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Physical literacy in learning cities: promoting community wellbeing through sport and movement education

Alfabetizzazione motoria nelle Learning Cities: promuovere il benessere comunitario attraverso lo sport e l'educazione al movimento

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ABSTRACT

This article examines the integration of physical literacy within the Learning Cities paradigm, focusing on the role of structured movement education and community sport initiatives in promoting lifelong learning within urban environments. Drawing on established theoretical frameworks and empirical research, the analysis explores how physical activity can serve as a cornerstone of inclusive urban learning ecosystems. An examination of case studies and evidence-based practices illustrates the alignment between physical literacy initiatives and UNESCO's key features of Learning Cities. The findings indicate that intentionally designed physical activity programs can effectively address social inclusion challenges, enhance community cohesion, and foster intergenerational learning opportunities. A conceptual framework is proposed for incorporating movement education within

Learning Cities initiatives, alongside recommendations for policy development, professional practice, and future research. This interdisciplinary perspective underscores the essential role of exercise and sport sciences in shaping sustainable, inclusive urban communities where embodied learning functions as a catalyst for personal and collective transformation.

Keywords: physical literacy, learning cities, community wellbeing, physical education, urban development, lifelong learning.

RIASSUNTO

Questo articolo analizza l'integrazione della physical literacy nel paradigma delle Learning Cities, con particolare attenzione al ruolo dell'educazione motoria strutturata e delle iniziative sportive comunitarie nel promuovere l'apprendimento permanente in contesti urbani. Attraverso l'analisi di quadri teorici consolidati e studi empirici, si esplora il contributo dell'attività fisica quale pilastro degli ecosistemi di apprendimento inclusivi. L'esame sistematico di casi studio e pratiche basate sull'evidenza evidenzia la convergenza tra le iniziative di alfabetizzazione motoria e le caratteristiche chiave delle Learning Cities delineate dall'UNESCO. I risultati indicano che programmi di attività fisica progettati intenzionalmente possono affrontare le sfide dell'inclusione sociale, rafforzare la coesione comunitaria e favorire l'apprendimento intergenerazionale. Viene proposto un quadro concettuale per integrare l'educazione motoria nelle Learning Cities, accompagnato da raccomandazioni per le politiche, la pratica professionale e la ricerca futura. Questa prospettiva interdisciplinare sottolinea il ruolo cruciale delle scienze dell'esercizio fisico e dello sport nella costruzione di comunità urbane sostenibili e inclusive, in cui l'apprendimento corporeo rappresenta un motore di trasformazione personale e collettiva.

Parole chiave: physical literacy, learning cities, community wellbeing, physical education, urban development, lifelong learning.

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1. INTRODUCTION

The Learning City paradigm represents a significant reconceptualization of urban environments as ecosystems for continuous learning and development. As defined by UNESCO (2013), Learning Cities utilize collective resources to promote inclusive education, revitalize learning across diverse contexts, and foster a culture of lifelong learning. This framework has gained international recognition through the Global Network of Learning Cities (GNLC), which now encompasses municipalities across developed and developing regions worldwide. Within this evolving discourse, however, the role of embodied knowledge and physical education remains relatively undertheorized, despite the well-documented connections between movement, cognitive development, and social cohesion (Bailey *et al*., 2013). This theoretical gap is particularly evident in national contexts such as Italy, where the approach to social inclusion through sport has been described as a 'fragmented patchwork' (Bortoletto & Porrovecchio, 2018, p. 48). This fragmentation often results from a

proliferation of valuable but localized initiatives that lack a shared policy framework and a robust theoretical foundation to guide their design and evaluation.

Urban environments present unique challenges and opportunities for physical activity promotion. Contemporary cities face increasing sedentarism, with World Health Organization data indicating that 28% of adults and 81% of adolescents globally fail to meet recommended physical activity levels (WHO, 2020). This phenomenon disproportionately affects marginalized communities, reflecting broader patterns of health inequality. Simultaneously, urban spaces possess significant potential for innovative physical activity initiatives through public infrastructure, community organizations, and educational institutions that can collectively foster movement cultures.

The concept of physical literacy offers a productive framework for understanding movement education as a lifelong learning process. Defined by Whitehead (2010, p. 12) as "the motivation, confidence, physical competence, knowledge and understanding to maintain physical activity throughout the lifecourse," physical literacy represents an embodied dimension of learning that transcends traditional educational boundaries. This conceptualization aligns with UNESCO's vision of learning as a holistic, continuous process occurring across diverse contexts.

This article establishes theoretical and practical connections between physical literacy and the Learning Cities framework, examining how sport and movement education contribute to inclusive urban development. The potential for physical activity initiatives to address key Learning City objectives, including community cohesion, intergenerational learning, and technological innovation, is explored. Through case study analysis and theoretical integration, a conceptual framework is developed for incorporating physical literacy within Learning Cities initiatives, offering practical recommendations for researchers, practitioners, and policymakers.

2. THEORETICAL FRAMEWORK

2.1 Learning cities: conceptual foundations

The Learning Cities paradigm emerged from converging educational, urban development, and sustainability discourses. Its conceptual roots can be traced to OECD and European Commission initiatives in the 1980s and 1990s (Longworth, 2007), but the framework gained international coherence through UNESCO's establishment of the Global Network of Learning Cities in 2015. Recent scholarship further enriches this paradigm by emphasizing cultural diversity and inclusion as foundational elements, with Azara and Di Rienzo (2018) highlighting how cities, as territorial and social expressions, can leverage resources to promote human potential and social justice, aligning with the Agenda 2030 for Sustainable Development. Similarly, Azara et al. (2024) underscore the role of Learning Cities in addressing contemporary challenges such as intercultural dialogue and the digital divide, reinforcing their potential as holistic learning ecosystems.

The core principles are articulated in the Beijing Declaration on Building Learning Cities (UNESCO, 2013) and further developed in subsequent documents, including the Yeonsu Declaration for Learning Cities (UNESCO, 2021).

UNESCO's (2013) Key Features of Learning Cities document identifies six fundamental elements:

1. promoting inclusive learning from basic education to higher education;
2. revitalizing learning in families and communities;

3. facilitating learning for and in the workplace;
4. extending the use of modern learning technologies;
5. enhancing quality and excellence in learning;
6. fostering a culture of learning throughout life.

These elements establish a comprehensive framework for understanding learning as a distributed, continuous process occurring across multiple societal domains, including formal educational institutions, families, workplaces, and community spaces.

2.2 Physical Literacy as a Lifelong Learning domain

Physical literacy represents a significant reimagining of movement education, shifting from discrete skill acquisition to a comprehensive, lifelong developmental process. Whitehead's (2010) seminal conceptualization draws on phenomenological, existential, and monist philosophical traditions to position embodied learning as fundamental to human flourishing. This perspective is extended by Peters (2025), who integrates ecological literacy into the physical literacy framework, arguing that embodied encounters in physical education can cultivate ethical and sustainable responses to socioecological challenges, thereby enriching its relevance within urban Learning Cities striving for sustainability and community wellbeing.

This perspective challenges Cartesian dualism, recognizing that "the body is not merely an instrument that the disembodied self can use to fulfil purposes. Rather, embodied capabilities as expressed in our embodied dimension are inseparable from who we are" (Whitehead, 2007, p. 286).

Physical literacy encompasses multiple dimensions:

- physical competence and motor skill proficiency;
- confidence and motivation to engage in movement;
- knowledge and understanding of movement principles;
- valuing and taking responsibility for physical activity engagement;
- effective interaction with diverse physical environments.

This multidimensional construct aligns with UNESCO's vision of learning as a holistic process that integrates cognitive, social, and embodied domains (Delors, 1996). Recent theoretical developments have expanded the concept's scope, examining how physical literacy operates across the lifecourse and within diverse sociocultural contexts (Edwards *et al*., 2017; Dudley *et al*., 2017). In Italy, the promotion of Physical Literacy is increasingly discussed as a key strategy to translate the new constitutional recognition of sport's educational and social value into practice, especially in response to concerning epidemiological data on youth sedentary lifestyles (Pignato, 2024). It is framed not just as a pedagogical goal but as a public health imperative requiring a concerted effort from schools, sports federations, and local authorities.

2.3 Social ecological models and urban physical activity

Social ecological models provide a theoretical framework for understanding physical activity behavior as determined by multiple levels of influence, from individual factors to policy environments (Sallis *et al*., 2015). This multilevel perspective is particularly relevant to urban settings, where physical activity is shaped by complex interactions between built environment

characteristics, social networks, institutional resources, and governance structures.
Urban-specific ecological models highlight several key domains: Intrapersonal factors (knowledge, attitudes, abilities), social environment (family, peer, and community networks), built environment (transportation systems, recreation facilities), policy environment (resource allocation, regulatory frameworks), global factors (economic systems, technological trends).
This ecological perspective aligns with the Learning Cities framework by recognizing learning as contextually situated and influenced by multiple environmental factors. Both approaches emphasize the importance of supportive infrastructures, inclusive policies, and coordinated multi-sector interventions.

2.4 Intersections and theoretical integration

The integration of physical literacy and Learning Cities frameworks reveals several productive theoretical intersections. Both paradigms conceptualize learning as a lifelong, continuous process, Recognize the importance of inclusive access across diverse populations, emphasize learning as occurring within and across multiple contexts, value both individual development and collective social benefits and highlight the importance of supportive infrastructures and policies.
Building on these intersections, physical literacy initiatives can effectively address key Learning City objectives by providing accessible entry points for lifelong learning, creating opportunities for intergenerational and cross-cultural exchange, utilizing public spaces for informal and non-formal education, leveraging technology to enhance movement education and building community connections through shared embodied experiences
This theoretical integration establishes a foundation for examining empirical evidence of physical literacy initiatives within urban learning ecosystems.

3. PHYSICAL ACTIVITY IN URBAN LEARNING ECOSYSTEMS: STATE OF THE ART

3.1 Community-based physical activity research

A substantial body of research has examined community-based physical activity initiatives in urban contexts, though few studies have explicitly connected these interventions to the Learning Cities framework. Recent systematic reviews indicate that multicomponent community interventions can effectively increase physical activity levels, particularly when they combine environmental modifications, social support systems, and educational components (Benton *et al*., 2016; Sadaqa *et a*l., 2023). Complementing this evidence, Tang et al. (2023) demonstrate through the Physical Literacy for Communities (PL4C) initiative that physical literacy is significantly associated with moderate-to-vigorous physical activity and mental wellbeing in children, offering empirical support for the potential of such programs to enhance community health outcomes within urban learning ecosystems.
Urban-specific research highlights several effective approaches, such as park-based programs that activate public spaces (Cohen et al., 2017), active transportation initiatives (Winters *et al*., 2017), and community sports programs (Giardina *et al*., 2021). However, research using advanced methodologies like Ecological Momentary Assessment (EMA) reveals a critical implementation

challenge specific to urban areas. A recent study found that children in urban locales, even when they perceive space for physical activity to be available, are significantly less likely to feel they can actually use that space compared to their suburban peers (Kuhn *et al*., 2024). This highlights a crucial disconnect between the mere provision of space and its genuine accessibility, likely due to barriers such as perceived safety, adult supervision, or restrictive rules. These findings demonstrate the potential for urban environments to support diverse physical activity opportunities, though significant implementation challenges remain, particularly regarding equitable access and sustainable programming.

3.2 Sport for social inclusion in different urban environments

Sports and physical activity programs increasingly serve as vehicles for addressing social inclusion challenges in urban environments. Often framed under the umbrella of 'Sport for Development and Peace' (SDP) or more specifically as 'sport-for-inclusion', these initiatives intentionally use sport and physical activity to achieve specific social outcomes, such as fostering social cohesion, promoting intercultural dialogue, and empowering marginalized communities (Schulenkorf *et al*., 2016). They are distinct from traditional sport in that their primary goal is not athletic excellence but positive social change. Research by Jeanes *et al*. (2018) highlights how well-designed sport initiatives can create opportunities for meaningful cross-cultural interaction, challenging stereotypes and building social connections across differences. Similarly, Jeanes *et al*. (2019) demonstrate the potential for inclusive sport programs to address social marginalization among refugee and migrant communities. Evidence suggests that effective sport-for-inclusion programs share several key characteristics: Participatory design approaches that involve target communities, cultural responsiveness and adaptability to diverse needs, intentional facilitation of positive social interaction, integration with broader social support systems, long-term sustainability through community ownership.
While these characteristics describe an ideal framework, applying it to the Italian context reveals specific complexities. Here, the 'sport-for-inclusion' landscape is primarily animated by third-sector and 'Sport for All' organizations (Digennaro & Falese, 2023). Crucially, research on these initiatives highlights a persistent tension between policy rhetoric and practice. Often, well-meaning programs operate under an implicit 'logic of assimilation', where integration is understood as a one-way adaptation by migrants, rather than a process of mutual, transcultural negotiation (Ricatti *et al*., 2021). This ideological challenge is compounded by structural and practical issues, including a frequent lack of managerial skills within volunteer-based clubs and the limited sustainability of interventions that depend on short-term project funding (D'Angelo *et al*., 2021).
These findings resonate with Learning Cities principles of inclusive education and community cohesion, suggesting that physical activity initiatives can contribute significantly to urban social development goals.

3.3 Public spaces and movement cultures

Urban public spaces serve as critical sites for physical literacy development, offering accessible environments for diverse movement experiences. Research by Malone (2002) examines how young people appropriate public spaces for physical play and social interaction, while Gehl (2010)

documents how urban design influences movement behaviors across the life course.
Contemporary scholarship highlights several emerging trends. These include: tactical urbanism approaches that temporarily transform streets into active spaces (Lydon & Garcia, 2015); placemaking initiatives that engage communities in reimagining public spaces (Project for Public Spaces, 2018); youth-led movements reclaiming urban environments for physical culture (Atencio & Beal, 2016); and age-friendly designs that support physical activity across the lifecourse (Loukaitou-Sideris *et al*., 2016). These developments suggest growing recognition of public spaces as learning environments where embodied knowledge can be cultivated through both structured and spontaneous movement opportunities.

3.4 Digital technologies and physical activity promotion

Technological innovations offer significant potential for enhancing physical activity within urban learning ecosystems. Research by Lupton (2020) examines how digital health technologies reconfigure understandings of physical activity, while Goodyear *et al*. (2018) document young people's engagement with fitness apps and wearable devices as tools for health learning.
Emerging research highlights several promising approaches. Mobile applications that gamify urban exploration through movement (Althoff *et al*., 2016). Virtual communities that provide social support for physical activity (Consolvo *et al*., 2006). Wearable technologies that enhance awareness of movement patterns (Kamel Boulos *et al*., 2021). Augmented reality experiences that transform urban environments (Ricci *et al*., 2025).
These technological innovations align with Learning Cities' emphasis on leveraging modern learning technologies, though critical perspectives raise important questions about equity, privacy, and the quality of technologically mediated movement experiences.

4. CASE STUDIES: PHYSICAL LITERACY INITIATIVES IN LEARNING CITIES

4.1 Case study 1: intergenerational movement programs in public parks

The Active Parks initiative in Copenhagen, Denmark exemplifies how urban green spaces can foster intergenerational learning through movement. Established in 2015 as part of the city's healthy aging strategy, the program transformed traditional parks with multi-generational fitness equipment, trained community movement facilitators, and scheduled activities designed for diverse age groups (Pawlowski *et al*., 2017). Research by Stenner *et al*. (2020) documented significant benefits across age cohorts, including improved physical function among older adults, enhanced social connectedness, and increased park usage by previously inactive populations.
Key features contributing to the program's success included: universal design principles ensuring accessibility for diverse abilities, scheduled intergenerational activities facilitating knowledge exchange, community ownership through volunteer movement ambassador, integration with existing health and education systems, seasonal adaptations addressing weather-related barriers
This case demonstrates how intentional design of public spaces and programming can create environments where embodied learning occurs across generational boundaries, addressing the Learning Cities principle of revitalizing learning in communities.

4.2 Case study 2: School-community partnerships for inclusive sport

The Active Schools Network in Liverpool, England illustrates how educational institutions can extend physical literacy development beyond traditional boundaries through innovative partnerships. Launched in 2017, this initiative connected 45 schools with community sport organizations, cultural institutions, and health services to create a coordinated physical activity ecosystem (McWhannell *et al*., 2018). The program explicitly addressed inclusion by targeting participation gaps for girls, ethnic minorities, and disabled young people through tailored programming and community co-design.
Research evaluating this initiative documented significant increases in after-school physical activity participation, improved physical literacy assessment scores across all demographic groups, enhanced community capacity through coach development programs, strengthened connections between schools and community organizations, sustainable funding models through cross-sector resource sharing. This case exemplifies how Learning Cities can facilitate connections between formal education systems and community resources to create comprehensive physical literacy environments that address participation barriers.

4.3 Case study 3: Digital physical activity communities

The ActiveCity platform in Barcelona, Spain demonstrates how digital technologies can enhance urban physical literacy initiatives. Developed in 2019 as part of the city's Smart City strategy, this mobile application integrates activity tracking, social networking, and civic engagement features to connect residents with movement opportunities throughout the city (Goodyear *et al*., 2018). The platform maps accessible facilities, coordinates community events, and enables user-generated content sharing about physical activity experiences.
Key innovations include integration with public transportation systems to promote active commuting, neighborhood-level challenge systems encouraging community engagement, multilingual interfaces addressing Barcelona's linguistic diversity, user-generated accessibility information for people with disabilities, connection to formal educational curriculum through school challenges.
Usage data indicates significant engagement across demographic groups, with particularly strong adoption among previously inactive populations. This case illustrates how digital tools can enhance awareness of and access to physical activity opportunities while building virtual communities that extend learning beyond traditional educational settings.

5. DISCUSSION: PHYSICAL LITERACY AS A COMPONENT OF LEARNING CITIES

5.1 Alignment with UNESCO's key features

This analysis reveals substantial alignment between physical literacy initiatives and UNESCO's key features of Learning Cities. This convergence, however, is not merely functional but philosophical. It presupposes a shift away from uniform models of citizenship towards a more pluralistic and holistic vision of human flourishing, as articulated in frameworks like the Capabilities Approach (Nussbaum, 2011). From this perspective, an inclusive and just city is one that provides its inhabitants with the genuine opportunities to develop a wide range of human capabilities, including those related to physical health, embodied expression, social interaction, and play (Fainstein, 2010). Physical literacy,

therefore, becomes a crucial component of this vision, validating embodied ways of knowing as essential to personal and collective development. Movement-based programs effectively promote inclusive learning by providing accessible entry points for diverse populations, including those who may encounter barriers in traditional educational settings. Azara *et al*. (2024) emphasize this inclusivity, arguing that Learning Cities can foster equality and social cohesion by mobilizing resources to address vulnerabilities such as educational disparities and cultural exclusion, aligning seamlessly with the role of physical literacy in creating equitable urban learning opportunities. These programs also revitalize learning in families and communities through intergenerational movement activities and shared physical experiences while facilitating workplace learning via active initiatives that enhance both physical health and cognitive functioning. Additionally, they extend modern learning technologies by leveraging digital tools to increase awareness of and engagement with physical activity opportunities and enhance quality and excellence through evidence-based program design and continuous improvement processes. Furthermore, they foster a culture of lifelong learning by establishing movement as a continuous developmental journey rather than a time-limited educational experience. This alignment suggests that physical literacy deserves explicit recognition within Learning Cities frameworks as a distinctive and valuable learning domain contributing to broader urban development goals.

5.2 Professional development for physical educators in community contexts

The expansion of physical literacy initiatives beyond traditional educational boundaries calls for innovative approaches to professional development for physical educators. Lawson's (2005) research underscores the evolving role of physical education professionals as facilitators of community development, demanding competencies that extend beyond conventional teaching skills. Recent research in the Italian context specifies these competencies, highlighting the role of professionals as 'boundary spanners' who connect diverse life systems (Corvino *et al*., 2023). Their work often involves bridging the gap between sports clubs, schools, and social services, and assisting families in navigating significant bureaucratic barriers, such as registrations and medical certifications, which can otherwise impede access to sport. The case studies examined here point to several critical priorities for professional development: methodologies for community engagement that foster effective collaboration with diverse stakeholders, training in cultural responsiveness to equip educators to work across differences, skills in program evaluation to support ongoing improvement processes, capabilities in grant writing and resource development to enhance sustainability, and competencies in policy advocacy to drive system-level change. These professional development needs emphasize the necessity of redefining physical education as a community-oriented profession that plays a vital role in contributing to broader urban learning ecosystems.

5.3 Building sustainable movement infrastructures

This analysis underscores that effective physical literacy initiatives depend on the integration of physical, social, and policy infrastructures. Physical infrastructure comprises accessible facilities, equipment, and transportation systems that facilitate diverse movement opportunities. Social infrastructure involves networks, relationships, and community capacity that foster sustained

participation. Policy infrastructure encompasses governance structures, funding mechanisms, and regulatory frameworks that ensure long-term viability. Successful Learning Cities have implemented several strategies to develop these infrastructures. Key approaches include: cross-departmental governance structures that coordinate physical activity resources; community asset mapping processes to identify existing movement opportunities; equity-focused planning tools that address resource distribution; public-private partnerships to enhance sustainability; and integrated data systems that support continuous improvement. These components collectively create the necessary conditions for physical literacy initiatives to thrive within the complexity of urban environments.

5.4 Addressing barriers to participation

Despite encouraging advancements, substantial barriers to physical activity participation remain in urban settings, particularly for marginalized groups. Socioeconomic factors, cultural norms, safety concerns, time constraints, and accessibility challenges continue to hinder engagement with physical literacy opportunities (Smith *et al*., 2019). Beyond these practical issues, a significant structural barrier can be ideological. Case studies from the Italian context suggest that programs for migrants are often implicitly shaped by a 'logic of assimilation' (Ricatti *et al*., 2021), where inclusion is predicated on the minority group adopting the dominant culture's language and norms. This underlying assumption can hinder the development of genuinely transcultural spaces and represents a subtle but powerful barrier to authentic participation. Furthermore, any discussion of barriers in Italy must acknowledge the profound structural disparities between different areas of the country, often described as the 'Southern Question' in sport (Castaldo & Mango, 2024). The historical lack of quality infrastructure and investment in Southern Italy creates an additional layer of exclusion that is geographical and systemic, meaning that the potential of Learning Cities to foster physical literacy is not uniform across the nation. Effective Learning Cities recognize these obstacles and adopt targeted strategies to address them. Evidence-based approaches include sliding-scale fee structures and equipment lending programs to mitigate economic barriers, culturally responsive programming developed through community co-design, women-only sessions that address gender-specific constraints, transportation assistance programs to enhance accessibility, and family-centered scheduling that accommodates complex time demands. These interventions exemplify the Learning Cities commitment to inclusive education by identifying and addressing the structural factors that restrict participation in physical literacy initiatives.

6. RECOMMENDATIONS AND FUTURE DIRECTIONS

Based on the research, the following policy recommendations are proposed to integrate physical literacy within Learning Cities frameworks. Explicitly incorporating physical literacy objectives into Learning City strategic plans aligns with Boffo *et al*. (2023), who advocate for urban projects that leverage learning processes to address contemporary societal needs, including health and wellbeing through movement education. This approach is gaining traction in the Italian context, where national policies and local initiatives are beginning to recognize the synergy between urban regeneration, public health, and sport. For instance, recent national sport reforms and projects funded by the National Recovery and Resilience Plan (PNRR) aim to enhance sport infrastructures in urban

peripheries, providing a concrete policy lever for Learning Cities to integrate physical literacy goals (Governo Italiano – Dipartimento per lo Sport, 2025). This ensures physical literacy is prioritized within broader urban development agendas. Establishing cross-sectoral governance structures connecting education, health, urban planning, and sport departments is essential, as are equity-focused funding mechanisms that prioritize underserved communities. Further actions are needed to strengthen these efforts, including developing physical literacy assessment frameworks to inform resource allocation; creating professional development pathways for community facilitators; integrating physical activity considerations into urban design standards; and establishing data-sharing agreements between agencies to enable comprehensive evaluation. To be effective, these system-level approaches should be informed by specific pedagogical models being developed within the Italian academic debate. These include frameworks like the Long Term Athletic Development (LTAD) to guide the progression from play to sport (Annoscia *et al*., 2024), practical tools such as the Inclusion Spectrum to ensure activities are genuinely inclusive and adaptable (Pascali & Colella, 2024), and holistic visions like the Dual Career model, which operationalizes the lifelong learning principle by integrating sport into the broader personal and professional life path of individuals (Monacis, 2024). These recommendations highlight the importance of system-level approaches that foster enabling conditions for physical literacy across diverse urban contexts.

This analysis identifies several priority areas for future research. Longitudinal studies examining the long-term impact of physical literacy initiatives on community wellbeing outcomes are critical, as is comparative research across diverse urban contexts to identify transferable implementation principles. Participatory methodologies centering marginalized communities in defining success, economic analyses demonstrating return on investment for physical literacy infrastructure, mixed-methods approaches exploring the interplay between digital and embodied learning experiences, and implementation science studies identifying effective scaling strategies for pilot programs are also needed. This proposed research agenda would bolster the evidence base linking physical literacy to Learning Cities outcomes while addressing gaps in current literature.

For practitioners implementing physical literacy initiatives within Learning Cities, the following guidelines are recommended. Employing asset-based approaches that build on existing community strengths and resources ensures sustainability. Utilizing co-design methodologies that meaningfully involve participants in program development fosters ownership. Several practices are crucial for success. These include implementing trauma-informed approaches that recognize barriers to participation, developing cross-sectoral partnerships to enhance sustainability, and establishing continuous improvement processes informed by systematic evaluation. Creating professional learning communities for knowledge exchange and maintaining flexible programming that adapts to emerging needs emphasize responsive, collaborative approaches recognizing urban learning ecosystem complexities.

Emerging technologies offer significant potential for enhancing physical literacy within Learning Cities. Artificial intelligence applications personalizing movement recommendations based on individual preferences, augmented reality experiences transforming urban environments into interactive movement landscapes, and inclusive design innovations enhancing accessibility for diverse abilities demonstrate this potential. Virtual communities providing social support across geographic boundaries, open data platforms increasing awareness of movement opportunities, and participatory sensing technologies engaging citizens in collecting environmental data through movement highlight how innovative digital tools can complement rather than replace embodied

learning experiences in urban contexts.

7. CONCLUSION

This article has established theoretical and practical connections between physical literacy and the Learning Cities framework, demonstrating how movement-based initiatives can contribute to inclusive urban development. This analysis reveals that intentionally designed physical activity programs can effectively address key Learning City objectives, including community cohesion, intergenerational learning, and technological innovation. The case studies presented illustrate diverse approaches to integrating physical literacy within urban learning ecosystems, offering valuable implementation insights for researchers, practitioners, and policymakers.

Several limitations should be acknowledged. First, the empirical evidence connecting physical literacy specifically to Learning Cities' outcomes remains limited, highlighting the need for targeted research in this area. Second, this analysis focused primarily on developed urban contexts, with less attention to the unique challenges and opportunities of developing regions. Finally, the rapid evolution of both physical literacy theory and Learning Cities practices necessitates ongoing conceptual development to maintain relevance.

Despite these limitations, this study underscores the significant potential for physical literacy to enhance urban learning ecosystems. By recognizing movement as a fundamental learning domain and intentionally designing urban environments to support diverse physical activity experiences, Learning Cities can more effectively pursue their vision of inclusive, lifelong learning for all residents. This interdisciplinary perspective highlights the essential contribution of exercise and sport sciences to creating sustainable, health-promoting urban communities where embodied learning serves as a vehicle for personal and collective transformation.

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