UNIVERSIDADE da MADEIRA

CDA ACADÉMICO

cidesd

INTERACTIVE TECHNOLOGIES INSTITUTE

ITI-LX UIDP/50009/2020 - IST-ID

fct Fundação para a Ciência e a Tecnologia

INTERNATIONAL SEMINAR

SPORT AND SCIENCE 2025

10-12 de ABRIL

LIVRO DE ATAS

FUNCHAL

Região Autónoma da Madeira

Secretaria Regional de Educação, Ciência e Tecnologia

Direção Regional de Desporto

Seminário Internacional Desporto e Ciência 2025

Comissão Organizadora
Rui Trindade, Helder Lopes, Élvio Gouveia, Catarina Fernando, Ana Luísa Correia, Ricardo Alves, Hélio Antunes, Cíntia França, João G. Saldanha, Francisco Teixeira, João Martins, Francisco Santos.

Comissão Científica
Élvio Gouveia, Helder Lopes, Rui Ornelas, Duarte Freitas, Catarina Fernando, Jorge Soares, Ana Rodrigues, Ricardo Alves, Hélio Antunes.

Ficha Técnica

Livro de Atas Seminário Internacional Desporto e Ciência 2025
ISBN: 978-989-9230-11-8

Coordenação da Edição: Hélio Antunes, Rui Ornelas, Helder Lopes, Catarina Fernando, Ana Rodrigues, Ana Luísa Correia, Cíntia França & Élvio Gouveia.

Editor: Universidade da Madeira
2025 – Funchal, Portugal
Suporte: Eletrónico
Formato: PDF/PDF/A

Physical Education and Health: Guidelines for the Inclusion and Exercise Prescription for Students with Asthma and Type I Diabetes Mellitus

José Sousa[1,2], João Silva[1,2], Filipe Coelho[2], Ana Rodrigues[1,3,4]

[1]Universidade da Madeira, Faculdade de Ciências Sociais, Departamento de Educação Física e Desporto
[2]Escola Básica e Secundária Gonçalves Zarco
[3]Centro de Investigação em Desporto, Saúde e Desenvolvimento Humano (CIDESD)
[4]Centro de Investigação, Desenvolvimento e Inovação em Turismo (CITUR)
Autor Correspondente: (José Sousa joseantoniom.1998@hotmail.com)

Abstract

The school is affirmed as a space for the integration and inclusion of students with a wide range of needs, vulnerabilities, and potential. Asthma and Type 1 Diabetes Mellitus (DM1) are two chronic conditions whose diagnosis has shown an increasing trend among the pediatric population.

Engaging in physical activity can be beneficial for children and adolescents with these conditions; however, the prescription of exercise must follow specific guidelines. Physical Education (PE) professionals should be well-versed in preventive protocols and response procedures for situations such as asthma attacks, hypoglycemia, or hyperglycemia.

This paper aims to propose a set of practical recommendations for the inclusion and exercise prescription for students with asthma and DM1 (DM1) during PE (PE) classes, based on a review of clinical guidelines, scientific articles, and other relevant documents.

Asthma is a chronic inflammatory disease of the airways (Padem & Saltoun, 2019) and is one of the most common chronic respiratory diseases worldwide, with an increasing prevalence in recent decades (Alhassan et al., 2016). For students with asthma, regular physical activity contributes to (i) slowing the decline in lung function, (ii) reducing symptoms and medication needs, and (iii) improving physical fitness, which enhances their ability to perform daily activities (Rochester et al., 2023).

DM1 is a chronic condition characterized by insulin deficiency due to the absence of pancreatic beta cells, resulting in hyperglycemia (Katsarou et al., 2017). Physical activity plays a critical role in managing DM1, offering significant health benefits for children and adolescents (American Diabetes Association, 2017).

For these reasons, it is essential for teachers to encourage physical activity among students with asthma and DM1, particularly through PE classes, which serve as the primary means of promoting physical activity in schools. However, educators must understand the specific characteristics of these health conditions, the precautions necessary for exercise prescription, and the development of school-wide and classroom-level protocols tailored to each student.

Keywords: PE; Inclusion; Physical Activity; Asthma; Diabetes.

Resumo

A escola, afirma-se como sendo um espaço de integração e inclusão de alunos com as mais diversas necessidades, fragilidades e potencialidades. A asma e a Diabetes Mellitus tipo 1 (DM1), são duas patologias crónicas em que o diagnóstico tem registado um incremento entre a população pediátrica. A prática de atividade física em crianças e jovens com estas patologias, poderá ser vantajosa, contudo a prescrição do exercício físico deverá respeitar orientações próprias, bem como os profissionais de Educação Física devem dominar um conjunto de procedimentos protocolares de prevenção e atuação em caso de ataques asmáticos, hipoglicemia ou hiperglicemia. Deste modo, com este trabalho pretende-se propor um conjunto de recomendações práticas para a inclusão e prescrição de exercícios físicos para alunos com asma e com DM1 nas aulas de Educação Física, com base na revisão de normas orientadoras, de artigos científicos e de outros documentos relevantes sobre a temática.

A asma é uma doença inflamatória crónica das vias respiratórias (Padem & Saltoun, 2019), e uma das doenças respiratórias crónicas mais frequentes no mundo, com prevalência crescente nas últimas décadas (Alhassan, et al., 2016). Para alunos com asma, a prática regular de atividade física contribui para: (i) desaceleração do declínio da função pulmonar, (ii) atenuar os sintomas e medicação, e (iii) a melhoria da aptidão física, o que se reflete numa maior eficiência na realização das atividades diárias (Rochester et al., 2023).

A DM1 é uma doença crónica, que se carateriza pela deficiência de insulina devido à ausência de células beta pancreáticas, o que resulta numa hiperglicemia (Katsarou et al., 2017). A prática de atividade física para estas populações desempenha um papel fundamental na gestão da DM1, uma vez que proporciona benefícios significativos para a saúde global das crianças e jovens (American Diabetes Association, 2017). É essencial que os professores incentivem a prática de exercício físico nas populações com asma e DM1, principalmente por meio das aulas de Educação Física, que são a principal forma de promoção de atividade física na escola. No entanto, é fundamental que conheçam as particularidades dessas condições de saúde, cuidados de prescrição do exercício físico, desenvolvimento de procedimentos protocolares ao nível da escola, da Educação Física, da turma e do aluno.

Palavras-chave: Educação Física; Inclusão; Atividade Física; Asma; Diabetes.

Introduction

Given the amount of time children and adolescents spend in school, this environment plays a central role in shaping and transforming behaviors, particularly in the development of healthy habits (Fragoeiro, 2024). Within this context, PE (PE) stands out as a key discipline aimed at encouraging the adoption of healthy lifestyles (Rodrigues et al., 2024), especially for students facing challenges related to chronic illnesses. Among these, asthma and DM1 (DM1) are notable due to their increasing prevalence among the population (Patterson et al., 2012; Alhassan et al., 2016; Panagiotou et al., 2020) and their significant impact on the quality of life of those affected.

Asthma is a chronic respiratory disease that affects a considerable number of children and adolescents. Its management is often positively influenced by regular physical activity, provided it is conducted with appropriate precautions.

Similarly, DM1—a metabolic condition resulting from the absence of insulin—requires specific care during physical activity, particularly the frequent monitoring of blood glucose levels.

Given the rising prevalence of these conditions among young people, it is essential that PE teachers adopt their classes to create an inclusive and safe environment where students with asthma and DM1 can participate in sports and physical activities—both within and beyond the school setting (Cardwell & Elliott, 2018). To achieve this, educators must possess both technical and practical knowledge that enables them to prescribe and supervise activities effectively, minimizing risks while maximizing health benefits.

In this light, the purpose of this paper is to propose a set of practical recommendations for the inclusion and exercise prescription in PE classes for students with asthma and DM1, with the aim of promoting health and ensuring full enjoyment of the benefits of physical activity.

School and chronic diseases

Asthma: a chronic respiratory disease

Chronic respiratory diseases (CRDs) are a group of conditions that cause long-term impairment of the airways and pulmonary structures, progressively compromising respiratory function (Gibson, 2013). In 2019, CRDs ranked among the leading non-communicable diseases, affecting approximately 456.6 million individuals globally and around 1.5 million in Portugal (GBD 2019 Chronic Respiratory Diseases Collaborators, 2023). Among the most prominent CRDs is asthma, which, more specifically, is classified within chronic obstructive pulmonary diseases (COPD).

Asthma is a chronic inflammatory disease of airways (Padem & Saltoun, 2019) and is one of the most common chronic respiratory conditions worldwide, with its prevalence steadily increasing over recent decades (Gibson et al., 2013; Alhassan et al., 2016; Panagiotou et al., 2020).

Regular physical activity (PA) is strongly recommended for individuals with asthma (Cardwell & Elliott, 2018), provided that the intensity is moderate (American College of Sports Medicine, 2016; Gloeckl et al., 2020) and the activities are properly tailored to the individual's abilities (American College of Sports Medicine, 2016).

For students with asthma, regular PA contributes to slowing the decline in lung function, reducing symptoms (Cardwell & Elliott, 2018), and improving both physical fitness and muscular strength. This leads to greater efficiency in performing daily tasks (Dowman et al., 2021; Lima et al., 2023; Rochester et al., 2023). However, despite these benefits, individuals with CRDs tend to be inactive and exhibit high levels of sedentary behavior (Albarrati et al., 2020; Breuls et al., 2022; Llamas-Saez et al., 2023). In this context, motivation plays a critical role in engaging in PA, with health and well-being being the most common motivational drivers (Mesquita et al., 2017; Pimenta et al., 2021). Conversely, disease severity and symptom burden can discourage physical activity (Mesquita et al., 2017).

Physical activity is considered safe for individuals with CRDs as long as specific clinical parameters are respected. Peripheral oxygen saturation (SpO_2) is a key indicator that must be interpreted with care. Reference values are provided in Section 4.1, item (g).

Diabetes

DM1 (DM1) is a chronic disease characterized by insulin deficiency due to the absence of pancreatic beta cells, resulting in hyperglycemia (Katsarou et al., 2017). The global incidence of DM1 has been rising annually, particularly among younger children (Patterson et al., 2012). It is one of the most prevalent chronic conditions among school-aged children (DGS, 2019).

Healthy eating plays a crucial role in managing the lifestyle of individuals with diabetes. A balanced diet provides essential energy and nutrients needed for proper bodily function and supports overall physical, mental, and social well-being (DGS, 2019).

Likewise, physical activity plays a fundamental role in the management of DM1, delivering significant health benefits for children and adolescents (American Diabetes Association, 2017; Riddell et al., 2017; Błaszczak et al., 2024). Physical activity recommendations for this population are consistent with those of the World Health Organization (2020), namely, at least 60 minutes of moderate to vigorous intensity activity per day, including at least three sessions of vigorous activity per week.

Although exercise contraindications are minimal, certain conditions require attention—particularly symptoms of hypoglycemia and hyperglycemia (MacMillan et al., 2014), as well as elevated ketonemia, which increases the risk of metabolic decompensation. Moreover, it is crucial to determine whether the student experienced a hypoglycemic episode within the previous 24 hours, as this significantly raises the risk of recurrence (DGS, 2019). Specific precautions before engaging in physical activity are outlined in Section 4.2.

Objectives

The aim of this work is to propose a set of practical recommendations for the inclusion and prescription of physical activity for students with asthma and DM1 (DM1) within the context of PE (PE) classes. Specifically, the objectives are to:

- Promote training and raise awareness among PE teachers regarding the specific requirements of physical activity prescription for students with asthma and DM1;
- Develop recommendations for monitoring and managing signs and symptoms during physical activity;
- Present an intervention proposal that includes the development of a procedural manual and the creation of a health condition registration form.

Methodology

This study adopted a qualitative approach based on a literature review to construct a set of practical recommendations. The methodology involved the following steps:

- Review of guidelines and official recommendations by analyzing documents from national and international health authorities, such as the World Health Organization (WHO), the Portuguese Directorate-General for Health (DGS), and other organizations specializing.
- Analysis of scientific articles, with relevant studies selected primarily from the PubMed database.

Based on the integration of these sources, the goal was to develop a synthesis that reflects the role and considerations of physical activity in individuals with asthma and DM1.

Recommendations for the Inclusion and Prescription of Physical Exercise for Students with Asthma and DM1 in PE

The inclusion of students with asthma in PE classes requires a thoughtful and evidence-based approach that respects their medical condition while promoting the benefits of physical activity (PA) in disease management. A healthy lifestyle is a fundamental aspect of chronic respiratory disease (CRD) therapy. Research shows that regular PA contributes significantly to disease control and improves quality of life (Cardwell & Elliott, 2018; GINA, 2024). Therefore, active encouragement of PA by teachers is essential. The following are practical recommendations (DGS, 2024):

a) Exercise Structure

i.Warm-up

Warm-up should last between 10 and 15 minutes, with a gradual increase in intensity (Panagiotou et al., 2020) until reaching approximately 50% of the student's maximal oxygen uptake (VO_2max).

ii.Exercise Intensity

The recommended intensity ranges from 50% to 80% of VO_2max, corresponding to light to moderate effort. However, it is crucial to respect each student's individual response and monitor signs of respiratory discomfort.

iii.Duration and Frequency

Sessions should last between 20 and 30 minutes of continuous aerobic exercise, ideally performed three to five times per week. Regular practice is essential to achieve the benefits outlined in section 1.1.1.

b) Type of Exercise

Aerobic exercises involving large muscle groups—such as swimming and walking—are recommended. Additionally, respiratory exercises (e.g., diaphragmatic breathing) are beneficial for improving ventilatory control (Panagiotou et al., 2020).

c) Environment and Equipment

The chosen activity space should be well-ventilated and protected from environmental factors that can trigger asthma attacks, such as cold air, dry climates, pollution, and pollen (Panagiotou et al., 2020). Indoor environments are preferable. It is also essential to ensure that equipment (e.g., gym mats) is properly cleaned to avoid allergen accumulation.

d) Monitoring Signs and Symptoms

Continuous observation of the students during activity is crucial. A clear warning sign is a shift to predominantly oral breathing, which increases the risk of an asthma episode due to reduced filtration of inhaled air. In such cases, reducing exercise intensity is recommended (Praena-Crespo et al., 2017).

e) Use of Medication: Routine and Emergency Inhalers

From the beginning of the school year, teachers should encourage students to establish medication routines. Bronchodilator medication for regular use should be administered 30 to 45 minutes before physical activity, ideally before PE class (Panagiotou et al., 2020). Teachers should routinely ask students whether they have followed this protocol.

It is also essential to verify whether the student has an emergency (SOS) inhaler. This device must be kept in a fixed, visible, and easily accessible location known to the teacher. Once again, establishing routines is critical.

f) Response to an Asthma Attack

In the event of an asthma attack, the following steps should be taken:

(i) Seat the student in an upright and comfortable position in a ventilated space. Avoid lying the student down or allowing other students to crowd around, as this may worsen respiratory distress.

(ii) Administer the emergency inhaler (SOS) as per medical instructions.

(iii) In severe cases, call emergency services (112).

g) Contraindications:

Physical activity must be adjusted based on peripheral oxygen saturation (SpO_2), which can be measured using a pulse oximeter. Alternatively, a digital watch equipped with a SpO_2 sensor may be used. The values should be interpreted as follows:

i. Readings below 88% represent an absolute contraindication for engaging in physical activity.

ii. Readings between 89% and 94% allow participation but require close monitoring of signs and symptoms.

iii. Readings above 95% indicate that activity may proceed according to the students' tolerance. It is essential to monitor symptoms such as dyspnea, excessive sweating, and fatigue to determine whether to adjust or stop the activity.

DM1 (DM1)

The inclusion of students with diabetes in PE classes requires strict monitoring of blood glucose levels (Błaszczak et al., 2024). Below are guidelines and recommendations for prescribing physical activity during PE classes, based on pre-activity and in-class assessments (DGS, 2019):

a) Blood Glucose Assessment

i. Before Class:

Blood glucose must be measured before the activity begins. Since most exercises in PE classes are aerobic or intermittent, glucose levels should fall between 126 mg/dL and 180 mg/dL (DGS, 2019; Błaszczak et al., 2024);

If the level is below the recommended range, the student should consume a carbohydrate-rich snack until at least 126 mg/dL is reached.

During Class:

Blood glucose should be checked every 30 to 40 minutes during the activity to ensure it remains between 110 mg/dL and 140 mg/dL;

iii. After Class:

After PE, it is important to replenish glycogen to prevent delayed hypoglycemia, which can occur up to 24 hours post-exercise. It is recommended that students consume foods that help stabilize blood glucose levels, such as fruit smoothies or milk-based drinks, aiming to maintain levels between 110 mg/dL and 140 mg/dL.

b) Monitoring and Record-Keeping

Teachers should encourage students to regularly log their glucose measurements and insulin needs. These records are essential for effective diabetes management and for adjusting exercise intensity (as discussed in section 4.2, d).

c) Specific Considerations for DM1
Teachers should be aware if the student carries glucagon, a fast-acting agent that raises blood glucose levels. If not, simple sugar should be available—this reinforces the importance of teachers having small packets of sugar on hand.
d) Effects of Exercise on Glucose
i. Moderate Aerobic Exercise:
This type of activity typically reduces blood glucose levels if carbohydrates are not consumed beforehand (Błaszczak et al., 2024), posing a risk of hypoglycemia after 45 minutes of exercise. Hence, frequent monitoring during class is essential, as described in section 4.2, a, ii.
e) Additional Considerations
i. Longer or More Intense Classes:
In extended or high-intensity sessions, students should have access to water and extra carbohydrate sources (e.g., fruit, cereal bars, or crackers) to ensure blood glucose remains stable.
f) Hypoglycemia and Hyperglycemia: Symptoms and Response
i. Hypoglycemia – Key Symptoms:
Intense hunger; drowsiness or extreme fatigue; weakness and trembling.
ii. Hypoglycemia – What to Do:
Administer glucagon or 10g of sugar (placed on the tongue or inside the cheek).
If available, use a glucose meter to recheck after 10 minutes.
If levels stabilize, the student should eat a carbohydrate-based meal such as crackers, toast, bread, or pasta.
Allow the student to rest.
Avoid sugary treats like cakes or chocolate, as their fat content delays sugar absorption.
iii. Hyperglycemia – Key Symptoms
Blurred vision; persistent thirst; dry mouth; excessive sweating.
iv. Hyperglycemia – What to Do:
Increase water intake;
Reduze carbohydrate consumption;
If necessary, administer insulin using the student's insulin pen.
g) In severe cases, contact emergency services (112).

Intervention Proposals

The following intervention proposals aim to implement two initiatives designed to enhance inclusion, safety, and well-being for all students in PE (PE) classes—particularly those with specific health conditions.

The first proposal involves the creation of a Health Condition Registration Form (Appendix 1), to be completed by parents or guardians at the time of enrollment and updated as needed. Given the rising prevalence of chronic illnesses, it is critical that families provide accurate information regarding their child's health status. This allows PE teachers to adapt their classes to individual needs within an inclusive and safe environment.

The second proposal is the development of a Practical Recommendation Manual (Appendix 2) focused on enhancing inclusion and prescribing appropriate exercises for students with asthma and DM1 (DM1) in PE classes. Noting the lack of standardized action protocols in schools (McClelland et al., 2018), this manual aims to equip teachers with detailed guidelines for safely including students with these health conditions. Both asthma and DM1 require specific

precautions; when these are not followed, students may be placed at risk during physical activity.

Together, these two initiatives aim to foster an inclusive school environment where all students—regardless of health status—can fully participate in PE classes.

Final Considerations

The inclusion of students with asthma and DM1 (DM1) in PE (PE) classes presents a challenge that requires a careful and well-informed approach by teachers. This work aimed to establish a set of practical recommendations—grounded in scientific evidence and official guidelines—with the goal of fostering a safe and inclusive environment for physical activity.

Physical activity is beneficial for students with these chronic conditions; therefore, it is essential that teachers are well-informed about the specific characteristics of each condition to ensure that interventions are as effective as possible. The recommendations highlight the importance of continuous monitoring during physical activity—whether by checking blood glucose levels for students with DM1 or by observing respiratory discomfort in students with asthma.

From a pedagogical standpoint, this study emphasizes the need for ongoing professional development for PE teachers, to raise awareness of students' individual needs. Including these students not only supports their physical health but also contributes to their emotional and social well-being by enabling their full participation in class activities.

Finally, schools must be recognized as inclusive spaces, capable of offering students with chronic illnesses the conditions necessary for their development and education. As stated by the Portuguese Directorate-General for Health: "(...) the school is obliged to promote safety and a sense of belonging. It must respect differences and practice acceptance." (DGS, 2019, p. 19)

References

Albarrati, A.M., Gale, N.S., Munnery, M.M. et al. Daily physical activity and related risk factors in COPD. BMC Pulm Med, 20(60). https://doi.org/10.1186/s12890-020-1097-y

Alhassan, S., Hattab, Y., Bajwa, O., Bihler, E., & Singh, A. (2016). Asthma. Critical Care Nursing Quarterly, 39(2), 110-123. https://doi.org/10.1097/CNQ.0000000000000104

American College of Sports Medicine. (2016). ACSM's Guidelines for Exercicise Testing and Prescription. (10.º ed.). Wolters Kluwer.

American Diabetes Association (2017). 4. Lifestyle Management. Diabetes Care, 40(1), 33-43. https://doi.org/10.2337/dc17-S007

Błaszczak, K., Kruszewski, A., Paduszyńska, N., Dąbrowska, A., Przybysz, P., Szyszka, M., & Kucharska, M. (2024). Sport and type 1 diabetes - a great value but also a challenge. Review of the literature and guidelines. Quality in Sport, 17. https://doi.org/10.12775/qs.2024.17.52978

Breuls, S., Pereira de Araujo, C., Blondeel, A., Yserbyt, J., Janssens, W., Wuyts, W., Troosters, T., & Demeyer, H. (2022). Physical activity pattern of patients with interstitial lung disease compared to patients with COPD: A propensity-matched study. PloS one, 17(11). https://doi.org/10.1371/journal.pone.0277973

Cardwell, F. S., & Elliott, S. J. (2018). Investigating Youth Sport Coach Perspectives of an Asthma Education Module. J Environ Public Health, 2018, 2512010. https://doi.org/10.1155/2018/2512010

Direção-Geral da Saúde. (2019). Crianças e jovens com DM1. Manual de formação para apoio aos profissionais de saúde e de educação. Direção-Geral da Saúde.

Direção-Geral da Saúde. (2024). Manual de Atividade Física Adaptada para Pessoas com Doença Respiratória Crónica. Direção-Geral da Saúde.

Dowman, L., Hill, C. J., May, A., & Holland, A. E. (2021). Pulmonary rehabilitation for interstitial lung disease. The Cochrane database of systematic reviews, 2(2), https://doi.org/10.1002/14651858.CD006322.pub4

Fragoeiro, I. (2024). Corpo e Mente de Braço Dado na Escola: Educar para a Saúde. In H. Antunes, H. Lopes, R. Alves, A. Correia, A. Rodrigues, & É. Gouveia (Coords.), Desafios da Escola e da Educação Física: Tradição e Inovação (pp. 37-52). Universidade da Madeira.

GBD 2019 Chronic Respiratory Diseases Collaborators (2023). Global burden of chronic respiratory diseases and risk factors, 1990-2019: an update from the Global Burden of Disease Study 2019. EClinicalMedicine, 59, 101936. https://doi.org/10.1016/j.eclinm.2023.101936

Gibson, G., Loddenkemper, R., Lundbäck, B., & Sibille, Y. (2013). Respiratory health and disease in Europe: The new European Lung White Book. The European respiratory journal, 42, 559-563. https://doi.org/10.1183/09031936.00105513

Global Initiative for Asthma. (2024). Global Strategy for Asthma Management and Prevention. GINA.

Gloeckl, R., Zwick, R. H., Fürlinger, U., Jarosch, I., Schneeberger, T., Leitl, D., Koczulla, A. R., Vonbank, K., Alexiou, C., Vogiatzis, I., & Spruit, M. A. (2023). Prescribing and adjusting exercise training in chronic respiratory diseases - Expert-based practical recommendations. Pulmonology, 29(4), 306–314. https://doi.org/10.1016/j.pulmoe.2022.09.004

Hills, A. P., Dengel, D. R., & Lubans, D. R. (2015). Supporting public health priorities: recommendations for PE and physical activity promotion in schools. Progress in Cardiovascular Diseases, 57(4), 368-374. https://doi.org/10.1016/j.pcad.2014.09.010

Katsarou, A., Gudbjörnsdottir, S., Rawshani, A., Dabelea, D., Bonifacio, E., Anderson, B., Jacobsen, L., Schatz, D., & Lernmark, Å. (2017). DM1. Nature Reviews Disease Primers, 3(17016). https://doi.org/10.1038/nrdp.2017.16

Lima, F., Pinheiro, D., & Carvalho, C. (2023). Physical training in adults with asthma: An integrative approach on strategies, mechanisms, and benefits. Front Rehabil Sci, 4(1115352). https://doi.org/10.3389/fresc.2023.1115352

Llamas-Saez, C., Saez-Vaquero, T., Jiménez-García, R., López-de-Andrés, A., Carabantes-Alarcón, D., Zamorano-León, J. J., Cuadrado-Corrales, N., Omaña-Palanco, R., de Miguel Diez, J., & Pérez-Farinos, N. (2023). Physical activity among adults with chronic obstructive pulmonary disease in Spain (2014-2020): Temporal trends, sex differences, and associated factors. Respiratory Medicine, 220(107458). https://doi.org/10.1016/j.rmed.2023.107458

MacMillan, F., Kirk, A., Mutrie, N., Moola, F., & Robertson, K. (2014). Supporting participation in PE at school in youth with type 1 diabetes. European PE Review, 21(1), 3-30. https://doi.org/10.1177/1356336x14534367

McClelland, Q. Y. L., Avalos, M. I., & Reznik, M. (2018). Asthma management in New York City schools: A PE teacher perspective. Journal of Asthma, 56(4), 422–430. https://doi.org/10.1080/02770903.2018.1463380

Mesquita, R., Spina, G., Pitta, F., Donaire-Gonzalez, D., Deering, B. M., Patel, M. S., Mitchell, K. E., Alison, J., van Gestel, A. Jr, Zogg, S., Gagnon, P., Abascal-Bolado, B., Vagaggini, B., Garcia-Aymerich, J., Jenkins, S. C., Romme, E. A., Kon, S. S., Albert, P. S., Waschki, B., Shrikrishna, D., Singh, S. J., Hopkinson, N. S., Miedinger, D., Benzo, R. P., Maltais, F., Paggiaro, P., McKeough, Z. J., Polkey, M. I., Hill, K., Man, W. D-C., Clarenbach, C. F., van Hernandes, N. A., Savi, D., Wootton, S., Furlanetto, K. C., Ng, L. W. C., Vaes, A. W., Jenkins, C., Eastwood, P. R., Jarreta, D., Kirsten, A., Brooks, D., Hillman, D. R., Sant'Anna, T., Meijer, K., Dürr, S., Rutten, E. P., Kohler, M., Probst, V. S., Tal-Singer, R., Garcia Gil, E., den Brinker, A. C., Leuppi, J. D., Calverley, P. M., Smeenk, F. W., Costello, R. W., Gramm, M., Goldstein, R., Groenen, M. Tj., Magnussen, H., Wouters, E. F. M., ZuWallack, R. L., Amft, O., Watz, H., Spruit, M. A. (2017). Physical activity patterns and clusters in 1001 patients with COPD. Chronic respiratory disease, 14(3), 256–269. https://doi.org/10.1177/1479972316687207

Organização Mundial de Saúde. (2020). WHO guidelines on physical activity and sedentary behaviour. https://apps.who.int/iris/handle/10665/336656

Padem, N., & Saltoun C. (2019). Classification of asthma. Allergy Asthma Proceedings, 40(6), 385-388. https://doi.org/10.2500/aap.2019.40.4253

Panagiotou, M., Koulouris, N. G., & Rovina, N. (2020). Physical Activity: A Missing Link in Asthma Care. J Clin Med, 9(3). https://doi.org/10.3390/jcm9030706

Patterson, C. C., Gyurus, E., Rosenbauer, J., Cinek, O., Neu, A., Schober, E., Parslow, R. C., Joner, G., Svensson, J., Castell, C., Bingley, P. J., Schoenle, E., Jarosz-Chobot, P., Urbonaite, B., Rothe, U., Krzisnik, C., Ionescu-Tirgoviste, C., Weets, I., Kocova, M., . . . Soltesz, G. (2012). Trends in childhood type 1 diabetes incidence in Europe during 1989-2008: evidence of non-uniformity over time in rates of increase. Diabetologia, 55(8), 2142-2147. https://doi.org/10.1007/s00125-012-2571-8

Pimenta, S., Silva, C. G., Flora, S., Hipólito, N., Burtin, C., Oliveira, A., Morais, N., Brites-Pereira, M., Carreira, B. P., Januário, F., Andrade, L., Martins, V., Rodrigues, F., Brooks, D., Marques, A., & Cruz, J. (2021). What Motivates Patients with COPD to Be Physically Active? A Cross-Sectional Study. Journal of clinical medicine, 10(23). https://doi.org/10.3390/jcm10235631

Praena-Crespo, M., Aquino-Llinares, N., Fernández-Truan, J. C., Castro-Gómez, L., Segovia-Ferrera, C., & GESA network (2017). Asthma education taught by PE teachers at grade schools: A randomised cluster trial. Allergologia et immunopathologia, 45(4), 375–386. https://doi.org/10.1016/j.aller.2016.10.022

Riddell, M. C., Gallen, I. W., Smart, C. E., Taplin, C. E., Adolfsson, P., Lumb, A. N., Kowalski, A., Rabasa-Lhoret, R., McCrimmon, R. J., Hume, C., Annan, F., Fournier, P. A., Graham, C., Bode, B., Galassetti, P., Jones, T. W., Millán, I. S., Heise, T., Peters, A. L., Petz, A., & Laffel, L. M. (2017). Exercise management in type 1 diabetes: a consensus statement. The lancet. Diabetes & Endocrinology, 5(5), 377–390. https://doi.org/10.1016/S2213-8587(17)30014-1

Rochester, C. L., Alison, J. A., Carlin, B., Jenkins, A. R., Cox, N. S., Bauldoff, G., Bhatt, S. P., Bourbeau, J., Burtin, C., Camp, P. G., Cascino, T. M., Dorney Koppel, G. A., Garvey, C., Goldstein, R., Harris, D., Houchen-Wolloff, L., Limberg, T., Lindenauer, P. K., Moy, M. L., Ryerson, C. J., Singh, S. J., Steiner, M., Tappan, R., Yohannes, A., & Holland, A. E. (2023). Pulmonary Rehabilitation for Adults with Chronic Respiratory Disease: An Official American Thoracic Society Clinical Practice Guideline. American Jorunal of Respiratory and Critical Care Medicine 208(4). https://doi.org/10.1164/rccm.202306-1066ST

Rodrigues, A., Antunes, H., Saldanha, D., Silva, B., Andrade, S. Silva, Lopes, H, & Sabino, B. (2024). Atividade Física, o Papel da Educação Física: uma Breve Revisão. In H. Antunes, H. Lopes, R. Alves, A. Correia, A. Rodrigues, & É. Gouveia (Coords.), Desafios da Escola e da Educação Física: Tradição e Inovação (pp. 77-86). Universidade da Madeira.

Apêndices

Appendix 1: Health Condition Registration Form

Escola Básica Secundária Gonçalves Zarco

Health Condition Registration Form for PE Classes

This form is intended to ensure that PE (PE) teachers have the necessary information regarding students' health conditions to safeguard their safety and well-being during class activities. Given the increasing prevalence of chronic illnesses, it is essential that parents or legal guardians provide accurate health information to allow PE teachers to adapt their lessons to the individual needs of each student, with a focus on inclusion and safety.

Filling Instructions

i. This form must be fully completed at the time of the student's enrollment and updated whenever relevant.
ii. In the "Health Conditions" section, all known health conditions of the student must be listed.
iii. Specific "Treatment and Care Instructions" should be as detailed as possible to ensure teachers follow the most appropriate procedures for the student.
iv Please ensure all applicable fields are completed before submitting this form.

Personal Information

Full Name	
Date of Birth	
National Identification Number	
Parent or Guardian (Legal Representative)	
Parent or Guardian Contact Number	

Health Conditions

Please indicate whether your child presents any of the health conditions listed below. This information is essential to ensure the student's safety during PE classes.

☐ Asthma;
☐ Epilepsy;
☐ Hearth conditions:
☐ Diabetes (please specify: _____);
☐ Allergies (please specify: _____);
☐Respiratory issues (e.g., sinusitis, rhinitis – please specify:_____);
☐Other health conditions (please specify:_____);

Treatments and Care

If your child has any health condition, please provide detailed information below.

. Medications (if applicable):_____;
. Dosage and Schedule (if applicable):_____;
. Specific instructions for treatment during physical activity:

_____
_____

d. Additional precautions (e.g., exertion limits, activity duration, others):

_____
_____
_____

Additional Information

Please provide any other details that may be helpful for PE teachers:

_____
_____

The PE Department would like to express its sincere appreciation for your collaboration!

Appendix 2 – Manual of Practical Recommendations for the Inclusion and Exercise Prescription for Students with Asthma and DM1 in PE Classes
The Recommendation Manual attached to this report is available for consultation via the following link and QR code:

https://drive.google.com/drive/folders/1G20LecxlFE_RBmQKZq2XPtMYBNmBglQD?usp=sharing