

Key points

1 Regular physical activity and exercise is a crucial component of type 1 diabetes management. It reduces the risk of diabetes-related complications by improving lipid profiles, reducing systemic inflammation and enhancing insulin sensitivity.

2 Inconsistent support, fear of hypoglycaemia and limited staff training mean that children with type 1 diabetes face significant barriers to physical activity and exercise in schools.

3 Platforms like DigiBete offer a promising solution by delivering flexible, evidence-based training that equips school staff with the knowledge and confidence needed to support students with T1D safely during exercise.

Empowering schools to support children and young people with T1D to live active lives

Monika Jakiel-Rusin highlights the barriers children with type 1 diabetes face in school-based physical activity and exercise and advocates for structured training and comprehensive individual healthcare plans to improve support

Children with type 1 diabetes (T1D) face significant barriers to physical activity and exercise (PAaE) in schools due to inconsistent support, fear of hypoglycaemia and limited staff training. Effective diabetes management requires balancing insulin, food and exercise, but many schools lack the necessary knowledge and resources.

This article explores the importance of structured training and comprehensive individual healthcare plans (IHPs) in improving school-based exercise for children and young people (CYP) with T1D. Drawing on research and the 'Improving access to school-based physical activity for young people with type 1 diabetes' project, gaps in school support and the impact on student wellbeing are highlighted.

This clinical review underscores the urgent need for mandatory, standardised diabetes education for all school personnel across the UK. It advocates for improved collaboration with diabetes teams, the integration of digital training tools like DigiBete and personalised exercise advice in IHPs. Addressing these challenges can create inclusive environments where CYP with T1D can safely participate in physical activity (PA) and gain confidence in self-management.

Every child should have the opportunity to be active, but for CYP with T1D it can be challenging. T1D is a lifelong autoimmune condition requiring careful management to prevent serious complications.¹ Alarming, global diagnoses are rising at younger ages.² Regular physical activity and exercise improves glycaemic control, cardiovascular health, and wellbeing.³ Schools play a vital role in promoting PAaE, yet many CYP with T1D face barriers to participating due to inadequate diabetes support.⁴ This article examines the role of standardised training and IHPs in UK schools, highlighting current limitations and offering recommendations for improving practice.

The importance of physical activity and exercise for children and young people with T1D in schools

Regular PAaE is a crucial component of T1D management. It reduces the risk of diabetes-related complications by improving lipid profiles, reducing

systemic inflammation and enhancing insulin sensitivity.⁵ It also supports cardiovascular health, promotes healthy body composition and has positive effects on mental wellbeing.⁶ Some evidence suggests that regular exercise may prolong partial remission in newly diagnosed youth.⁷ The National Institute for Health and Care Excellence T1D guidelines⁸ emphasise the importance of a healthy lifestyle, acknowledging that effective T1D management goes beyond insulin therapy. A recent systematic review found that engaging in at least four hours of moderate-to-vigorous PAaE per week, in conjunction with effective insulin therapy, can significantly improve health outcomes in adolescents with T1D.⁶ Moreover, Riddell et al.³ highlight advancements in exercise and nutrition as therapeutic strategies in diabetes care.

The International Society for Pediatric and Adolescent Diabetes (ISPAD) Clinical Practice Consensus Guidelines 2022 state that "children and adolescents with diabetes should be fully included in all school activities, with individualised plans and trained staff to manage glycaemia during exercise".⁹ Likewise, the American Diabetes Association's (ADA) position statement on

Monika Jakiel-Rusin RD, MSc, BSc is Specialist Paediatric Diabetes Dietitian at Bristol Royal Hospital for Children and Research Fellow with Bristol Biomedical Research Centre. She has an honorary contract with the University of Bristol.





diabetes care in schools underscores that “students with diabetes must not be excluded from any activity, and schools should have policies in place to support safe participation”.¹⁰ Integrating these recommendations into school training programmes and individual health plans (IHPs) can optimise glycaemic management and encourage greater participation in PAaE.

The impact of school support on PAaE in CYP with T1D

International exercise consensus guidelines recommend that CYP with T1D engage in at least 60 minutes of PAaE daily, emphasising the importance of school-based PAaE.¹ However, many CYP with T1D face challenges in meeting the guidelines and participating in school-based PAaE due to barriers such as fear of hypoglycaemia and inadequate support.^{11,12} McCollum and O’Grady¹³ highlight that while primary schools often provide better diabetes support than secondary schools, gaps in staff training remain. They suggested that mandatory, standardised diabetes education for school staff, alongside clear PAaE-specific guidance within IHPs, would significantly improve the quality of support.

In clinical practice, a key challenge is the inconsistency of school policies and staff education on the management of T1D, particularly around glucose control during PAaE. These inconsistencies can result in variable levels of support for children and young people with T1D, potentially affecting both their health outcomes and participation in school-based activities. The INSCHOOL project highlighted the urgent need for standardised policies and improved staff training in this area, drawing attention to disparities across schools that hinder equitable care.¹⁴ Currently, a research team at the University of Exeter is investigating school policies on T1D management across the UK.¹⁵ The findings of this study are expected to provide valuable insights and inform the development of targeted interventions to enhance diabetes care and support within educational settings.

The national launch of the DigiBete platform aimed to address that across the country. However, while around 70% of UK diabetes centres now use it, gaps remain where it has not been fully integrated. To explore the current practices and perspectives of diabetes MDT members regarding the integration of more guidance on PAaE in



Figure 1. SurveyMonkey responses to the question: "What do you like about the DigiBete online platform? Select all that apply"

school training and IHPs, a nationwide SurveyMonkey questionnaire was conducted in March 2025. The survey showed that nearly half of healthcare professionals using DigiBete value its evidence-based exercise section, developed by specialist dietitians (see Figure 1).

Ensuring accessible and effective diabetes management training in schools: a blended learning approach

A national guide for teachers and parents of children and young people in pre-school, early years, primary and secondary schools highlights the need for school staff to have appropriate diabetes management training to ensure student safety. All staff should have foundational diabetes knowledge, with at least two designated members receiving in-depth training to manage diabetes-related emergencies.¹⁶ Training must be both accessible and effective to reach all school staff. Traditional in-person training, while valuable for hands-on learning, is resource-intensive and limits participation. Online evidence-based platforms like DigiBete provide a scalable alternative, allowing staff to access training flexibly. This approach ensures that more staff can undertake and revisit training at their convenience, reinforcing their knowledge over time. Healthcare professionals (HCPs) also report that DigiBete training saves time and resources, allowing diabetes teams to focus on more tailored support.¹⁷

A combination of online learning and in-person sessions can help bridge this gap. This is especially important in primary schools, where children often require more practical support from their teachers and staff. The online PAaE module can cover topics like PAaE's impact on glucose fluctuations, glucose monitoring, mitigating the risk of hypo- or hyperglycaemia, and using continuous glucose monitoring (CGM) and automated insulin delivery (AID) systems. Practical hands-on training can complement this with the opportunity to apply staff learning in practice, building confidence in managing glucose fluctuations. These interactive sessions foster a supportive environment, allowing staff to ask questions and receive direct feedback from diabetes educators. They would be recommended as mandatory for primary schools and optional for secondary schools, available upon request.

Enhancing DigiBete schools and community platform with interactive tutorials and strengthened communication pathways

Anecdotal evidence from clinical practice suggests that parents often hesitate to request assistance from school staff for insulin adjustments before exercise, such as activating the exercise function on AID systems, due to limited diabetes training among staff. While hands-on training sessions can help address this gap, participation is typically limited to a small number of key workers. As a result, other staff, including cover teachers, may miss out on essential training opportunities.

To bridge this gap, targeted modules on diabetes management during PAaE within platforms such as DigiBete could be further enhanced. Incorporating interactive tutorials and step-by-step videos could support staff in understanding how to use different AID and CGM systems in the context of exercise. Decision-making flowcharts could also guide school staff in adjusting insulin delivery based on activity type, duration and real-time glucose trends. These digital resources would be especially valuable for staff who have limited access to in-person training. In line with professional guidance, any clinical tasks must be signed off by a registered nurse to ensure safe delegation of care.¹⁸

To strengthen communication pathways, DigiBete could introduce feedback loops that allow schools to share their experiences and receive tailored advice from diabetes multidisciplinary teams (MDTs), supporting continuous learning and improvement. Integrating peer support networks within the platform would further enable school staff to exchange best practices and seek informal guidance from diabetes educators and other schools. This multi-faceted approach would promote collaboration, enhance teachers' confidence and competence, and contribute to a more inclusive school environment for children and young people with T1D. While implementing these features would require some development work and potentially increased contributions from diabetes teams, it could also help reduce the time clinicians spend responding to individual school queries by offering a more structured and scalable support system.

Insights from focus groups: improving access to school-based physical activity for young people with T1D

To inform the design and direction of the 'Improving access to school-based physical activity for young people with type 1 diabetes' project – supported by the Bristol Biomedical Research Centre (BRC) – patient and public involvement (PPI) focus groups were held with secondary school students with T1D and their parents in the Bristol area. These discussions provided valuable insights into their lived experiences of managing diabetes around PAaE at school. At the time of the focus groups and this article's writing, Bristol had not yet implemented the DigiBete online training platform.

A recurring theme that emerged from the focus groups was around the balance between autonomy and support. Students valued their independence but expressed concerns about whether school staff were sufficiently trained to handle emergencies. There was a noticeable inconsistency in teachers' knowledge

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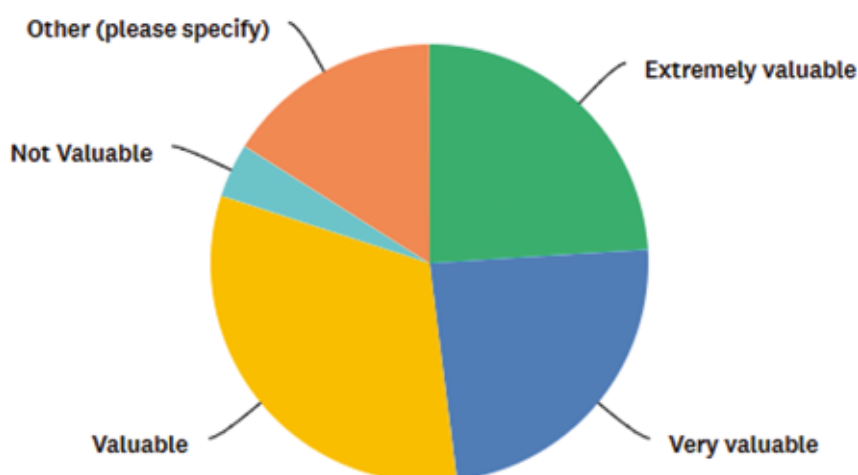


Figure 2. SurveyMonkey responses to the question: "How valuable do you think it is to include tailored physical activity (PA) guidance in individual healthcare plans (IHPs)?"

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of diabetes management, with PE teachers typically more informed than cover teachers or non-specialist staff. This disparity led to varying levels of support in managing PAaE-related glucose fluctuations. One participant described a hypoglycaemic episode where a teaching assistant insisted on escorting her to the office for treatment. Despite the student's attempts to explain the correct emergency protocol, the assistant's lack of understanding caused significant distress. Some participants reported negative early experiences in school sports due to inadequate support during hypoglycaemia, leading to disengagement from PAaE and reduced confidence. In response, Bristol Specialist Paediatric Diabetes Dietitians (SPDDs) are committed to incorporating structured and, when needed, personalised exercise advice into IHPs from diagnosis. Following the implementation of the DigiBete online training, we will consider introducing the DigiBete School Care Plan, developed collaboratively with input from healthcare professionals, families and educators. This plan fosters a safe and inclusive environment, enhancing staff confidence and supporting children with T1D to participate fully in school activities.

Additionally, concerns were raised regarding PAaE advice in individualised healthcare plans (IHPs), which often contained generic and overly simplistic information, sometimes leading to unnecessary restrictions. For instance, students were occasionally excluded from PE due to high blood glucose levels, despite evidence supporting the benefits of light-intensity exercise in reducing hyperglycaemia, unless ketones are present.¹⁹ Some parents also noted that the PAaE-related advice in IHPs was not regularly updated to reflect their child's changing needs. Recognising the time constraints and limited capacity of Paediatric Diabetes Specialist Nurses (PDSNs) to provide tailored input in this area, the Bristol dietetic team has proposed taking on this responsibility. As dietitians already provide exercise-related advice as part of their role, this would be integrated into routine clinic reviews or offered in dedicated appointments. The team is currently piloting a specialist exercise clinic for CYP with T1D. While this approach requires coordination, it is considered sustainable and may reduce the burden

on nursing teams while improving the quality and consistency of PAaE guidance in schools. Implementing the recommendations in Table 1 can empower schools to play a key role in supporting the physical and emotional wellbeing of CYP with T1D.

Integrating individualised exercise plans into individual healthcare advice for CYP with T1D in Bristol

ISPAD guidelines recommend monitoring glucose levels before, during (if prolonged) and after PAaE. IHPs should offer clear, actionable guidance for school staff on target glucose ranges, carbohydrate need and insulin adjustments based on PAaE type and timing.⁹ Fear of hypoglycaemia can influence nutritional choices and behaviours before exercise, underscoring the need for tailored guidance and proactive management.²⁰ Personalised nutritional advice can empower CYP with T1D to participate in PAaE confidently.

Glycaemic management around PAaE requires an individualised approach as exercise responses vary by age, growth, gender and development.²¹ Adjustments may involve specific insulin dose changes or additional carbohydrates to prevent hypo.^{22,3}

AID systems introduce further complexities.²³ Although general exercise guidelines exist for AID users, individual adjustments remain essential based on the system, exercise type and personal factors. IHPs should include clear, practical guidance on PAaE management for AID users, covering activity mode activation depending on type of exercise, bolus adjustments (e.g., reducing by 25% if within two hours of exercise) and delivering fast-acting carbohydrates as required²⁴.

However, current practice often lacks detailed exercise guidance in IHPs. A national survey for this discussion revealed that only 16% of respondents provide tailored PA advice within IHPs, while over 70% considered it valuable to extremely valuable (see Figure 2). This highlights the need for better integration of PAaE guidance into IHPs. All comments in the 'other' responses highlighted that exercise management depends on the individual child and their activity levels and standardised guidance is sometimes enough. Standardised IHP advice should align with recent international guidance from the ISPAD consensus guidelines¹ and the EASD-ISPAD position statement.²³ If no individual adjustments are required, it can be beneficial to include a note in the IHP that it can serve as a starting point, with the understanding that it will be reviewed as needed and adjusted as required. Schools and families should be encouraged to provide feedback and communicate to the diabetes MDT any concerns or observations that may indicate the need for adjustments.

Tanenbaum's et al.'s study²⁵ has demonstrated the benefits of structured exercise interventions at diagnosis through a combination of individualised sessions and group workshops. Integrating personalised exercise advice into IHPs from diagnosis could establish a foundation for ongoing group exercise education across the first year post-diagnosis facilitating peer support and shared learning. Further research is needed to explore scalable implementation strategies. Collaborating with the Tanenbaum study team could generate valuable evidence to inform best practices and update global exercise management guidelines for CYP with T1D.

Implementing DigiBete training and personalised exercise education in Bristol

Following discussions with Bristol's lead PDSN and lead SPDD, and after reviewing preliminary findings from the literature search and PPI focus groups, the Bristol Diabetes MDT decided to adopt the DigiBete online school training platform. The entire PDSN and dietetic team will receive training on its use, with a dedicated session scheduled for April 2025. Additionally, IHPs will now include initial standardised exercise advice at diagnosis, which dietitians will review and personalise within the first two months from the ward discharge.

The Bristol Diabetes MDT has also committed to continuing mandatory in-person, hands-on training for key primary school staff members working directly with children with T1D. This approach will ensure a comprehensive understanding of glucose management and device use, including CGM and AID systems, with tailored strategies for PAaE. Dietitians will contribute to these educational efforts by joining the face-to-face training sessions to deliver detailed guidance on managing glucose levels during PAaE. Where attendance is not possible, dietitians will provide a short, interactive recorded presentation to ensure this vital aspect is consistently covered. This collaborative approach will empower school staff with the knowledge and confidence to implement effective diabetes management strategies during school activities and create a more supportive and inclusive school environment for children and young people with T1D in Bristol. The RCN¹⁸ supports the practical delivery of such training but also highlights

that any clinical tasks undertaken by school staff must be appropriately delegated to a registered nurse, in line with professional accountability and governance frameworks. A registered nurse will always be present during these sessions to oversee the training and formally sign off staff once competencies have been demonstrated.

Conclusion

In conclusion, supporting CYP with T1D to engage in regular PAaE is essential for their physical and mental wellbeing. However, the challenges faced by them in school settings, including inconsistent staff training and inadequate IHPs, highlight the urgent need for structured and accessible training resources. Platforms like DigiBete offer a promising solution by delivering flexible, evidence-based training that equips school staff with the knowledge and confidence needed to support students with T1D safely during exercise. Implementing it across all UK centres can contribute to the standardised and consistent education and development of national school policies. Additionally, individualised PAaE guidance within IHPs should be prioritised. By tailoring plans to reflect a child's specific insulin regimen and glycaemic response patterns, schools can better support CYP in managing their diabetes during PAaE. Collaborative input from HCPs, schools, patients and families can further enhance the quality and relevance of these plans. Prioritising inclusive, well-informed support systems can help ensure every child benefits from PAaE, both in school and beyond.

RECOMMENDATION	DETAILS
Standardised training implementation	Implement evidence-based training programmes like DigiBete across all UK schools with CYP with T1D. This can ensure all school staff receive evidence-based and consistent education including managing PAaE for CYP with T1D.
Scenario-based learning	Incorporate interactive video-based PAaE modules into online school platforms like DigiBete. Include demonstrations of the practical use of CGM and AID systems to enhance teachers' confidence and competence in real-life situations.
Face-to-face training	Provide additional hands-on training for key staff supporting CYP with T1D at school. Make this training mandatory for primary schools and optional for secondary schools, available upon request. Ensure there is a focus on building confidence in managing diabetes-related challenges during PAaE.
National policy development	Establish standardised national policies for managing PAaE in CYP with T1D in schools. National-level collaboration with diabetes MDTs, education authorities and patient advocacy organisations can ensure effective implementation and promote a consistent standard of care. Monitoring and regular updates to policies should reflect emerging evidence and best practices.
Individual healthcare plans (IHPs)	Ensure all CYP with T1D have standardised PAaE advice in their IHPs at diagnosis, appropriate to their insulin delivery system (e.g., MDI or AID). IHPs should be reviewed and updated as needed to reflect individual needs. Ensure substitute teachers have access to IHPs to stay informed about individual exercise management strategies when covering lessons.
Collaboration and communication	Foster effective communication between schools, families and the diabetes MDT by: - Proactive development and review of IHPs coordinated by all parties involved. - Electronic feedback loops within school platform to facilitate ongoing communication, share best practices and provide opportunities for peer learning.
Further research	Further research is needed to evaluate the effectiveness of online training platforms and personalised exercise advice into IHPs from diagnosis. Findings to inform updates to international guidelines and policies.

Table 1. Key recommendations for supporting physical activity in CYP with T1D in schools

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