International Journal of Education and Social Development
ISSN: 3078-9931 (Print), ISSN: 3078-2287 (Online) | Vol. 7, No. 2, 2026

The Impact of Integrating Ice and Snow Sports into School Campuses on the Physical and Psychological Development of Primary and Secondary School Students

Yuxi Zhou

School of Physical Education, Xi'an Shiyou University; Xi'an 710000, China

Abstract: This study employs methods including literature review, expert interviews, field research, and logical analysis to examine the effects of integrating ice and snow sports into school curricula on enhancing the physical and psychological attributes of primary and secondary school students. The findings indicate that participation in ice and snow sports can improve overall physical fitness, foster healthy bodily development, enhance cardiorespiratory functions, and ameliorate suboptimal health conditions. Additionally, these sports cultivate a positive mindset, elevate psychological health, and nurture team spirit, thereby contributing to the all-around development of students. However, current initiatives face several challenges: inadequate equipment, limited venues and practice time; pressures from exam-oriented education and safety concerns compounded by insufficient family support; a need for improved school-based curriculum development and a more robust evaluation system for ice and snow sports; and a shortage of physical education teachers equipped to support these programs, resulting in a lack of in-depth specialized courses. In response to these challenges, the paper proposes targeted optimization strategies: school leadership must prioritize physical education and establish a dedicated working group for campus-based ice and snow sports; logistical departments should implement tailored support measures to ensure the construction and maintenance of appropriate facilities and equipment; teachers should fully deploy comprehensive ice and snow sports curricula to secure sufficient, high-quality participation opportunities; and coordinated efforts among government, schools, families, and communities are essential to create diverse participation scenarios and a conducive atmosphere for ice and snow sports. This research aims to provide strategic recommendations for advancing the integration of ice and snow sports into school environments and further promoting the physical and psychological development of primary and secondary school students.

Keywords: Ice and snow sports; integration of ice and snow sports into schools; Beijing; Shijia Primary School; implementation pathways.

1. Introduction

Ice and snow sports are athletic activities conducted under cold conditions, characterized by high spectator appeal and strong technical requirements, which easily stimulate participants' enthusiasm for exercise[1]. The successful bid and organization of the 2022 Beijing Winter Olympics have significantly "engaged 300 million people in ice and snow sports" while also spawning land-based events such as "rotating ice" and "rotating snow"[2]. In 2020, the General Administration of Sport of China selected 2,000 schools with a focus on ice and snow sports, with plans to expand this number to 5,000 by 2025, designate 100 counties (or districts) as pilot areas for campus ice and snow sports, and establish 20 reform pilot zones. This ongoing effort to promote the popularization of ice and snow sports on campuses underscores that the development of these sports remains vigorous in the post-Winter Olympics era[3].

Integrating ice and snow sports into school campuses not only enriches and enhances campus sports life but also effectively stimulates students' interest and enthusiasm for physical exercise. This integration plays a crucial role in improving the physical fitness and health levels of primary and secondary school students, alleviating the pressures they face in academics and daily life, and enhancing both their physical and psychological well-being[4]. However, since the inception of these campus initiatives, there has been a lack of comprehensive theoretical frameworks and mature practical experience to guide implementation. Many schools are still in the exploratory phase, and existing literature indicates that research on the integration of ice and snow sports in primary and secondary schools is relatively scarce and not sufficiently in-depth[5]. Therefore, this paper summarizes the impact of integrating ice and snow sports on the physical and psychological development of primary and secondary school students, analyzes the current practical challenges, and proposes optimization strategies to provide theoretical guidance for the ongoing development of campus ice and snow sports, ultimately furthering the holistic development of students.

2. The Impact of Ice and Snow Sports on the Physical and Psychological Well-being of Primary and Secondary School Students

2.1. Enhancing Physical Fitness: Promoting Healthy Physical Development

Ice and snow sports are high-intensity physical activities that provide comprehensive training effects across multiple physiological systems of the body[6]. First, such sports significantly improve students' cardiorespiratory functions by enhancing cardiac and pulmonary endurance and promoting efficient blood circulation and oxygen intake. Second, they

contribute to the development of muscular strength and endurance. Participation in ice and snow sports requires robust lower-body strength and stability, while sports like ice hockey and figure skating also demand upper-body strength and coordination, facilitating well-rounded physical development.

Furthermore, ice and snow sports emphasize balance and coordination—skills essential for maintaining control, adjusting speed, and changing direction on icy surfaces. These demands cultivate students' dynamic stability and motor coordination. Additionally, flexibility is critical in performing various movements such as deep turns in skiing or complex maneuvers in figure skating, thereby improving students' overall flexibility. These sports also require rapid responses and adaptability to changing conditions, such as making quick decisions or adjusting posture mid-movement during competitions, which enhances students' reaction speed and agility.

Therefore, as a holistic category of physical activity, ice and snow sports effectively improve students' physical fitness across multiple dimensions—including cardiorespiratory endurance, muscle strength, balance, coordination, flexibility, and responsiveness—all of which are fundamental to healthy growth and development[7].

2.2. Enhancing Cardiorespiratory Function: Improving Sub-Health Conditions in Students

Conducted in cold environments, ice and snow sports are technically demanding and fall under the category of hybrid endurance-technical activities, requiring full-body engagement[8]. Regular participation can significantly enhance the cardiorespiratory capabilities of primary and secondary school students, thus alleviating symptoms of physical sub-health. Firstly, these activities require substantial aerobic endurance. Sports such as skating and skiing involve sustained effort and energy expenditure, stimulating the cardiovascular and respiratory systems to meet increased oxygen demands. Over time, this leads to improved cardiac output and pulmonary efficiency, boosting students' resistance to fatigue.

Secondly, these sports help increase lung capacity. The respiratory demands during skiing or skating—such as pole use or balance control—promote lung expansion, enhancing oxygen intake and carbon dioxide elimination. Lastly, due to their high intensity, these sports elevate metabolic rates, accelerating fat oxidation and reducing fat accumulation, thereby improving students' body composition and overall health. In summary, ice and snow sports enhance students' cardiorespiratory function, leading to better endurance, lung capacity, and metabolic health, ultimately mitigating sub-health conditions and contributing to overall physical well-being.

2.3. Fostering a Positive Mindset: Promoting Students' Mental Health

Ice and snow sports demand resilience and a positive psychological disposition. Through training and competition, primary and secondary school students can develop confidence, perseverance, and teamwork, while learning to maintain a constructive attitude in the face of failure, setbacks, and pressure[9]. These sports challenge students in various domains—such as performance, self-control, social interaction, and cognitive skills—nurturing optimism and restoring self-confidence, which are crucial for adolescent development.

Participation also helps relieve stress. Students frequently face academic and personal pressures, including exams and family responsibilities. Engaging in ice and snow sports allows them to temporarily disengage from these stressors, facilitating mental relaxation and emotional regulation. On the one hand, physical exertion releases accumulated tension and promotes relaxation; on the other, focused engagement in sporting activity helps divert attention from stressors, improving emotional stability. Moreover, these activities can boost immunity and reduce susceptibility to illness, further supporting mental and physical well-being.

Finally, ice and snow sports enhance students' social adaptability. Training and competing in cold, unfamiliar environments cultivate adaptability and coping skills, enabling students to better face future challenges across life domains. Overall, these experiences promote resilience, emotional health, and social competence.

2.4. Cultivating Team Spirit: Advancing Holistic Student Development

Bringing ice and snow sports into school settings can effectively foster team spirit among students, thereby promoting their comprehensive development[10]. Many of these sports, such as curling and ice hockey, inherently require teamwork. Through participation, students learn to cooperate, communicate, and coordinate with teammates, developing a strong sense of collective responsibility.

During practice and competition, students support and encourage each other, which strengthens their sense of community and belonging. Team-based environments foster mutual care and a shared sense of purpose. Role differentiation within teams—where each member contributes specific skills and assumes distinct responsibilities—teaches the importance of division of labor and collaboration toward a common goal.Moreover, sustained group training builds trust and rapport among team members, enhancing team cohesion. This collective strength not only benefits performance in sports but also translates to broader aspects of student development, including interpersonal skills and problem-solving abilities.

In conclusion, integrating ice and snow sports into school curricula positively influences students' physical fitness and psychological health. Participation offers valuable opportunities for teamwork, personal growth, and comprehensive capacity-building, fostering students' well-rounded development.

3. Practical Challenges in Integrating Ice and Snow Sports into School Campuses

3.1. Insufficient Equipment, Limited Venues, and Restricted Practice Time

Ice and snow facilities and equipment serve as fundamental prerequisites for implementing ice and snow sports in schools. They are particularly crucial in southern regions or in northern schools temporarily lacking the infrastructure to support such activities. For instance, a field study conducted at Shijia Hutong Primary School in Dongcheng District,

Beijing, revealed that its urban location and distribution across three campuses result in limited space, making it unfeasible to construct dedicated ice and snow venues. Consequently, the school adapts to its conditions by conducting outdoor ice training in winter—when environmental dependence is relatively low—and resorting to dryland substitutes such as “rotating ice” and “rotating snow” during non-winter seasons.

Due to the large student population (over 3,000 students), the school's instructional approach is predominantly introductory, which weakens the overall quality of students' experience and engagement in ice and snow sports. Furthermore, environmental constraints and limited school budgets hinder long-term investment in ice and snow equipment. In addition, the general atmosphere for campus-based ice and snow sports in Beijing remains underdeveloped, making shared facility use among schools largely impractical.

3.2. Academic Pressure and Safety Concerns, Alongside Insufficient Family Support

The successful integration of ice and snow sports into schools not only requires institutional commitment but also robust support from governments, society, and—critically—families[12]. While many parents support school-organized ice and snow excursions and parent-child activities, a portion remain skeptical about the value of such sports, citing concerns over safety and the potential disruption of academic learning. Parental involvement is often limited to financial support, lacking emotional engagement or shared learning experiences with their children.

Moreover, during parent-teacher conferences or communication sessions, parents frequently fail to fulfill their roles as active stakeholders. Their feedback is sparse, often passive, and communication tends to be unidirectional—teachers transmit information, but parents seldom offer meaningful responses. This passive attitude toward student participation in ice and snow activities impedes the effective development of campus sports programs.

3.3. Underdeveloped School-Based Curricula and Incomplete Evaluation Mechanisms

Current school-based curriculum development in ice and snow sports requires optimization, particularly with respect to evaluation systems, which remain underdeveloped and lack consistent feedback mechanisms. This undermines the objectivity and comprehensiveness of physical education programs. Taking Shijia Primary School as an example[13], although its curriculum development—from team formation and planning to implementation and evaluation—has several strengths, notable deficiencies persist.

First, the early development stages lacked sufficient theoretical guidance and technical support, making it difficult to elevate practical experiences into structured knowledge. Second, during the implementation phase, evaluation processes were neither systematic nor continuous, with no objective mechanisms in place to assess student performance scientifically. These shortcomings highlight gaps in both theoretical understanding and practical expertise within the curriculum development team, leading to inconsistent and non-standardized programming.

3.4. Inadequate Teaching Staff and Superficial Ice and Snow Curriculum Implementation

A widespread challenge to integrating ice and snow sports into schools lies in the shortage of qualified physical education teachers who can meet the demands of this rapidly expanding initiative[14]. As a result, specialized ice and snow courses are often implemented at a superficial level. A case study at the Second Experimental Primary School in Shijingshan District, Beijing, revealed that the school had to address its shortage of qualified in-house instructors by adopting a school-enterprise cooperation model. External coaches led the instruction, while internal teachers played supportive roles.

While this approach aimed to foster internal capacity-building, interviews conducted after one semester indicated that most in-house teachers possessed only limited theoretical knowledge and practical skills in skiing, and were not equipped to independently teach ice and snow courses. Two key reasons emerged: first, physical education teachers already face heavy teaching loads and lack spare time, and many do not yet recognize that acquiring ice and snow expertise is part of their professional responsibility; second, the school's system for training physical education staff in ice and snow sports is underdeveloped, lacking incentives or oversight to encourage teachers to actively enhance their competencies in this area.

4. Optimization Strategies for Integrating Ice and Snow Sports into School Campuses

4.1. Strengthening Leadership Commitment: Establishing Dedicated Working Groups

Active support from school leadership is a critical driver of the high-quality integration of ice and snow sports into campus life[15]. This support is reflected in two main areas: recognition of the educational value of physical activity, and appreciation of the broader significance of incorporating ice and snow sports into the school environment. School administrators should lead the establishment of a dedicated working group to oversee the integration process.

Key implementation steps include:

Establishing a clear organizational structure with defined responsibilities. The working group should consist of school leaders, physical education (PE) teachers, and logistics personnel, working collaboratively to develop implementation plans.

Desgning a detailed action plan tailored to the school’s actual conditions, specifying objectives, types of activities, timelines, and resource requirements.

Securing essential resources—including venues, equipment, and personnel—through potential partnerships with local ice and snow sports associations or sports authorities.

Launching awareness campaigns to promote ice and snow sports among students and staff, increasing participation and interest.

Organizing professional development for PE teachers to enhance their skills and safety knowledge, ensuring students can participate in activities safely and effectively.

Implementing a variety of activities in accordance with the plan, such as curling competitions, ski training, or ice hockey

exhibitions.

Conducting evaluations and summaries of activities to assess outcomes, identify challenges, and continuously improve the implementation of ice and snow sports programs.

4.2. Enhancing Logistical Support: Tailoring Venue and Equipment Development to Local Conditions

Logistical support is essential for the successful implementation of ice and snow sports on campus. Schools must designate specialized teams responsible for logistical planning and execution, covering venue preparation, equipment maintenance, and safety management. A comprehensive logistics management plan should outline task distribution, scheduling, and resource allocation.

Given the unique requirements of ice and snow venues and equipment, logistical teams must receive targeted training to understand operational protocols, safety procedures, and emergency responses, thereby improving efficiency and professionalism. Schools should adapt to local conditions when selecting or modifying venues—such as converting existing spaces into skating rinks or snow zones—ensuring both safety and functionality.

Essential equipment (e.g., curling stones, skis, ice hockey gear) should be procured in sufficient quantities and with high quality. Where climate or space is limiting, temporary rinks may be constructed, with regular inspections and maintenance to guarantee safety and usability. Finally, schools must develop clear safety guidelines to provide students with a secure and supportive environment, enabling them to enjoy ice and snow sports while developing their physical literacy.

4.3. Expanding and Structuring Curricula: Ensuring Time and Quality in Student Participation

In alignment with national initiatives such as the “One Hour of Exercise Daily” campaign and the “Sunshine Sports” program, recent education policies—such as the integration of sports and education and the “double reduction” policy—emphasize the need to reduce academic burden while increasing both the duration and quality of student physical activity[16].

To support these goals, schools should supplement regular PE classes with approximately 30 minutes of daily dryland ice and snow activities, such as “rotating ice” and “rotating snow,” ensuring full implementation of the “sunshine hour.” Schools with adequate resources should fully implement dedicated ice and snow curricula, while those with temporary constraints can collaborate with community sports clubs to offer experiential lessons.

Ice and snow instruction for primary and secondary students can be structured into “rotating ice” for grades 1–2 and “rotating snow” for grades 3–6, based on students’ developmental characteristics. Class sizes should align with teaching schedules, and appropriate equipment and protective gear must be provided according to the number of participants.

4.4. Coordinated Efforts Among Government, Schools, Families, and Communities: Creating Diverse Participation Environments

Successful implementation of ice and snow sports on campus is a result of coordinated efforts across multiple sectors, as evidenced by case studies of model schools and expert interviews. At the governmental level, top-down policy design provides schools with direction and financial support, enabling the introduction of ice and snow sports. Community resources allow schools to collaborate deeply with external organizations, avoiding inefficiencies in program development. Family support—both moral and financial—reinforces school efforts and bolsters confidence in the sustainability of such programs.

These findings highlight that only through synergistic coordination among government, schools, families, and communities can a rich and diverse participation environment be cultivated. The absence of support from any one of these sectors can negatively impact the overall implementation. Ultimately, the integration of ice and snow sports into school life is a product of multi-stakeholder collaboration, mutual promotion, and shared success[17].

5. Conclusion

This study demonstrates that ice and snow sports have a significant and positive impact on the physical and psychological development of primary and secondary school students. Participation in these activities notably enhances students’ physical coordination, endurance, and strength—factors that not only improve overall physical fitness but also help prevent and alleviate common health issues among adolescents.

In addition to physical benefits, ice and snow sports play a constructive role in fostering psychological well-being. Students engaged in such activities tend to exhibit greater self-confidence, stronger teamwork skills, and improved resilience in coping with stress. These psychological gains contribute to students’ holistic development and positively influence their academic and everyday lives in the long term.

Longitudinal studies tracking the sustained effects of ice and snow sports *participation* would offer deeper insights into their broader impact on student growth and development. Overall, this research provides empirical support for the promotion of ice and snow sports in schools and offers valuable guidance for the formulation and refinement of related educational policies and practices. It is hoped that this study will draw increased attention from educators and policymakers alike, further advancing the integration of ice and snow sports into school settings and contributing to the healthy development of students.

References

[1] Chen, H. Y. (2022). Promotion mechanism and optimization strategies of integrating ice and snow sports into schools. *Journal of Sports Culture Guide*, (4), 22–28. [In Chinese]

[2] Liu, J. S., Zou, L. M., Zou, Y., et al. (2023). Scientific connotation, main features, and practical pathways of "Rotating Ice" training in the post-Winter Olympics era. *Journal of Wuhan Institute of Physical Education*, *57*(9), 71–76. [In Chinese]

[3] Bi, Z., Yang, L., & Wang, Z. C. (2023). Research on strategies for promoting ice hockey in primary schools. *Journal of Chinese Education*, (S2), 182–184. [In Chinese]

[4] Zhao, D. L., & Zhou, L. J. (2023). Constructing a process model for enhancing adolescents' subjective well-being through ice and snow winter camps—An exploratory analysis based on grounded theory. *Journal of Physical Education*, *30*(6), 97–103. [In Chinese]

[5] Xu, H. (2021). The current status, reflections, and prospects of introducing ice and snow sports into schools under the background of the 2022 Beijing Winter Olympics and Paralympics. *Sports Science*, *41*(4), 41–48. [In Chinese]

[6] Wang, B. (2021). The value and pathways of integrating ice and snow sports into schools from the perspective of sport-education integration. *Journal of Sports Culture Guide*, (4), 92–98. [In Chinese]

[7] Cheng, W. G., & Feng, Z. W. (2020). Ice and snow sports in Chinese schools: Influencing factors, promotion mechanisms, and practical pathways. *Sports Science*, *40*(7), 40–48. [In Chinese]

[8] Yang, S. J., & Liu, B. (2021). The intrinsic relationship and practical lessons of ice and snow sports in schools and sport-education integration. *Journal of Beijing Sport University*, *44*(3), 105–113. [In Chinese]

[9] Cui, J. Q., Xing, J. M., & Wang, W. L. (2020). A study on the development of ice and snow sports characteristic schools in China from the perspective of core competencies. *Journal of Sports Culture Guide*, (6), 92–97. [In Chinese]

[10] Zhang, S. P., & Luo, B. Q. (2021). A study on the sustainable implementation of "Ice and Snow Sports in Classrooms" in Beijing primary and secondary schools. *Journal of Capital University of Physical Education and Sports*, *33*(1), 56–61. [In Chinese]

[11] Zhang, S., & Zhu, J. B. (2023). The value and practice paths of high-quality development of ice and snow sports in building a strong sports nation in the new era. *Journal of Harbin Sport University*, *41*(6), 37–42. [In Chinese]

[12] Jin, T., & Liu, J. Y. (2021). The value, challenges, and pathways of sports social organizations participating in campus ice and snow sports. *Journal of Sports Culture Guide*, (5), 98–103. [In Chinese]

[13] Zhang, S. (2021). A study on the development of ice and snow sports in schools under the background of the Beijing Winter Olympics—Taking Shijia Hutong Primary School in Dongcheng District of Beijing as an example. In General Administration of Sport of China Sports Culture Development Center & Sports History Branch of China Sport Science Society (Eds.), *Proceedings of the 2021 Academic Conference on Cultural Resources Supporting the Communication and Heritage of Beijing Winter Olympics Culture* (p. 1). Harbin Sport University. [In Chinese]

[14] Cao, Y., Cheng, C. Y., & Dong, P. (2020). Opportunities, problems, and strategies in the development of campus ice and snow sports in China. *Journal of Sports Culture Guide*, (11), 13–19. [In Chinese]

[15] He, L. J., & Ru, X. Y. (2023). The "Chinese Solution" for the implementation and evaluation of Olympic education for the Beijing 2022 Winter Games. *Journal of Capital University of Physical Education and Sports*, *35*(5), 530–541. [In Chinese]

[16] Ding, S. W., & Chu, Z. D. (2022). What, why, and how: A review and outlook on sport-education integration research. *Journal of Shanghai University of Sport*, *46*(7), 89–102. [In Chinese]

[17] Zhao, J., & Li, Z. W. (2024). A study on the development of ice and snow sports in China under the background of building a strong sports nation. *Journal of Chengdu Sport University*, *50*(4), 88–94. [In Chinese]