand clinical and public health applications, and enhance global collaborations. Addressing these areas will help Baduanjin evolve from a time-honoured traditional healing practice into a rigorously validated, internationally accepted mind-body intervention.

Baduanjin is becoming increasingly important in global health, education, and rehabilitation. Its application has been documented in China and other countries such as Australia, the United States, and Europe. Baduanjin has been integrated into programs to prevent chronic diseases, provide mental health support, and promote community wellness (Zhou et al., 2020). Baduanjin is easy to learn and practice, relatively inexpensive, and requires little to no equipment, making it attractive for international health promotion and as a culturally sensitive intervention model (Zou et al., 2019). The use of Baduanjin in interdisciplinary health programs, as well as in care for older people and in digital health, further enhances its importance in public health. These observations indicate a change in scientific research on martial arts intended to adapt traditional forms to contemporary global circumstances, placing Baduanjin alongside other cross-cultural movement practices (Bailey & Samsudin, 2025).

Limitations of the Study

This study has several limitations that should be acknowledged. First, the analysis relied exclusively on the Scopus database, which, although comprehensive, may have omitted relevant studies indexed in other databases such as Web of Science or PubMed. Second, only English-language publications were included, which might limit the diversity of perspectives and

exclude valuable research published in other languages. Third, the study focused on quantitative bibliometric indicators without assessing the methodological quality of individual studies, which may affect the interpretation of research trends. Future research could address these limitations by integrating multiple databases, including non-English sources, and incorporating quality assessment tools to provide a more holistic understanding of Baduanjin research.

Conclusion

Baduanjin has become a multidisciplinary study area, integrating traditional Chinese medicine with modern biomedicine. Baduanjin demonstrates considerable potential for preventive medicine and public health, particularly in managing chronic diseases and supporting post-COVID rehabilitation. Nevertheless, the research mainly concentrates on China, calling for more international collaboration. Its study has been associated with evidence-based medicine; however, methodological inconsistencies and lack of large-scale validation may limit its acceptance. Expanding target populations, notably young adults, college students, and working professionals, signify its developing role in stress management in the workplace and educational settings. Future work should put a stronger emphasis on standardisation, clinical trials on a larger scale, and interdisciplinary integration to solidify Baduanjin as a credible mind-body intervention.

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Message from the ISCPES President

Prof Dr Rosa López de D'Amico

It gives me great pleasure to share highlights from the 23rd Biennial Conference of the International Society for Comparative Physical Education and Sport (ISCPES), held in the beautiful city of Auckland, New Zealand, from December 1st to 4th, 2025. The programme opened with a meaningful and traditional Maori cultural welcome, setting the tone for rich exchange and collaboration. The conference theme, "Advancing Global Well-being through Physical Education and Sport," guided the conversation, scholarship, and cultural engagement throughout the event.

This is the first ISCPES congress organised in New Zealand —a milestone long overdue—and we are grateful to the organising committee for their dedication and hospitality. In these current global challenges, we especially appreciate everyone who took the effort to submit their research, attend, and participate. To all those who consistently follow ISCPES wherever we hold our events and who support and trust us, our ongoing gratitude goes to you.

The world has changed significantly in recent years. The COVID-19 pandemic, the rise of global sedentarism, and the ongoing socio-political uncertainties have reshaped our lives and work. Yet, they have also made us more adaptable. In response, ISCPES successfully held its first virtual Biennial Conference organised by LNCPE Trivandrum, India, in December 2021. In 2025, we were pleased to reconvene in person, complemented by selected virtual presentations.

Participants represented a broad global community, including colleagues from Japan, Spain, Mexico, Trinidad and Tobago, Brazil, China, Portugal, Malaysia, India, the USA, Italy, Chile, Barbados, Venezuela, and, of course, New Zealand. We were privileged to learn from distinguished speakers and to engage with diverse research topics through oral and poster presentations. The congress fostered collaboration, cultural learning, and professional connections---an essential step in strengthening our global academic network.

During the conference, three key announcements were made:

1. The 24th ISCPES Biennial Conference will be hosted by the Universidad Autónoma de Nuevo León (Autonomous University of Nuevo Leon) in Monterrey, Mexico, in 2027.
2. In 2026, we look forward to a regional conference in Havana, Cuba, entitled "University, Physical Activity and Sports" (UNAFID), organised by the Universidad de Ciencias de la Cultura Física y el Deporte "Manuel Fajardo," scheduled for October 19-23, 2026.
3. The ISCPE General Assembly endorsed the continuity of the 'International Study of Quality Physical Education (ISQPE), 5-Year Plan from 2026 to 2030' coordinated by Dr. Walter Ho.

I also take this opportunity to formally present the ISCPES Board for 2025 – 2027:

- Rosa López de D'Amico - Venezuela (President),
- Usha Nair - India (Vice-President)
- Jennie Yang Xie - China (Membership Coordinator)
- Maria Gutiérrez - Spain (Treasurer),
- Ling Qin - China (Research Coordinator)
- Oswaldo Ceballos - Mexico (Americas Representative)
- Sanjay Kumar Prajapati - India (Asia Representative)
- Antonio Campos - Spain (Europe Representative),
- Francisco Serrano - New Zealand (Oceania Representative)
- Maria Luisa Guinto - Philippines (Journal Editor)
- Pedro Carvalho - Portugal (Past President)

We extend our heartfelt thanks to Dr Gopinathan Kishore and Dr Naoki Suzuki for their dedicated service to the 2023-2025 Board. To the new board, let us continue working together! There is still much to be done as we continue advocating for the recognition of our field. Physical Education and sport have the power not only to unify people, but also to contribute meaningfully to the development of societies.

Let us move forward----together.

https://iscpes.net/

Rosa López de D'Amico
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