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Sports programs for children and adolescents with chronic diseases: an overview paper

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1. Introduction

Chronic diseases in children and adolescents (CaA) encompass enduring medical conditions necessitating continuous medical attention and management, impacting a child's physical, emotional, and social well-being over extended periods. Common examples of such conditions include asthma, diabetes, obesity, cystic fibrosis, autoimmune disorders, cancer, and neurological disorders (Torpy, Campbell, & Glass, 2010). The prevalence of these disorders varies, with approximately 27% of CaA in the United States having a chronic health condition, and nearly 20% experiencing multiple chronic conditions (Gallegos, Aldridge, Connor, & Zuba, 2022). Effective management and support for these conditions are imperative to enhance the well-being of affected children and their families.

Regular physical activity is pivotal in promoting overall well-being and improving the quality of life. However, despite the positive impact of physical activity on young people's health, studies show that many CaA with chronic diseases do not meet these recommendations (Lankhorst et al., 2021). Barriers to physical activity participation include physical limitations, fear of symptom exacerbation, lack of knowledge, motivation, or access, as well as social isolation and exclusion due to their condition (Lankhorst et al., 2019). Considering these barriers, exploring alternatives that can partially mitigate them is essential. Sports have been shown to improve physical and psychological function in young people (Eime, Young, Harvey, Charity, & Payne, 2013). Participation in sports can alleviate barriers to physical activity, offering social interaction, structured and supervised activities, and a sense of belonging. Sports often provide clear rules and objectives, addressing the uncertainty that may deter individuals from physical activity. Engaging in sports can improve physical fitness, self-esteem, and mental health, motivating those with chronic diseases to continue being active. However, empirical evidence regarding the impact of sports engagement on the well-being of CaA with chronic diseases is limited (Lankhorst et al., 2021).

In a systematic review conducted by our EU research group, we aimed to assess the physical, psychological, and social benefits of sports participation among CaA with chronic diseases. We identified tested sports-related interventions for this population, to facilitate practical applications to encourage sports engagement among children with prevalent pediatric chronic diseases.

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2. Sports-related Interventions in Children and Adolescents with Chronic Diseases

This section delves into the vital role that sports and physical activities play in the lives of young individuals facing chronic health conditions. It explores how tailored sports programs can offer not only physical benefits but also significant psychosocial advantages for this special population. A diverse range of chronic diseases affecting CaA will be discussed, providing insights into various sports-related interventions and their potential to enhance the well-being and quality of life of these resilient young individuals.

2.1 Attention Deficit Hyperactivity Disorder (ADHD)

Interventions included various sports and physical activities like basketball, soccer, taekwondo, tag and ball games, table tennis, horse riding, and target-shooting sports. In general, sports and physical activity programs have been shown to benefit both physical and psychosocial outcomes in children and adolescents with ADHD. The changes in physical outcomes included significant improvements in aerobic capacity, flexibility, muscular endurance, and gross and fine motor skills. Further, increased strength, coordination, agility, and overall motor skills were common in most studies. On the other hand, the psychosocial outcomes included a reduction in behavioral problems, including attention, hyperactivity, and impulsivity issues. Enhancement of social skills, peer relationships, and prosocial behavior were also observed. Positive effects on executive functions, such as inhibition, attention switching, and working memory, are another group of outcomes that should be highlighted in this population group. In general, these sports led to greater interest and social acceptance among children with ADHD.

Suggested references:

- Montalva-Valenzuela F, Andrades-Ramírez O, Castillo-Paredes A. Effects of Physical Activity, Exercise and Sport on Executive Function in Young People with Attention Deficit Hyperactivity Disorder: A Systematic Review. Eur J Investig Health Psychol Educ. 2022 Jan 14;12(1):61-76. doi: 10.3390/ejihpe12010006. PMID: 35049535; PMCID: PMC8774533.

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- Pagani LS, Harbec MJ, Fortin G, Barnett TA. Childhood exercise as medicine: Extracurricular sport diminishes subsequent ADHD symptoms. Prev Med. 2020 Dec;141:106256. doi: 10.1016/j.ypmed.2020.106256. Epub 2020 Sep 28. PMID: 33002520.
- Corrigan B. Attention deficit hyperactivity disorder in sport: a review. Int J Sports Med. 2003 Oct;24(7):535-40. doi: 10.1055/s-2003-42015. PMID: 12968213.

2.2 Cerebral Palsy

Physical activity among children and adolescents with cerebral palsy involves golf training, active video games at home, and participation in various sports such as soccer, netball, T-ball, cricket, swimming, tennis, dance, martial arts, basketball, soccer, baseball, and adapted cycling. On the other hand, it has been observed that the use of technology, such as video games, is a growing trend to motivate this population to engage in physical activity.

Motivation seems to be a crucial factor influencing the participation of adolescents with cerebral palsy in physical activities. However, caution should be advised when considering the physical and psychosocial benefits of these interventions. Sports interventions can significantly improve motor function and physical fitness among children with cerebral palsy. However, the diverse presentations and varying levels of motor impairments in this population suggest that video game-based interventions may have limited efficacy. Factors influencing physical activity participation in these children include musculoskeletal pain, exercise skills, and social support, among others. Sports activities enhance physical abilities and provide enjoyable experiences and opportunities for social interaction.

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- Toldi J, Escobar J, Brown A. Cerebral Palsy: Sport and Exercise Considerations. Curr Sports Med Rep. 2021 Jan 1;20(1):19-25. doi: 10.1249/JSR.0000000000000798. PMID: 33395127.
- Enright E, Beckman EM, Connick MJ, Dutia IM, Macaro A, Wilson PJ, O'Sullivan J, Lavalliere JM, Block T, Johnston LM, Panagoda G, Tweedy SM. Competitive sport, therapy, and physical education: voices of young people with cerebral palsy who have high support needs. Br J Sports Med. 2020 Sep 28:bjsports-2020-102276. doi: 10.1136/bjsports-2020-102276. Epub ahead of print. PMID: 32988931.

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2.3 Autism Spectrum Disorder (ASD)

Encompassed activities such as horse riding, soccer, judo, ball games, dances, active video games, swimming, and table tennis. In general, participation in sports and physical activity programs has shown significant benefits for children with ASD across the physical domain. Again, significant enhancements in gross motor skills, fine motor skills, motor proficiency, and aquatic skills were observed in these children. Moreover, improvements in muscular endurance, strength, agility, balance, bilateral coordination, flexibility, and overall physical fitness are common improvements described in most studies. On the other hand, within the psychosocial outcomes, studies reported substantial reductions in aggression, anxiety, depression, atypical behaviors, hyperactivity, attention problems, and somatization. Positive changes in social skills, leadership abilities, interpersonal relations, social inclusion, and prosocial behavior were also described. These benefits also encompass enhancements in adaptive skills, self-perceptions, and overall quality of life, coupled with improved executive functions like inhibition control, working memory, and response inhibition. Furthermore, engagement in sports contributes to greater social responsiveness, communication skills, and a reduction in repetitive behaviors while also positively impacting sleep quality, social behavior, and social communication. These multifaceted improvements underscore the significance of sports-related interventions in promoting the holistic well-being of individuals with ASD.

Suggested references:

- Ryan S, Fraser-Thomas J, Weiss JA. Patterns of sport participation for youth with autism spectrum disorder and intellectual disability. J Appl Res Intellect Disabil. 2018 May;31(3):369-378. doi: 10.1111/jar.12414. Epub 2017 Oct 4. PMID: 28976054.
- Guest L, Balogh R, Dogra S, Lloyd M. Examining the Impact of a Multi-Sport Camp for Girls Ages 8-11 With Autism Spectrum Disorder. Ther Recreation J. 2017 Jun;51(2):109–26.

2.4 Cancer

Engaged in various activities like ball games, racket sports, fighting activities, dance, basketball, badminton, yoga, skiing, swimming, paddling, climbing, and active video games. Engaging in physical activity and sports programs can offer a range of physical and

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psychosocial benefits for children and adolescents dealing with cancer. These benefits include improvements in physical functioning, aerobic capacity, flexibility, balance, strength, and muscle endurance. Additionally, participation in such programs is associated with enhanced self-esteem, higher quality of life, and increased self-efficacy. Moreover, some studies have indicated positive effects on neurocognitive functions, including general intelligence and executive function. These holistic improvements underscore the potential of physical activity interventions to positively impact the well-being of young individuals dealing with cancer.

Suggested references:

- Spreafico F, Murelli M, Timmons BW, Massimino M, Barr R. Sport activities and exercise as part of routine cancer care in children and adolescents. Pediatr Blood Cancer. 2019 Aug;66(8):e27826. doi: 10.1002/pbc.27826. Epub 2019 May 21. PMID: 31115152.
- Kuehn M, Wypyrsczyk L, Stoessel S, Neu MA, Ploch L, Dreismickenbecker E, Simon P, Faber J. Physical Activity as a Treatment for Cancer-Related Fatigue in Children, Adolescents and Young Adults: A Systematic Review. Children (Basel). 2023 Mar 17;10(3):572. doi: 10.3390/children10030572. PMID: 36980130; PMCID: PMC10047895.

2.5 Asthma

The most recurrent physical activities for people with asthma were active play and games, particularly ball games and team games. These interventions produced significant improvements in lung function as well as cardiorespiratory fitness, along with improvements in overall quality of life. The study points to the crucial role of instructors in designing enjoyable programs that foster children's sense of normalcy and independence. It also emphasizes the importance of mutual support among participants, which can contribute to a sense of normalcy and competence.

Suggested references:

- Wanrooij VHM, Willeboordse M, Dompeling E, van de Kant KDG. Exercise training in children with asthma: a systematic review. Br J Sports Med. 2014 Jul;48(13):1024–31.

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- Westergren T, Fegran L, Nilsen T, Haraldstad K, Kittang OB, Berntsen S. Active play exercise intervention in children with asthma: A Pilot Study. BMJ Open. 2016;6(1).

2.6 Cystic Fibrosis (CF)

The lack of physical activity in children and adolescents with cystic fibrosis has serious consequences for their well-being and quality of life (i.e., lung function deteriorates more in those children who have less physical activity), limiting their participation in sports and recreational activities despite several studies emphasizing the importance of physical activity in this population. Unfortunately, most young people with CF do not meet the recommended amounts of physical activity, and this situation worsens during adolescence. While the reasons behind this inactivity are not fully understood, it is believed that numerous barriers exist, such as low self-efficacy and competitive time demands. These participants can benefit from improving their quality of life by participating in activities such as cycling, swimming, walking, dancing, playing ball, jumping rope, jumping, stretching, and gymnastics.

Suggested references:

- Field SJ, Oates RK. Sport and recreation activities and opportunities for children with spina bifida and cystic fibrosis. J Sci Med Sport. 2001 Mar;4(1):71-6. doi: 10.1016/s1440-2440(01)80009-8. PMID: 11339495.
- Puppo H, Torres-Castro R, Vasconcello-Castillo L, Acosta-Dighero R, Sepúlveda-Cáceres N, Quiroga-Marabolí P, et al. Physical activity in children and adolescents with cystic fibrosis: A systematic review and meta-analysis. Pediatr Pulmonol. 2020 Nov 1;55(11):2863–76.

2.7 Obesity

Engaging in various sports and programs like volleyball, football, or physical education activities such as swimming and balloon volleying can be a great way to promote physical activity among children. While team or group sports may be the preferred choice, some children may opt for individual sports or activities due to the possibility of peer rejection or past negative experiences. Sports programs offer opportunities for enhancing psychosocial aspects in children with obesity, including improvements in self-esteem and perceived competence, which are crucial during this developmental stage and essential for adherence

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to such programs. Additionally, these programs contribute to improved physical fitness and body composition, which are vital for children's physical, social, and psychological well-being. Prior evaluation is always advisable before starting any physical activity program, as it is essential to approach this activity with care and consider each child's specific needs and limitations.

Suggested references:

- Ring-Dimitriou S, Krustrup P, Coelho-E-Silva MJ, Mota J, Seabra A, Rego C, Mazur A, Vlachopapadopoulou E, Caroli M, Frelut ML, Erhardt E, Forslund A, Boyland E, Weghuber D, Thivel D. Could sport be part of pediatric obesity prevention and treatment? Expert conclusions from the 28th European Childhood Obesity Group Congress. J Sport Health Sci. 2019 Jul;8(4):350-352. doi: 10.1016/j.jshs.2019.01.007. Epub 2019 Jan 18. PMID: 31333888; PMCID: PMC6620416.
- Weintraub DL, Tirumalai EC, Haydel KF, Fujimoto M, Fulton JE, Robinson TN. Team sports for overweight children: the Stanford Sports to Prevent Obesity Randomized Trial (SPORT). Arch Pediatr Adolesc Med. 2008 Mar;162(3):232-7. doi: 10.1001/archpediatrics.2007.43. PMID: 18316660.

2.8 Post-Traumatic Stress Disorder (PTSD)

Sports-based interventions have emerged as effective tools for improving the physical and mental health of children with post-traumatic stress disorder (PTSD), including team sports (e.g., soccer or basketball), yoga, martial arts, and equine and dance therapy. These interventions are supported by relaxation techniques such as mindfulness exercises, controlled breathing techniques, and meditation. Specific improvements in physiological parameters result in increased aerobic capacity and flexibility, improved heart rate regulation, muscular strength, muscle mass, and overall endurance. Furthermore, improvements in fine and gross motor skills, including precise movements such as hand-eye coordination and more extensive activities like running, jumping, and throwing, have contributed to better overall physical health. Active lifestyle habits are also associated with sleep and physical fitness improvement. The psychosocial benefits of sports interventions included reductions in symptoms related to anxiety, depression, and post-traumatic stress in children. Emotional regulation, self-esteem, concentration, coping skills, and pro-social behaviors have improved significantly. Furthermore, participation in team-based activities and group sports has

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fostered the development of social skills, peer relationships, and a sense of belonging among children with PTSD.

Suggested reference:

- Ashdown-Franks G, Firth J, Carney R, Carvalho AF, Hallgren M, Koyanagi A, Rosenbaum S, Schuch FB, Smith L, Solmi M, Vancampfort D, Stubbs B. Exercise as Medicine for Mental and Substance Use Disorders: A Meta-review of the Benefits for Neuropsychiatric and Cognitive Outcomes. Sports Med. 2020 Jan;50(1):151-170. doi: 10.1007/s40279-019-01187-6. PMID: 31541410.

2.9 Congenital Heart Defects (CHD)

Sports-related interventions are vital in improving children's physical and psychosocial well-being with congenital heart defects (CHD). These interventions often include controlled aerobic exercises (e.g., walking, hiking, cycling, swimming) and low-impact activities to strengthen the cardiovascular system without overexertion. Sport-based interventions can improve cardiovascular fitness and pulmonary health, as indicated by increased aerobic capacity, heart rate regulation, endurance, and lung function. Dance-based exercises, rowing, and modified gymnastics can positively affect muscular strength, flexibility, and coordination.

Psychosocially, sport-based interventions have increased self-esteem, self-confidence, resilience, and normalcy among children with CHD. These interventions offer opportunities for social interaction and peer relationships, particularly through team sports and group activities. Engaging in physical activities can promote a positive body image, improving self-perception.

Suggested references:

- Dulfer K, Helbing WA, Utens EMWJ. The Influence of Exercise Training on Quality of Life and Psychosocial Functioning in Children with Congenital Heart Disease: A Review of Intervention Studies. Sports (Basel). 2017 Feb 10;5(1):13. doi: 10.3390/sports5010013. PMID: 29910373; PMCID: PMC5969012.

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- Gauthier N, Curran T, O'Neill JA, Alexander ME, Rhodes J. Establishing a Comprehensive Pediatric Cardiac Fitness and Rehabilitation Program for Congenital Heart Disease. Pediatr Cardiol. 2020 Dec;41(8):1569-1579. doi: 10.1007/s00246-020-02413-z. Epub 2020 Jul 17. PMID: 32681180.
- Dold SK, Haas NA, Apitz C. Effects of Sports, Exercise Training, and Physical Activity in Children with Congenital Heart Disease-A Review of the Published Evidence. Children (Basel). 2023 Feb 2;10(2):296. doi: 10.3390/children10020296. PMID: 36832425; PMCID: PMC9955038.

3. Exploring the Key Components of Special Sports Programs

Exploring the key components of special sports programs and establishing guidelines for designing sports activities for children with chronic conditions is a critical endeavor aimed at enhancing the well-being and quality of life of these young individuals. These programs are specially tailored to address the unique needs and challenges faced by children with chronic illnesses, offering a holistic approach that encompasses physical, psychological, and social aspects. By delving into the core components that make these sports programs effective and by identifying key considerations for planning and implementing such activities, we can create opportunities for children with chronic conditions to not only engage in these activities but also experience the myriad of physical and psychosocial benefits that sports can provide. This section explores these crucial aspects, shedding light on how specialized sports programs can play a pivotal role in the lives of children with chronic diseases.

Please note that the listed components and quality criteria are provided as a selection and may not encompass all country-specific requirements within the European Union in detail.

3.1 Key Components of Special Sports Programs for Children with Attention Deficit Hyperactivity Disorder (ADHD)

1. Many of the identified sports programs emphasize teamwork or group participation. This is significant because children with ADHD often face challenges in peer relationships, and participation in team sports can help mitigate these issues.

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2. Exergaming (interactive video games that require physical activity) has been proposed as an alternative to traditional physical activity programs. Children with ADHD may find exergaming more engaging and less exhausting, potentially increasing their participation.
3. Incorporating multiple activities: Some interventions included multiple sports activities simultaneously. Evidence suggests that such multifaceted interventions may have the most significant potential to improve ADHD symptoms, indicating that variety in activities can be beneficial.
4. Session frequency and duration: The frequency of sports sessions varied across studies, with some showing benefits even with just one session per week. Sports sessions should not be excessively long, especially for younger children with ADHD. Shorter and more focused sessions are often more effective and prevent fatigue and loss of interest. However, the optimal frequency and duration of sessions may need further investigation.
5. Maintaining clear structure and organization during sports sessions is essential. Establishing predictable rules and routines can help children with ADHD feel more comfortable and engaged.
6. Rewards and reinforcement: Using positive reward systems can motivate children with ADHD to participate actively and follow the rules. Recognizing and praising individual achievements can be especially effective.
7. Before sports sessions, allowing children with ADHD to engage in relaxation or energy-releasing activities can reduce anxiety or excess energy.
8. Open communication: Maintaining open communication with the parents and caregivers of children with ADHD is essential. Parents can provide valuable information about their children's specific needs and collaborate in planning sports activities.

3.2 Key Components of Special Sports Programs for Children with Cerebral Palsy

1. Providing a variety of options ensures that children can find activities that match their interests and abilities. The use of technology, such as active video games, can be instrumental in promoting physical activity among this population. Technology can enhance motivation and engagement in physical activities.

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2. Motivation has a significant role in encouraging adolescents with Cerebral Palsy to participate in physical activities. Special sports programs should incorporate strategies to boost motivation among participants.
3. Interventions should be specific and tailored to address the underlying motor impairments and functional limitations associated with Cerebral Palsy. Generic or non-specific approaches may not yield meaningful improvements.
4. Children with Cerebral Palsy have diverse presentations and varying levels of motor impairments. Programs should take into account these individual needs and abilities to provide personalized support.
5. The effectiveness of interventions should be assessed in terms of their transferability to real-life activities. Movements and coordination developed in interventions, such as video games, should directly translate into improved abilities for everyday tasks.
6. Coaches and instructors should align sports interventions with improving motor skills, coordination, balance, flexibility, and physical fitness.
7. Promotion of Social Interaction: Positive social interactions among participants, including peer support, should be fostered within the sports programs.

3.3 Key Components of Special Sports Programs for Children with Autism Spectrum Disorder (ASD)

1. Some children with ASD may initially resist new activities or environments. Gradual exposure and desensitization techniques can help ease them into sports participation.
2. Participation in structured sports programs with clear rules and routines can contribute to improvements in executive functioning and attention abilities. Concentration and focus requirements during sports activities can also enhance attention skills.
3. Sports can provide an opportunity to work on social skills, but coaches should be patient and understanding, providing guidance on appropriate behavior and communication. Traditional ball games and sports have been shown to significantly enhance motor skills, particularly object-control skills, among children with ASD. These activities contribute to physical fitness changes, including improvements in aerobic capacity, flexibility, balance, and strength.
4. Individual Sports vs. Team Sports: Both individual sports (e.g., horse riding, judo, table tennis) and team sports (e.g., soccer, mini-basketball) have been reported to lead to

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improvements in repetitive behaviors, social interaction, social communication, and emotional response in children with ASD.

5. Visual Supports: Visual supports, such as schedules, visual timers, or social stories, can help children with ASD understand the sequence of activities and manage transitions during sports sessions.
6. Active video games, such as Kinect, offer multisensory and interactive experiences that can improve motivation to participate in physical activities. They have the potential to enhance motor function, although they may not promote correct movement patterns effectively.
7. Many children with ASD have sensory sensitivities, so it's important to create an environment that minimizes sensory overload. This might include using soft equipment, providing noise-canceling headphones, or choosing quieter locations for activities.
8. Children with ASD may have difficulty with communication and understanding verbal instructions. Coaches and instructors should use clear, simple language and consider visual cues, such as pictures or diagrams, to aid understanding.
9. Individuals with ASD often thrive in structured environments with predictable routines. Sports sessions should have a clear structure and schedule, with consistent warm-up and cool-down routines.
10. Allow for sensory breaks when needed. Some children with ASD may become overwhelmed, and short breaks can help them self-regulate.
11. Ensure safety by providing appropriate protective gear and supervising activities closely. Some children with ASD may have limited awareness of danger, so safety precautions are essential.

3.4 Key Components of Special Sports Programs for Children with Cancer

1. Be aware of the potential side effects of cancer treatments and the disease itself, such as fatigue, muscle weakness, or neuropathy. Adjust sports activities to accommodate these symptoms and ensure the child's comfort and safety.

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2. Children with cancer may require additional supervision and support during sports activities. Trained coaches or supervisors should be aware of the child's medical condition and know how to respond to any medical emergencies.
3. Training content and intensity should be tailored to the child's individual needs in consultation with the pediatric oncologist. Any exercise restrictions, limitations, medication, and hygiene measures, among other things, must be closely coordinated.
4. Diverse settings: Recognize that CaA with cancer may have unique circumstances, including long periods in the hospital (e.g., in isolated rooms) and treatments at home. Design sports programs that can accommodate these diverse settings, such as in-hospital programs, home-based programs, supervised online trainings, or mixed settings.
5. Flexible program duration: Recognize that positive outcomes can be achieved in a relatively short time frame, such as less than four weeks, with a limited number of weekly sessions. This suggests that shorter, focused sessions may be more effective and suitable for CaA.
6. Combining different sports: Consider incorporating a variety of sports and physical activities within the program to cater to the diverse interests and abilities of CaA. Combining different sports can provide a well-rounded and engaging experience.
7. Ensure that the sports facilities and environments are safe and clean to reduce the risk of infections, especially for children with compromised immune systems.

3.5 Key Components of Special Sports Programs for Children with Asthma

1. Engaging in regular physical activities can enhance lung function and cardiorespiratory fitness. These improvements can help children manage their asthma symptoms more effectively and reduce the risk of exacerbations.
2. Effective sports programs should not solely focus on physical fitness but also address the holistic well-being of children with asthma. This includes promoting emotional health, self-confidence, and overall quality of life. Physical activity can contribute, in general, to a sense of accomplishment and well-being.
3. Well-trained and knowledgeable instructors are essential in designing and implementing sports programs for children with asthma. They should have a good

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understanding of asthma management and create an environment that is safe, supportive, and enjoyable for participants.

4. Encouraging mutual support among participants can foster a sense of belonging and normalcy. Children with asthma may sometimes feel isolated or different from their peers due to their condition.

3.6 Key Components of Special Sports Programs for Children with Cystic Fibrosis (CF)

1. Prior to initiating any physical activity or sports program, it is essential for the child with CF to undergo a comprehensive medical assessment and consult with a CF specialist. The doctor can provide specific guidance and tailor recommendations to the child's individual needs.
2. Aerobic exercise is beneficial for improving cardiovascular endurance and lung function. Activities such as cycling, swimming, walking, dancing, playing ball, or jumping rope are excellent options.
3. Gradually adjust the intensity and duration of exercise according to the child's individual capacities. Remember to do so progressively.
4. Ensure that the child performs proper warm-up before starting physical activity and cool-down exercises afterward to reduce the risk of injuries and prevent muscle strain.
5. Children with CF can benefit from respiratory physiotherapy exercises before and after exercise. These exercises help loosen mucus in the lungs and facilitate breathing. The physiotherapist or doctor can teach specific techniques.
6. During physical activity, it is important for the child to be closely supervised by an adult or coach trained to recognize signs of fatigue or respiratory difficulties.
7. Keep the child well-hydrated before, during, and after exercise. Hydration is essential to maintain lung function and prevent dehydration.
8. It is crucial for the child and responsible adults to be aware of their limits. If the child experiences excessive fatigue, difficulty breathing, or any discomfort, they should stop and rest.
9. Avoid exercise in extreme temperatures or when the child is ill. Adverse weather conditions can increase stress on the lungs.

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10. Schedule regular check-ups with the doctor to assess progress and adjust the exercise plan as needed.

3.7 Key Components of Special Sports Programs for Children with Obesity

1. Help the child choose a sport or physical activity that they find enjoyable and motivating. This will increase the likelihood of long-term commitment and adherence.
2. Look for sports programs or activities that promote inclusion and teamwork. This can help improve the child's self-esteem and confidence.
3. Seek sports programs with at least 2-3 sessions per week and aim for continuity for at least one academic year to achieve results and improvements.
4. If the child is not accustomed to physical activity, start with adapted and gentle group activities. Gradually increase the frequency and intensity. Once the foundation is established, successful sports participation is more likely.
5. Children with obesity may face emotional challenges. Listen to their concerns and offer emotional support. Avoid making negative comments about their weight or appearance.
6. Physical activity is important, but nutrition also plays a crucial role in health. Try to address this issue, as studies show better results when physical activity is combined with a healthy diet.
7. Do not pressure the child to engage in physical activity. Provide alternatives, create a positive environment that encourages physical activity, and allow the choice to be personal.
8. Ensure that the child is supervised and guided by a physical activity professional while participating in physical activities, especially if they have obesity-related comorbidities.
9. The primary goal should be to promote an active and healthy lifestyle that the child can maintain throughout their life. Do not focus solely on weight loss.

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3.8 Key Components of Special Sports Programs for Children with Post-Traumatic Stress Disorder (PTSD)

1. Professional guidance: As an exercise professional, work together with mental health professionals and therapists specializing in trauma and child psychology to design the program. Close medical monitoring and supervision by mental health professionals ensure the safety and appropriateness of the intervention.
2. Conduct individual assessments to understand each child's trauma triggers, coping mechanisms, and comfort levels with different sports activities.
3. Create a safe and supportive environment where children feel secure and judgment-free. Incorporate mindfulness and relaxation techniques to help children manage anxiety and stress during activities.
4. Training content: Choose sports adapted to accommodate various skill levels and physical abilities. Include team-based activities to promote social interactions, cooperation, and trust among children. Gradually introduce challenges to help children build confidence and resilience.
5. Diverse activities: Incorporating a variety of sports and activities ensures engagement, enjoyment, and a more holistic approach to physical and psychological well-being.
6. Emotional support and family involvement: Encourage peer interactions and support to foster children's sense of belonging and understanding. Organize family-friendly sports activities to strengthen family bonds and create positive experiences together.
7. Crisis Management: Establish clear protocols for handling emotional crises or triggers during sports activities. If possible, consider on-site support, including mental health professionals available during sessions who can provide immediate help if needed.

3.9 Key Components of Special Sports Programs for Children with Congenital Heart Defects (CHD)

1. Regardless of their physical performance, children and adolescents with CHD should receive a sports medicine check-up before participating in sports programs. The child's physical performance is assessed during this examination, and individual exercise recommendations and limitations are defined.

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2. Medical supervision: Work closely with pediatric cardiologists to assess each child's condition and provide guidelines for safe physical activities. Ensure all coaches and staff are trained in CPR and first aid to handle emergencies. Take a medical history before the first training session and clarify medication administration.
3. Choosing the appropriate type of sport: If a heart defect is diagnosed, choosing more dynamic sports is recommended. Moderate, endurance-based exercises increase cardiac output due to increased heart rate. At the same time, peripheral vascular resistance is reduced as systolic blood pressure increases. On the other hand, predominantly static activities lead to significant increases in systolic and diastolic blood pressure, which results in a pressure load on the left ventricle of the heart, resulting in a high-stress level for the heart.
4. Safe physical activities: Emphasize low-impact sports and activities such as swimming or walking. Reduce the risk of injury and avoid contact and high-intensive martial arts. Modified versions of team sports like soccer, basketball, or volleyball can be designed to suit the child's abilities. When choosing sports equipment, make sure that you use rather soft objects and balls for the workout. Introduce adapted sports that can accommodate varying levels of physical abilities, ensuring inclusivity and participation.
5. Increasing self-confidence: Celebrate the achievements and milestones of each child, whether it's improved endurance, better cardiovascular health, or enhanced social skills, to boost self-esteem and motivation.
6. Accessibility: Ensure that the sports facilities are accessible to children with mobility challenges, allowing everyone to participate.
7. Health monitoring: Regularly monitor the children's heart health and overall well-being, adapting exercise plans as needed. Consult with the parents and, if they have consented, with the responsible physicians.

Special sports programs for children with chronic diseases should encompass key components to provide a safe and supportive environment. Having coaches or supervisors with specialized training is paramount, as they can offer the necessary guidance and adapt activities to meet the unique needs of these children. Safety remains a top priority, with a focus on ensuring that participants use appropriate protective equipment and adhere to safety rules throughout their sports endeavors. Positive reinforcement strategies, including praise and rewards, play a pivotal role in motivating and fostering good sportsmanship

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among the children. Open communication and collaboration with parents and caregivers are essential, as their insights into the child's needs and preferences are invaluable. Moreover, promoting inclusivity and understanding among typically developing peers helps create an environment where all children feel accepted and valued. These programs should also address the physical, social, and psychological well-being of the participants, acknowledging the holistic nature of their needs. Finally, individualized approaches tailored to each child's condition and treatment response, coupled with educational efforts to raise awareness among coaches and peers, collectively contribute to the success of these special sports programs.

4. Identify the Quality of Sports Programs for Children and Adolescents with Chronic Diseases

Overall, these results support the idea that physical activity and participation in sports can effectively improve the physical health and psychosocial well-being of children and adolescents with chronic diseases. However, it is important to tailor programs to individual needs and provide appropriate supervision to ensure the success and safety of participation. Additionally, the diversity of sports activities used in these interventions, which often involve teamwork or group participation, suggests the importance of tailoring programs to individual needs and fostering social inclusion for children with chronic diseases. However, despite these special needs, coaches often need to prepare for these special considerations. Hence, fundamental criteria could be defined that, in a general sense, allow us to assess the competencies of those who train (chronically ill) children and adolescents. Table 1 covers key components of special sports programs for children with chronic diseases and PTSD, in addition to the previously mentioned conditions. It offers a quick reference for program design, ensuring that the specific needs of children with various health conditions are addressed.

Further, national and European best practices/sports programs established or applied in the European Union focusing on children and adolescents with chronic diseases and/ or PTSD were identified within our consortium (see Annex).

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Table 1: General recommendations and specifications for the development and implementation of a sports program for various chronic diseases among children and adolescents.

Key Components	ADHD	Cerebral Palsy	ASD	Cancer	Asthma	Cystic Fibrosis	Obesity	PTSD	CHD
Variety of Activities	Teamwork & Group Participation	Technology Integration	Gradual Exposure & Desensitization	Accommodate Side Effects	Enhance Lung Function	Comprehensive Medical Assessment	Enjoyable Activities	Professional Guidance	Sports Medicine Check-Up
Motivation	Clear Rules & Routines	Motivation Strategies	Structured Programs with Clear Rules	Supervision & Support	Holistic Well-being	Tailored Recommendations	Inclusion & Teamwork	Mental Health Professionals	Medical Supervision
Tailored Interventions	Address Motor Impairments	Individualized Support	Focus on Motor Skills & Object-Control	Diverse Settings	Well-Trained Instructors	Adjust Intensity & Duration	Regularity & Continuity	Individual Assessments	Guidelines for Safe Activities
Assess Transferability	Diverse Presentations	Real-Life Application Assessment	Individual & Team Sports	Flexible Program Duration	Mutual Support	Warm-up & Cool-down Exercises	Emotional Support	Safe & Supportive Environment	Appropriate Type of Sport

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Key Components	ADHD	Cerebral Palsy	ASD	Cancer	Asthma	Cystic Fibrosis	Obesity	PTSD	CHD
Improve Motor Skills & Coordination	Open Communication with Parents	Improvement in Motor Skills	Development of Social Skills	Combining Different Sports	Supervision during Activity	Respiratory Physiotherapy Exercises	Nutrition Consideration	Training Content	Medical History Assessment
Foster Social Interaction	Reward Systems	Social Interaction Promotion	Social Behavior Guidance	Safe Sports Facilities	Personal Limits Awareness	Close Adult Supervision	Healthy Lifestyle Promotion	Diverse Activities	Safe Physical Activities
Clear Structure & Organization	Relaxation & Energy-Relieving Activities	Visual Supports	Active Video Games	Safe & Clean Environments	Hydration Maintenance	Awareness of Personal Limits	Positive & Encouraging Environment	Emotional Support and Family Involvement	Accessibility
Sensory Breaks When Needed			Sensory-Sensitive Environment	Individual Training Control	Regular Check-ups	Avoid Extreme Conditions	Non-Pressure Approach	Training Protocols	Health Monitoring

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Key Components	ADHD	Cerebral Palsy	ASD	Cancer	Asthma	Cystic Fibrosis	Obesity	PTSD	CHD
			Clear & Simple Language	Adhere to exercise restrictions		Hydration Maintenance	Personal Choice	Crisis Management	Celebrating Achievements
			Structured Sessions with Predictable Routines	Consultation with pediatric oncologists		Regular Check-ups	Supervision by Professionals		Health Monitoring
			Safety Precautions				Active & Healthy Lifestyle		Health Monitoring
							Goal: Promote Active Lifestyle		Adapted Sports

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5. Requirements for Trainers and Sports Instructors Working with Chronically ill Children and Adolescents

In addition to quality criteria for sports programs, there are also general requirements that a trainer is expected to meet in the setting of sports for children and adolescents with chronic diseases.

Evaluation and monitoring skills: The sports instructor must have basic medical skills and the necessary tools to be able to interact with the child's/adolescent´s doctor. Based on the information he or she has received from the doctor, the sports instructor must be able to design a monitoring evaluation chart that can monitor behavior trends (progress and difficulties) related to physical activity. The instructor should collect information on the CaA´s health before, after, and during the sport in which he or she is involved. This information should be requested not only from the doctor but also from parents and other sports staff (including teachers if the context is school).

Knowledge of useful resources: It is important that the coach knows the useful resources to refer to in case of doubts/difficulties/emergencies. In a potential risk or emergency, the coach must know how to handle the situation and immediately what action to take. The coach should, therefore, know useful contacts, locations, and facilities that may be immediately available for support, safety actions and tools, where to find a safety kit, and knowledge of valuable and necessary medication/medicines.

Knowing how to educate pupils to respect differences: The coach must know how to involve the group and train them not only in sports-related techniques but also in respect for individuals and differences. Teams are composed of people with different individual characteristics; it is important to educate them to respect, get to know each other, and share. For example, the systematic application of group dynamics of a playful nature, far removed from sports technique, could be activities to promote group interaction in a fun environment.

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In this section, we will delve into the requirements for coaches and instructors working with children and adolescents dealing with chronic illnesses in various European countries. We will explore the diverse qualifications, certifications, and training standards that exist across Europe, shedding light on the expectations and competencies expected of individuals in this crucial role. By examining these requirements on a country-by-country basis, we aim to provide a comprehensive overview of the qualifications necessary for professionals who work with chronically ill youth in the realm of sports and physical activities across the European continent.

Table 2 provides an overview regarding country-specific trainer qualifications, education contents, and responsible organization within Germany, Italy, Portugal, Spain, and Greece.

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Table 2: Trainer qualification systems among European countries.

Characteristic	Germany	Italy	Portugal	Spain	Greece
Minimum Qualification	Coach C mass sports/sport-specific, Trainer C cross-sport, mass sports for children and adolescents, Trainer C disability sports.	Various qualifications and levels	Bachelor's degree in Sport Sciences field, Level 1 coaching license (any sport).	Degree in Physical Activity and Sport Sciences or equivalent.	Higher education degree in a relevant field, recognized coaching schools, vocational education and training diploma, or equivalent.
Allowed Professionals without a Trainer's License	Sports teachers, sports scientists (Bachelor, Master, or Diploma), and exercise professionals (fitness trainers, physiotherapists).	Sports professionals with an old degree in physical education and a diploma from ISEF.	Sport Sciences graduates specialized in fitness, Dance graduates, and health professionals.	Specific requirements vary by Autonomous Community.	Not specified.
Responsible Organization	German Olympics Sports Confederation (DOSB), German Disabled Sports Association (DBS), State Sports Associations, and Sports Federations.	C.O.N.I. - Italian National Olympic Committee, Sports Federations, Universities.	IPDJ (Portuguese Institute for Sports and Youth), Sports Federations, Universities.	Public and private universities offering relevant degrees. Supported by the Spanish Ministry of	General Secretariat for Sports.

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Characteristic	Germany	Italy	Portugal	Spain	Greece
				Education and Vocational Training	
Extent of Trainer Education	125 learning units (LU), split into basic, advanced, and examination courses.	Varies depending on the program and qualification.	Bachelor's degree (3 years) and Level 1 coaching license.	Varies depending on the level of qualification.	Varies depending on the level of the license (A, B, or C).
Content of Trainer Education	Various topics, including training and movement theory, sports pedagogy, sports biology, sports medicine, and more.	Specialist knowledge, general knowledge, and sport-specific topics.	Topics include methodology, sports pedagogy, sports biology, and more.	Various topics related to physical activity and sports.	Diverse topics including anatomy, physiology, coaching, and more.
Costs for Education	Approximately 500 €.	Varies by region and sport.	Approximately 2091€ for the bachelor's degree.	Varies widely from free to private universities' costs.	Not specified.
Specific Educational Programs for Chronically Ill Children	Yes, including Trainer C disability sports, Trainer B rehabilitation sports, and others.	Yes, including courses related to disability sports.	Yes, including courses in "Preventive and Adapted Physical Activity" and more.	Not mentioned.	Yes, programs are available in sports higher education institutions.
Recognized by Health Insurance	Yes, insured persons receive financial support for certified trainers and sports groups.	Health insurance does not depend on the coach's	Not mentioned.	Health insurance companies do not provide financial	Not specified.

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Characteristic	Germany	Italy	Portugal	Spain	Greece
		license but on the type of contract with the club.		assistance to certified individuals or clubs.	

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6. Conclusion

In summary, the requirements for coaches and instructors working with CaA dealing with chronic illnesses in various European countries vary in terms of qualifications, allowed professionals, overseeing organizations, educational content, costs, and specific programs for working with chronically ill children. However, a common thread among these countries is the emphasis on specialized training and education to ensure the well-being and safety of young individuals with chronic illnesses. These requirements reflect the commitment to providing inclusive and supportive sports programs tailored to the unique needs of this population while promoting their physical, social, and psychological development.

Having identified the key components of special sports programs for children with chronic diseases and examined the requirements for coaches and instructors across various European countries, it is imperative that future studies take a comprehensive approach. One promising avenue for further research involves gathering valuable insights and perspectives from experienced coaches who have worked directly with children and adolescents facing chronic illnesses. This approach can help define the actual requirements necessary to effectively cater to the needs of this specific population. By engaging with seasoned coaches, researchers can gain a deeper understanding of the practical aspects, challenges, and best practices involved in providing sports programs that promote physical, social, and psychological well-being in these young individuals. This collaborative effort between researchers and experienced coaches will contribute to the development of more tailored and effective strategies for supporting children and adolescents dealing with chronic illnesses in the realm of sports and physical activity.

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Annex. Sports Programs for Children and Adolescents with Chronic Diseases and Post-Traumatic Stress Disorder: Best Practices from Europe

Annex I: Best Practices from Italy

General information	
Name/title of the Best Practice	"Cuori in movimento"
Period of realisation *[Timeframe of the practice (period/duration). Is it finished?]*	12 months
Type *(program, project, activity, event, multimedia, etc.)*	Project
Sources of information *(where information can be found about this best practice)*	https://unbattitodiali.it/progetto-app-cuori-in-movimento/
Administering organisation *(name & address)*	UN BATTITO DI ALI ONLUS Via A. Volta n.6 Collemarino 60126 Ancona
Provide information: o *Contact details: name & email* o *Certification/accreditation* o *Financing: how is the organization funded?*	Chiara Mormile – President - info@unbattitodiali.it Non-profit organisation
Country of origin/Location of the program	Ancona (Italy)
Other countries participating	N/A
Partnerships or collaboration involved (e.g., institutions, organizations, associations, communities)	Paediatric and Congenital Cardiac Surgery Centre of Ospedali Riuniti di Ancona
Target group/beneficiaries	Target Group: children (over six years) and adults affected by heart disease or have chronic or congenital heart disease. Target group families

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Parameters	
Short description of initiative/Best Practice	"Cuori in movimento" (Hearts on the Move) is a project that aims to encourage the start or return to physical activity and sport for both paediatric (over 6 years old) and adolescent and adult heart patients, who are affected by heart disease or have chronic or congenital heart conditions. In particular, through the creation and testing of an 'app' as well as the construction of pathways and a support network for patients and their families, the project intends to extend and integrate territorial policies by integrating and strengthening existing networks.
Goals and objectives of initiative/Best practice	- Improving the health of people with heart disease with regard to adopting an appropriate lifestyle - Combat the feelings of helplessness that are often experienced during the course of treatment and satisfy the expectations of reintegration into active life and the world of sport, while respecting the delicate psychological balance - Allowing the practice of physical-sporting activities for psychological and physical benefits through customised plans based on the limitations that the pathology entails; the application can in fact be used not only at home but also in the gym or in outdoor activities - Favouring the establishment of a correct diet.
Key components and activities of initiative/Best practice	- accompaniment of subjects with heart disease followed by the Paediatric and Congenital Cardiac Surgery Centre of the Ospedali Riuniti in Ancona - production of video-tutorials and video testimonials - creation and activation of an "app" to manage individual programmes - training.
Duration of the Best Practice/program	The project will run for 12 months for the implementation and testing of the app.
Required resources or equipment	Smartphone app: " Cuori in Movimento"
Staffing requirements	Cardiologist, Physiotherapist and Nutritionist

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Costs for the participants, if any	NO
Services that are/were developed *(i.e. counselling, capacity building, teaching, mentoring, supporting, accompanying, participant involvement in planning and decision making, training, coaching, etc.)*	N/A
Evidence and Effectiveness	
Has the Best Practice/program been evaluated?	No
If yes: Impact/Results of the Best Practice on the target group/beneficiaries	
If no: Subjective opinions/comments about the Best Practice/program and its impact on the target group (i.e., from participants, parents; if available)	Unfortunately, there are no project results, so it is not possible to get feedback from people who have used the app.
Recommendations for implementation In what way can children with a chronic disease and/ or post-traumatic stress disorders benefit from this best practice?	Recommendations: - Increased visibility of the project and use of the app. - the app is only in Italian. If the results on the use of the app are positive, it might be useful to have it in English as well.
Individualisation and social interaction	
How is the supply adapted to individual needs (participants or beneficiaries)?	Through the creation and testing of an 'app' and the construction of pathways and a support network for patients and their families. This gives young patients the opportunity to be followed up even after their journey in the healthcare facility.
Challenges encountered? What has worked? What didn't work?	
In what way this Best Practice promotes social interaction and integration?	Building a support network for patients and their families. Extend and integrate territorial policies and strengthen existing networks. The project also creates relationships and is developed in collaboration with social and health actors and the Third Sector.
Additional comments or information	None

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General information	
Name/title of the Best Practice	DIABETE SPORT TRAINING
Period of realisation *[Timeframe of the practice (period/duration). Is it finished?]*	2 years
Type *(program, project, activity, event, multimedia, etc.)*	Project
Sources of information *(where information can be found about this best practice)*	https://www.agditalia.it/progetti-partnership/diabete-sport-training/ http://www.diabetesporttraining.it/
Administering organisation *(name & address)*	AGD ITALY in partnership con Marathon Sport Medical Center AGD Italy: is a co-ordination between Associations helping Children and Young People with Diabetes. Parma, Italy
Provide information: o *Contact details: name & email* o *Certification/accreditation* o *Financing: how is the organization funded?*	The Scientific Referent of the Project is Dr. Stefano Tumini. agditalia@agditalia.it The Association is non-profit-making and has unlimited duration. The association operates with the primary purpose of protection of civil rights in the social and health sector, training and scientific research in favour of disadvantaged people as children and young people with diabetes in the age of development.
Country of origin/Location of the program	Parma, Italy
Other countries participating	Lignano Sabbiadoro, Pavia, Sorrento, Tirrenia, Orosei, Riccione e Roma

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Partnerships or collaboration involved (e.g., institutions, organizations, associations, communities)	Collaborations: - Ministry of Health - CONI - SIEDP - Parliamentary Association for the protection and promotion of the right to prevention - Diabetes Italy Onlus - Sport Without Borders Italy - A.N.I.A.D National Association of Diabetic Athletes - IDF Young Leaders Italy. Fondazione Vodafone Italia, Marathon Sport Medical Center (www.marathoncenter.it)
Target group/beneficiaries	children and young people with diabetes from 6 to 30 years of age.
Parameters	
Short description of initiative/Best Practice	The project aims to give children and young people with diabetes between the ages of 6 and 30 a sports passport, certifying, by means of a specific battery of motor tests/games, the subject's coordination and conditioning skills in order to highlight predispositions, aptitudes, in relation to biological age, modulating motor activity in attention to the pathology, thus favoring the inclusion of our young people in sports. The program will take place through the implementation of sports education and promotion "camps", three-day residential camps, organized in homogeneous groups by age where a team of professionals will follow the young participants step by step from a clinical, psychological and in particular in the initiation and practice of sport.
Goals and objectives of initiative/Best practice	To increase children's awareness of safe sports safety, having fun and socializing with each other.
Key components and activities of initiative/Best practice	Participants will be divided by age and constantly followed by a team of professional SPORT professionals consisting of sports doctors exercise science graduates and athletic trainers of various sports disciplines, and by an composed of diabetologists, nurses nutrition experts and psychologists. 3-day campus organised in 8 Italian locations.
Duration of the Best Practice/program	The Project has a duration of two years.

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	Campus activities last three days.
Required resources or equipment	No resources or equipment are required, but certain documents must be presented in order to participate: - Registration form for the sports education and promotion camp - Release form for sensitive data and images - medical emergency - Medical certificate of good health or fitness for competitive sport - Diabetologist's certificate confirming current therapy
Staffing requirements	sports doctors, exercise science graduates and athletic trainers. Diabetologists, nurses nutrition experts and psychologists.
Costs for the participants, if any	no
Services that are/were developed *(i.e. counselling, capacity building, teaching, mentoring, supporting, accompanying, participant involvement in planning and decision making, training, coaching, etc.)*	sports programmes, game activities, physical tests
Evidence and Effectiveness	
Has the Best Practice/program been evaluated?	Yes
If yes: Impact/Results of the Best Practice on the target group/beneficiaries	The results were presented at the PRESS CONFERENCE organised by the Vodafone Italia Foundation at the Aula Magna del Coni in September 2014 in the presence of President Alex Zanardi and Coni President Dr. Giovanni Malagò, the data demonstrated the effectiveness and achievement of the project's objectives. The Diabetic Training Camp activities were also organised in 2023. https://www.facebook.com/metodopronking/posts/pfbid0VnAwGXraAppUsm6Srk3ARZuRa7yNBGkHWa8pB3Awh4D7Kgxsa2Qdd3dzFJQjqe9ql
If no: Subjective opinions/comments about the Best Practice/program and its impact on the target group (i.e., from participants, parents; if available)	

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Recommendations for implementation In what way can children with a chronic disease and/ or post-traumatic stress disorders benefit from this best practice?	Safe management of sports activities. The children are first subjected to various physical tests in order for them to be able to participate in sports activities. The campus also allows them to experience a sense of autonomy and responsibility, while also having the opportunity to make friends with other peers.
Individualisation and social interaction	
How is the supply adapted to individual needs (participants or beneficiaries)?	Through constant monitoring by a trained staff.
Challenges encountered? What has worked? What didn't work?	We have no practical, measurable results.
In what way this Best Practice promotes social interaction and integration?	The opportunity to go on a three-day campus gives the youngsters the chance to experience not only sport but autonomy and social interaction.
Additional comments or information	None

General information	
Name/title of the Best Practice	"Sport Therapy"
Period of realisation *[Timeframe of the practice (period/duration). Is it finished?]*	3 years
Type *(program, project, activity, event, multimedia, etc.)*	research project
Sources of information *(where information can be found about this best practice)*	https://comitatomarialetiziaverga.it/capire-la-malattia/cura-e-terapie/sport-therapy/
Administering organisation *(name & address)*	Maria Letizia Verga Centre at the Paediatric Clinic of the University of Milan Bicocca - Fondazione Monza e Brianza per il bambino e la sua Mamma, ASST San Gerardo di Monza. Monza, Italy
Provide information: o *Contact details: name & email* o *Certification/accreditation* o *Financing: how is the organization funded?*	pilot project, in collaboration between the Paediatric Clinic of the San Gerardo Hospital and the Human Physiology of the University of Milan Bicocca. (Milan, Italy)

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	The association 'Maria Letizia Verga Comitato" (Monza, Italy)
Country of origin/Location of the program	Monza
Other countries participating	No
Partnerships or collaboration involved (e.g., institutions, organizations, associations, communities)	University of Milan Bicocca. (Milan, Italy)
Target group/beneficiaries	Children treated for hematological diseases
Parameters	
Short description of initiative/Best Practice	The 'Sport Therapy' research project aims to demonstrate that, through targeted physical activity administered by the sports doctor in collaboration with the haemato-oncologist, it is possible to promote the full recovery of patients who have undergone anti-tumor therapies, enabling them to reintegrate as best they can, once they have recovered, into their community (school, sport and social relations).
Goals and objectives of initiative/Best practice	The aim of this study is to evaluate the impact of a specific training program on the efficiency of the systems necessary for the transport and utilisation of O2 in children and girls who are being treated for hematological diseases.
Key components and activities of initiative/Best practice	1. report of the potential athlete by the haemato-oncologist pediatrician to the sports physician. 2. sports doctor's examination and assessment of aerobic power, strength, stability and flexibility with the sports doctor and motor scientist. 3. Development of a specific training plan.
Duration of the Best Practice/program	Total project duration 3 years. Duration of the program: three trainings per week, for almost three months.
Required resources or equipment	N/A
Staffing requirements	For training and clinical monitoring: Pediatrician, sports physician, motor scientist and osteopath.

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	The psychologist and dietician also participate in the assessment of the individual characteristics required to carry out the training program
Costs for the participants, if any	no
Services that are/were developed *(i.e. counselling, capacity building, teaching, mentoring, supporting, accompanying, participant involvement in planning and decision making, training, coaching, etc.)*	N/A
Evidence and Effectiveness	
Has the Best Practice/program been evaluated?	Yes
If yes: Impact/Results of the Best Practice on the target group/beneficiaries	Over 200 children (3-18 years) were involved in the trial. The researchers subjected them to three training sessions per week for almost three months. Results: Among the boys who had followed the training program more assiduously (at least twice a week), performance improved significantly. 'With training of this kind, continuing to train even once the acute phase of the disease has passed, these boys can achieve high-level performance despite their experience,' says Francesca Lanfranconi, sports physician and researcher in human physiology: she is the first name in the study published in the journal Scientific Reports.
If no: Subjective opinions/comments about the Best Practice/program and its impact on the target group (i.e., from participants, parents; if available)	
Recommendations for implementation In what way can children with a chronic disease and/ or post-traumatic stress disorders benefit from this best practice?	In addition to physical performance, progress was also measured in the form of improved self-esteem, increased socialisation, reduced anger and increased social inclusion.
Individualisation and social interaction	
How is the supply adapted to individual needs (participants or beneficiaries)?	With the support of a trained staff with different roles, a specific training plan is designed. This guarantees security and constant monitoring.
Challenges encountered? What has worked? What didn't work?	

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In what way this Best Practice promotes social interaction and integration?	Increasing physical capacity enables the children to return to a more active life rhythm, while also acquiring a more positive mental/psychological state. This will enable them to re-engage in their environments (school, sport, social relationships).
Additional comments or information	None

Annex II: Best Practices from Spain

General information	
Name/title of the Best Practice	Capitán Volante
Period of realisation *[Timeframe of the practice (period/duration). Is it finished?]*	Every year since 2022
Type *(program, project, activity, event, multimedia, etc.)*	3 Sport events per year Monthly exercise sessions
Sources of information *(where information can be found about this best practice)*	https://capitanvolante.org/
Administering organisation *(name & address)*	Asociación Española para los efectos del tratamiento del cáncer. C/ Guadalquivir 10 (Local). Sevilla 41002
Provide information: o *Contact details: name & email* o *Certification/accreditation* o *Financing: how is the organization funded?*	info@asociacionetc.org 955281014 / 644411014 Asociación Española para los efectos del tratamiento del cáncer.
Country of origin/Location of the program	Seville (Spain)
Other countries participating	N/A
Partnerships or collaboration involved (e.g., institutions, organizations, associations, communities)	No
Target group/beneficiaries	Children with cancer
Parameters	
Short description of initiative/Best Practice	Challenges in Running, Swimming, and Triathlon. Further, to prepare these challenges, participants

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	receive personal training in a gym (in-hospital and in an sport setting).
Goals and objectives of initiative/Best practice	The overall objective of the proposal is to enable boys and girls to enhance their sports performance and, ideally, participate in high-level competitions. However, it goes beyond just support for various sports disciplines.
Key components and activities of initiative/Best practice	The "good practice" lies in the opportunity to train with a personal coach at sports medical centers (e.g., INMUV) or at the hospital itself, using specialized equipment and personnel. Participants attend the center once a week as a group to engage in physical exercise and improve their fitness under the guidance of specialized trainers.
Duration of the Best Practice/program	Once a week during 9 months.
Required resources or equipment	Sports medical centers (e.g., INMUV)
Staffing requirements	Graduates in Sports Science with specialized training.
Costs for the participants, if any	Nothing for the participant. The cost of renting the room is covered by the association.
Services that are/were developed *(i.e. counselling, capacity building, teaching, mentoring, supporting, accompanying, participant involvement in planning and decision making, training, coaching, etc.)*	N/A
Evidence and Effectiveness	
Has the Best Practice/program been evaluated?	No
If yes: Impact/Results of the Best Practice on the target group/beneficiaries	
If no: Subjective opinions/comments about the Best Practice/program and its impact on the target group (i.e., from participants, parents; if available)	A significant number of boys and girls who are cancer survivors participate in the activity each year. The boys describe the activity as fun, and the parents themselves comment on improvements in their children's mood and physical condition.
Recommendations for implementation	An improved physical condition can lead to overall improvements in children with health conditions in several ways:

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In what way can children with a chronic disease and/ or post-traumatic stress disorders benefit from this best practice?	Cardiorespiratory Health: Enhanced cardiovascular and respiratory fitness can lead to better circulation and oxygen delivery, improving the body's overall efficiency and reducing fatigue. This, in turn, can positively impact daily activities and quality of life. Muscular Strength and Endurance: Improved muscle strength and endurance can lead to increased mobility and independence, making it easier for children to engage in physical activities and perform everyday tasks. Psychological Well-being: Physical activity has been linked to improved mental health by reducing symptoms of anxiety, depression, and stress. It can also boost self-esteem and provide a sense of accomplishment. Social Interaction: Participating in physical activities can help children interact with their peers, develop social skills, and build friendships, which are crucial for their emotional and social development. Cognitive Benefits: Physical activity has been shown to enhance cognitive function, including attention, memory, and problem-solving skills, which can support academic achievement and overall cognitive development.
Individualisation and social interaction	
How is the supply adapted to individual needs (participants or beneficiaries)?	The physical exercise program for children with cancer is designed with a strong emphasis on adapting the supply to the individual needs of each participant. We recognize that every child's medical condition, treatment plan, physical capabilities, and personal preferences are unique. As a result, our program is carefully crafted to ensure that each child receives the appropriate level of support and engagement.
Challenges encountered? What has worked? What didn't work?	Tailored Exercise Plans: Based on the assessment, we create personalized exercise plans for each child. These plans take into consideration their physical abilities, energy levels, and any restrictions posed by their medical condition. Our expert trainers work closely with

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	healthcare professionals to design safe and effective exercise routines. Progressive Approach: We understand that a child's needs may change over time due to their medical progress or treatment adjustments. Our program follows a progressive approach, allowing us to modify and adapt exercise routines as needed. This ensures that the child continues to challenge themselves while remaining within safe boundaries. One-on-One Support: Our trainers provide individualized attention during sessions, ensuring that each child is performing exercises correctly and comfortably. We also encourage open communication, allowing children to express any concerns or preferences they may have.
In what way this Best Practice promotes social interaction and integration?	Group Sessions: The program organizes regular group exercise sessions where children come together to engage in physical activities. These sessions provide opportunities for participants to interact, communicate, and build friendships with their peers who are experiencing similar challenges. Group settings foster a sense of belonging and camaraderie, reducing feelings of isolation.
Additional comments or information	None

General information	
Name/title of the Best Practice	PAIDO
Period of realisation *[Timeframe of the practice (period/duration). Is it finished?]*	1 year
Type *(program, project, activity, event, multimedia, etc.)*	Physical exercise
Sources of information *(where information can be found about this best practice)*	https://programapaido.general-valencia.san.gva.es/index.php/p-ejercicio/
Administering organisation *(name & address)*	Programa PAIDO

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	Unidad contra la Obesidad y el Riesgo Cardiovascular, Servicio de Pediatría, CHGUV
Provide information: o *Contact details: name & email* o *Certification/accreditation* o *Financing: how is the organization funded?*	Casa Misericordia 12 46014 Valencia Phone: 963131800. Extensión 437353 Email: secretaria.programapaido@gmail.com
Country of origin/Location of the program	Valencia (Spain)
Other countries participating	N/A
Partnerships or collaboration involved (e.g., institutions, organizations, associations, communities)	None
Target group/beneficiaries	Children with obesity and cardiovascular risk
Parameters	
Short description of initiative/Best Practice	This is a specifically designed program by pediatricians from the Unit against Obesity and Cardiovascular Risk, along with the Physical Therapy Department at CEU Cardenal Herrera University, for children and adolescents with excess weight. We have demonstrated through two studies that performing at least three days a week leads to a decrease in fat and an improvement in physical condition.
Goals and objectives of initiative/Best practice	The overall objective is to improve physical fitness and reduce fat mass.
Key components and activities of initiative/Best practice	Minimum of 5 physical exercise sessions will be held per week. To ensure the program's success, the number of sessions must never be less than 3. In case only 3 sessions can be held during a particular week, they should be conducted on alternate days (e.g., Monday, Wednesday, and Friday).
Duration of the Best Practice/program	Three times per week during 1 year.
Required resources or equipment	• Comfortable clothing and shoes • Towel or a folded cloth • Watch (with a second hand or preferably a stopwatch)

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	• 2 weights (0.5 kg) or two filled water bottles of half a liter each
Staffing requirements	Physiotherapist
Costs for the participants, if any	Nothing for the participant.
Services that are/were developed *(i.e. counselling, capacity building, teaching, mentoring, supporting, accompanying, participant involvement in planning and decision making, training, coaching, etc.)*	
Evidence and Effectiveness	
Has the Best Practice/program been evaluated?	No
If yes: Impact/Results of the Best Practice on the target group/beneficiaries	
If no: Subjective opinions/comments about the Best Practice/program and its impact on the target group (i.e., from participants, parents; if available)	This was a home-based intervention with significant improvements in physical fitness.
Recommendations for implementation In what way can children with a chronic disease and/ or post-traumatic stress disorders benefit from this best practice?	This was a non-supervised program.
Individualisation and social interaction	
How is the supply adapted to individual needs (participants or beneficiaries)?	N/A
Challenges encountered? What has worked? What didn't work?	N/A
In what way this Best Practice promotes social interaction and integration?	This was one of the main limitations of the program. It was a home-based intervention with limited interaction.
Additional comments or information	None

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Name/title of the Best Practice	EL PODER DEL CHANDAL: PROYECTO MINI GYM
Period of realisation *[Timeframe of the practice (period/duration). Is it finished?]*	1 year
Type *(program, project, activity, event, multimedia, etc.)*	Pediatric in-hospital mini-gyms
Sources of information *(where information can be found about this best practice)*	https://elpoderdelchandal.org/proyectos/minigym/
Administering organisation *(name & address)*	Programa MINI GYM Association "El Poder del Chandal"
Provide information: o *Contact details: name & email* o *Certification/accreditation* o *Financing: how is the organization funded?*	ASOCIACION EL PODER DEL CHANDAL CIF/NIF G88123765 con domicilio en PLAZA JOSE CELESTINO MUTIS 8 1°B, RIVAS-VACIAMADRID (MADRID), 28522 Email: hola@elpoderdelchandal.org
Country of origin/Location of the program	Spain
Other countries participating	N/A
Partnerships or collaboration involved (e.g., institutions, organizations, associations, communities)	Trainsplant GetStrong Legatik Incopyme
Target group/beneficiaries	Children with chronic diseases
Parameters	
Short description of initiative/Best Practice	The Project MiniGym is an incredible initiative that provides specially designed mini gyms for children with special needs. It's so cool that someone is dedicating themselves to creating these tiny gyms and donating them where they are needed most.
Goals and objectives of initiative/Best practice	Providing pediatric in-hospital mini-gyms to improve the recovery and health of our children
Key components and activities of initiative/Best practice	Have access to adapted materials for their rehabilitation. Improve their muscle tone and autonomy. Provide spaces where they and their families receive the best support and advice.

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Duration of the Best Practice/program	N/A
Required resources or equipment	in-hospital mini-gyms with basic equipment: Treadmill: A low-impact exercise machine to develop psychomotor skills. It does not have a motor, so it adapts to the rhythm and intensity of each child who controls the machine through movement. Stationary bike: Completely adjustable to the height of the user. Its mechanism is fully protected by plastic. The safety of children is paramount. Stepper: Perfect for improving coordination and proprioception. Its LCD screen allows you to control times, distances, and its pedals are also non-slip! Elliptical: A healthy way to have fun and find stimuli. Exactly the same dynamics as the adult elliptical, but in mini format; always controlled by the movement of each child.
Staffing requirements	Personal trainers and fitness instructors with specific training
Costs for the participants, if any	Nothing for the participant.
Services that are/were developed *(i.e. counselling, capacity building, teaching, mentoring, supporting, accompanying, participant involvement in planning and decision making, training, coaching, etc.)*	Counselling Training *Coaching*
Evidence and Effectiveness	
Has the Best Practice/program been evaluated?	No
If yes: Impact/Results of the Best Practice on the target group/beneficiaries	
If no: Subjective opinions/comments about the Best Practice/program and its impact on the target group (i.e., from participants, parents; if available)	Different comments in the website (e.g., It has become a reality! Thanks to El Poder del Chandal for helping me and to everyone for accompanying me in such a beautiful moment. I hope that this small contribution helps many children in their recovery).

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Recommendations for implementation In what way can children with a chronic disease and/ or post-traumatic stress disorders benefit from this best practice?	Providing children with the resources they need to recover and thrive, such as adapted exercises and therapy tools, as well as offering support and guidance to their families. By doing so, the Project MiniGym aims to improve the overall quality of life for children with special needs and their families.
Individualisation and social interaction	
How is the supply adapted to individual needs (participants or beneficiaries)?	Specific equipment and coaches.
Challenges encountered? What has worked? What didn't work?	There is a continuous need for subsidies to acquire new gyms.
In what way this Best Practice promotes social interaction and integration?	Having a common intra-hospital space with trained professionals facilitates interaction among participants. This interaction can have various impacts on the hospital environment, including motivation of hospital staff. Interactions perceived by family caregivers in the hospital setting between team members and the caregiver can also play a significant role.
Additional comments or information	None

Annex III: Best Practices from Germany

General information	
Name/title of the Best Practice	Eingebunden e.V.
Period of realisation *[Timeframe of the practice (period/duration). Is it finished?]*	Project start in 2007, program start every year in October, linked to the German school year (until July)
Type *(program, project, activity, event, multimedia, etc.)*	Sports club, regular training program, optional vacation camps/intensive courses
Sources of information *(where information can be found about this best practice)*	www.eingebunden-ev.de
Administering organisation *(name & address)*	

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	Eingebunden e.V. Verein zur Förderung außergewöhnlicher Kinder und Jugendlicher Adinda-Flemmich-Straße 14 79100 Freiburg Germany
Provide information: o *Contact details: name & email* o *Certification/accreditation* o *Financing: how is the organization funded?*	Eingebunden e.V. is a non-profit association that is financed by membership fees, donations, subventions and parents' contributions. Mail: team@eingebunden-ev.de Phone: +49 761 35559
Country of origin/Location of the program	Germany, Freiburg
Other countries participating	No
Partnerships or collaboration involved (e.g., institutions, organizations, associations, communities)	-Freiburger Vereinigung zur Hilfe psychisch kranker Kinder und Jugendlicher e.V. -Foundation "Jugendstiftung Baden-Württemberg" -Red Chilli -Rockterra -Foundation "Jugend spielt"
Target group/beneficiaries	Children with attention deficit/hyperactivity disorder (ADHD); 5-12 years of age, Parents of concerned children
Parameters	
Short description of initiative/Best Practice	Eingebunden e.V. offers help for self-help. Therapeutic climbing in groups for children with ADHD is the focus of the work
Goals and objectives of initiative/Best practice	The program for children with an increased risk in their health and psycho-social development wants to offer assistance for a healthy integration into the social community. The children's climbing group is aimed at children with ADHD but also at children who do not show the full picture of ADHD but have specific symptoms and need specific support. The age of the children should be between 5 and 12 years. This age range is deliberately kept large, as experience shows that children, especially children with ADHD, benefit

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	enormously from mixed-age groups in an appropriate setting.
Key components and activities of initiative/Best practice	Activities: -climbing courses every two weeks -parents' evenings -climbing excursion Key components: Climbing requires directed action, motivation and social interaction. In a rope partnership, responsibility is assumed and trust is developed. The partnership, independence, appropriate impulse control, self-assessment, reliability in action and the possibility to come into contact with borderline experiences without taking a real risk, make climbing an ideal training field. In addition, the sport offers enough space to train self-awareness and healthy self-assessment.
Duration of the Best Practice/program	-1 year, after the first year in a "basic group" participation in a sport climbing training group is possible. -intensive climbing courses during school holidays (7-10 days).
Required resources or equipment	The groups usually meet at the climbing hall. Therapeutic climbing takes place on 2 afternoons during the week. Climbing equipment is provided by the club.
Staffing requirements	Climbing trainers, occupational therapists, physical therapists
Costs for the participants, if any	64€ per month per participant for the climbing course plus 50€ per year for club membership. Financial support from the city of Freiburg possible, financial support from the "Förderverein" possible.
Services that are/were developed *(i.e. counselling, capacity building, teaching, mentoring, supporting, accompanying, participant involvement in planning and decision making, training, coaching, etc.)*	Educational camps, parents' seminar, parents' network
Evidence and Effectiveness	

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Has the Best Practice/program been evaluated?	No
If yes: Impact/Results of the Best Practice on the target group/beneficiaries	
If no: Subjective opinions/comments about the Best Practice/program and its impact on the target group (i.e., from participants, parents; if available)	The responsible trainers have observed so far: -Self-assessment improves, personal responsibility is strengthened. -The children develop seriousness, accuracy and attentiveness. -They discover their strength, as well as willpower and endurance to carry out an action. Frustration tolerance is increased, self-esteem rises. -Almost all children, who usually start out as lone fighters, succeed in integrating into a group structure in the course of a school year. -Particular emphasis is placed on allowing each individual child to develop according to his or her own ability and measure - self-seeking, but also self-found.
Recommendations for implementation In what way can children with a chronic disease and/ or post-traumatic stress disorders benefit from this best practice?	A successfully performed action stimulates motivation. Once a problem or a route has been mastered, this course of action, which has successfully led to the solution of the problem, is classified as meaningful and worthwhile for repetition and stored in the nerve cell networks. A new repertoire of behavioral structures emerges. Climbing, more than almost anything else, consists almost exclusively of "problems" to be solved. Very many children like to climb. Climbing is a natural resource for pedagogical work. It corresponds to the children's interests and gives the therapists access to the children's behaviour and actions.
Individualisation and social interaction	
How is the supply adapted to individual needs (participants or beneficiaries)?	The program is based on the leading symptoms of ADHD: 1. disturbance of attention: climbing requires undivided attention to the momentary action. If the concentration

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	is interrupted, the consequence is immediate. One falls into the rope. 2. impulse control disorder: climbing requires a high level of impulse control. Just as with point 1, an impulsive outburst has immediate consequences without the need for pedagogical intervention; the consequence results from the action itself. Climbing also requires perseverance and endurance, and frustration tolerance can be optimally expanded. 3. hyperactivity or hypoactivity: climbing places high demands on the coordination of movement sequences, as well as the foresighted planning of the same. The children also learn to correctly assess their motor skills and limits and to put them into practice. Disturbances in proprioception, force dosage and the verstibular system are improved by climbing. Both hyperactive and hypoactive children benefit from this.
Challenges encountered? What has worked? What didn't work?	N/A
In what way this Best Practice promotes social interaction and integration?	Climbing offers the opportunity to train social skills. Climbing cannot be done alone. Teams need clear agreements, the assumption of responsibility, mutual trust and the ability to respond to each other. In the groups, the children have the opportunity to practice the social skills they have learned and thus integrate into a group.
Additional comments or information	Additional offerings for parents: -Parent meetings -Introduction to therapeutic climbing -Safety briefing -Networking with parents -Family excursions -Parent seminars

General information

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Name/title of the Best Practice	Network ActiveOncoKids (NAOK)
Period of realisation *[Timeframe of the practice (period/duration). Is it finished?]*	Founded in 2012, since 2019 full-time position network coordination in Essen. Continuous offerings and programs
Type *(program, project, activity, event, multimedia, etc.)*	Nationwide network, exercise programs, sport events, online activities
Sources of information *(where information can be found about this best practice)*	www.activeoncokids.org
Administering organisation *(name & address)*	NAOK coordination Universitätsklinikum Essen (AöR) Zentrum für Kinder- und Jugendmedizin, Kinderheilkunde III Hufelandstraße 55 45147 Essen
Provide information: o *Contact details: name & email* o *Certification/accreditation* o *Financing: how is the organisation funded?*	Since 2019 third-party-funded by Deutsche Krebshilfe Mail: kontakt@activeoncokids.de Phone: +49 201 723 6563
Country of origin/Location of the program	Germany, Essen
Other countries participating	Switzerland
Partnerships or collaboration involved (e.g., institutions, organizations, associations, communities)	-NAOK is an official working group in the German Society for Pediatric Hematology and Oncology -collaboration between health care professionals, exercise professionals, pediatricians, physiotherapists among different acute cancer and rehabilitation clinics in Germany - Cooperation with various foundations, associations and federations in the sports and health sector -Cooperation with universities, acute pediatric cancer centers in Germany -International research cooperations with iPOEG, FORTEe, PanCare -Initiation of Pediatric Exercise Oncology Congress

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Target group/beneficiaries *(target group, ages, gender, chronic disease, parents, other stakeholder, etc)*	-Children, adolescents and young adults with cancer, childhood cancer survivors -Parents and siblings of concerned children - health care professionals, institutions, physical education teachers
Parameters	
Short description of initiative/Best Practice	NAOK is an interdisciplinary network to improve pediatric exercise oncology in Germany and beyond. NAOK's main goal is to provide opportunities for physical activity promotion and exercise therapy for children, adolescents, and young adults during all phases of cancer treatment. To this end, NAOK works and cooperates with partners and network members (sites, centres) in an interdisciplinary team in a transparent and consensus-oriented manner. Among 60 pediatric clinics, collaborating in the German Society for Pediatric Hematology and Oncology, exercise programs are now offered at more than 30 hospitals.
Goals and objectives of initiative/Best practice	All patients with childhood cancer and survivors should have access to tailored exercise programs and suitable physical activities, so that physical activity and exercise are accessible as a resource to support physical and psychosocial resilience throughout treatment and survivorship. Therefore, NAOK's actions aim at enhancing physical activity and facilitating participation in exercise programs for children, adolescents, and young people with cancer.
Key components and activities of initiative/Best practice	NAOK acts on different levels, which are in line with current health promotion strategies. Actions target several determinants of physical activity implementation in children and adolescents: -Physical activity support (Strengthen physically active behavior, implement exercise programs during acute care and aftercare): In- and outpatient exercise programs for children with cancer; exercise programs, courses and excursions for survivors; re-integration of patients into sport structures (school or sport club);

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	advising physical education teachers, club coaches and sport clubs -Policy change (Establish sustainable structures and exercise guidelines) -Scientific evidence (Initiate and collaborate in exercise research projects) NAOK offers exercise-related support for patients and families by addressing their questions, discussing uncertainties, and develop strategies to change physical activity behavior. Further activities like patient and survivor workshops, family workshops, and individual physical activity counseling, including reintegration support into sport structures, are organized and conducted directly by the NAOK coordination office. To extend the knowledge of physical activity benefits and to familiarize patients with cancer and survivors with the network, posters, flyers, homepage, and several social media accounts have been created. Moreover, NAOK participates at family and young patient camp activities of the German Pediatric Cancer Foundation and patient conferences.
Duration of the Best Practice/program	Exercise program over all phase of cancer treatment, no fixed program duration, depending on supply and location
Required resources or equipment	Structures and facilities to enable exercise in acute cancer clinics, sponsoring/funding opportunities for personal and sports material
Staffing requirements	Sports scientists coordinating the NAOK. A network steering group of scientists and physicians. A council of therapists, scientists, and physicians. Exercise professionals in every clinic.
Costs for the participants, if any	Exercise programs at acute cancer clinics are free of charge. The health insurance company covers the training sessions in the rehabilitation facilities. For out-of-hospital offers in sports clubs, the providers charge individual fees for the participants.
Services that are/were developed *(i.e. counselling, capacity building, teaching,*	-A multidisciplinary expert group led by

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mentoring, supporting, accompanying, participant involvement in planning and decision making, training, coaching, etc.)	NAOK developed a consensus-based medical guideline for exercise during anticancer treatment -Production of educational exercise videos for children, adolescents, young adults, and parents -Live online exercise lessons -Development of training brochure for patients and their families in German language -Organization of an international scientific congress
Evidence and Effectiveness	
Has the Best Practice/program been evaluated?	Yes
If yes: Impact/Results of the Best Practice on the target group/beneficiaries	In 2016, a NAOK research group was founded. To facilitate selection of evaluation methods in research or clinical contexts, NAOK research group summarized and reviewed existing assessment tools to measure physical activity and physical performance in patients with pediatric cancer and survivors. Another focus is the design, submission, and conduction of multicenter clinical trials to evaluate the effects of specific exercise and behavioral interventions on physical activity levels, and physical and psychosocial health. Ongoing quantitative and qualitative studies assess motivations and barriers for engagement in outdoor sports, as well as factors influencing physical activity behavior after cancer treatment. A recently launched EU-project, the FORTE study examines a precision exercise program during anti-cancer treatment in 7 European countries. Methodological limitations, for example, small numbers of patients in each center, and great diversity in pediatric cancer types, often hamper the explanatory power of study results and confine the generalizability. Therefore, NAOK members are initiating multicenter randomized controlled clinical trials to gain evidence and shorten research gaps. A current retrospective analysis of adverse events during exercise programs underlines the safety of structured and supervised exercise interventions with only 6 adverse events grades 2–3 according to the CTCAE criteria in 35,110 exercise interventions.

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If no: Subjective opinions/comments about the Best Practice/program and its impact on the target group (i.e., from participants, parents; if available)	Positive feedback from parents: The children escape the daily routine of the clinic through the sports sessions and forget the actual illness. The training helps them to cope better with everyday tasks.
Recommendations for implementation In what way can children with a chronic disease and/ or post-traumatic stress disorders benefit from this best practice?	**Benefit for the children:** Exercise during and after treatment of pediatric cancer shows promising results in diminishing disease and treatment-related side, late effects and reducing long-term mortality. **Benefit for the sites/providers**: The NAOK offers demand-oriented services to support expansion, facilitate implementation of exercise programs, and overcome common barriers to physical activity and exercise in the clinical setting. To increase the number of acute pediatric cancer clinics offering exercise programs, the implementation is guided throughout the whole process: -First step is the intention and interest to offer exercise programs, either as a result of self-initiative by an acute cancer clinic or through attention-led initiative of NAOK. -Second step is any kind of contact between NAOK coordination and staff of the acute cancer clinic -Third step, on-site visits for transfer of information provide, for example, informative talks for staff members to lower personal barriers or concerns and clarify the purpose of an exercise program. -Fourth, the NAOK coordination performs an analysis with the contact person in the acute cancer clinic to identify possibilities and challenges during the implementation process.
Individualisation and social interaction	
How is the supply adapted to individual needs (participants or beneficiaries)?	The sports programs are adapted to the age of the children and are based on the content of school sports. Due to the different experiences and interests of the

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	children, but especially due to the side effects of the therapy and the type of cancer, there are no standardized programs. The training is individually adapted depending on the underlying conditions. Taking into account generally applicable workout and didactic principles, endurance, strength, coordination and mobility are trained.
Challenges encountered? What has worked? What didn't work?	At present, the German diagnosis-related groups system, as part of German hospital reimbursement, does not cover pediatric exercise oncology programs. Hence, most supervised exercise programs and exercise activities for patients with pediatric cancer, and survivors, operate on mixed financing solutions via third-party funds, research funds, grants, sponsoring, and donations. Lack of training spaces (rooms, gyms) and equipment. Missing clinical exercise physiologists/exercise professionals within the interdisciplinary teams. Those missing facilities and structures, in addition to the missing knowledge about the benefits of exercise, sustain the severe inactivity of patients and needs to be changed and adapted to enable movement possibilities for children and adolescents with cancer.
In what way this Best Practice promotes social interaction and integration?	In practice, the buddy concept has become established, which invites those affected to involve siblings or friends. The program supports re-integration into sports structures and promotes participation in school and club sports.
Additional comments or information	None

General information	
Name/title of the Best Practice	Bundesverband Herzkranke Kinder e.V. (BVHK)
Period of realisation *[Timeframe of the practice (period/duration). Is it finished?]*	Founded in 1993, continuous programs and offers

Type *(program, project, activity, event, multimedia, etc.)*	-National network for exchange and dissemination of information -Identification of cardiac sports groups in Germany, organization of own sports programs
Sources of information *(where information can be found about this best practice)*	www.bvhk.de
Administering organisation *(name & address)*	BVHK Office Vaalser Str. 108 52074 Aachen
Provide information: o *Contact details: name & email* o *Certification/accreditation* o *Financing: how is the organisation funded?*	Non-profit association. Awarded with the DZI donation seal. Bundles 26 regional parent initiatives and regional groups as an umbrella organization. The office in Aachen is regarded as the coordination and networking platform for regional support service. The association is represented by 4 board members and financed by donations. Mail: info@bvhk.de Phone: +49 241 91 23 32
Country of origin/Location of the program	Germany, Aachen
Other countries participating	No
Partnerships or collaboration involved (e.g., institutions, organizations, associations, communities)	-Memberships in committees, such as the German Society for Pediatric Cardiology (DGPK) and the Registry / Competence Network for Congenital Heart Defects (KN AHF) with all important organizations in the field of "congenital heart defects -Member of the Action Alliance for Congenital Heart Defects -has a scientific advisory board -cooperates with parent initiatives in Germany -supported by celebrities
Target group/beneficiaries	-Children, adolescents and young adults with congenital heart defects or cardiovascular diseases, childhood cancer survivors -Parents and siblings of concerned children

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Parameters	
Short description of initiative/Best Practice	The BVHK is a federation of numerous nation-parent associations and regional groups. The BVHK represents about 3,000 people of all ages in Germany who live with congenital heart defects. The BVHK regularly informs about current news, helpful events as well as the work and progress of the actions. As an association, the BVHK seeks to make a difference in healthcare policy and in clinics and practices.
Goals and objectives of initiative/Best practice	-Emotional, psychological and financial support of children with heart disease and their families. -A contact address for those affected: providing information and advice -Recommendation of own offers/external offers and projects
Key components and activities of initiative/Best practice	Sports-related activities - Offer sports and encounter programs (horseback riding and sailing week) - Support children's cardiac sports groups nationwide - School and club sports integration Other activities - Promote family-oriented rehabilitation - Inform and advise affected persons and their relatives - Provide contacts in self-help, clinic and aftercare - Support research in the field of pediatric cardiology - Provide or mediate social-legal and psycho-social assistance - Provide educational and public relations work - Conduct doctor-parent-patient seminars and events for the "Day of the Child with Heart Disease" - Enforce improvements in the area of health policy - Promote integration of those affected (kindergarten, school, work, sports, etc.) - Establish and promote networks and the exchange of experiences among those affected.
Duration of the Best Practice/program	No specific program duration. If necessary, lifelong support of the affected persons. Cardiac sports groups are held regularly, several times a week, depending on

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	the location. One training session lasts approx. 45-90min. The sports camps go for one week.
Required resources or equipment	Individuals who want to volunteer. Sports clubs that offer children's cardiac sports groups. Gyms and sports equipment. Locations for the implementation of their own sports projects. Donations for the implementation of the projects.
Staffing requirements	Engaged parents and volunteers. Full-time management. Collaboration with scientists, psychologists, pediatric cardiologists, and exercise professionals.
Costs for the participants, if any	Information and counselling is free of charge. Health insurance companies subsidize the offers and sports groups. The providers charge individual fees for the participants within the cardiac sports groups. E.g. in Munich 120€ per year/child.
Services that are/were developed *(i.e. counselling, capacity building, teaching, mentoring, supporting, accompanying, participant involvement in planning and decision making, training, coaching, etc.)*	-A brochure on the integration of children with heart diseases in physical education at school -digital information platform, including the individual locations in Germany that offer a children's cardiac sports group -Establishment of family-oriented rehabilitation -free social law hotline
Evidence and Effectiveness	
Has the Best Practice/program been evaluated?	Yes
If yes: Impact/Results of the Best Practice on the target group/beneficiaries	Questionnaires are used to determine the effect of the sports and exercise offers. The results: the offers improve quality of life, increased self-confidence and an optimal management of the disease.
If no: Subjective opinions/comments about the Best Practice/program and its impact on the target group (i.e., from participants, parents; if available)	Positive feedback from children: -"I felt happy with all the children who have the same worries." -"I have experienced that I am not alone with my heart disease and can share my experiences with it there: talk about surgeries, medications and what not to do because of the disease." Feedback from the parents: -"I learned to focus on the abilities of my child with heart disease instead of the deficits."

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Recommendations for implementation In what way can children with a chronic disease and/ or post-traumatic stress disorders benefit from this best practice?	Regular exercise and sporting activities also lead to a measurable increase in physical performance among children with congenital heart defects. The increase in physical performance is not the main focus. The aim is rather to promote motor development in the sense of holistic physical education, paying particular attention to the interaction of motor development with emotional, psychosocial and cognitive development. Here, there are clearly positive effects with regard to movement coordination, self-esteem, fear of contact and speed of comprehension. Through the educational work of the BVHK, parents and teachers are relieved of the anxiety of holding back children, adolescents and young adults with heart disease in their desire to move. The BVHK is the central contact for the implementation of cardiac sports groups and coordinates the existing offers throughout Germany.
Individualisation and social interaction	
How is the supply adapted to individual needs (participants or beneficiaries)?	The offers are individually adapted to the age and needs of the children. For children who have been hospitalized more often, the competent care and medical accompaniment means a high safety factor. Children with congenital heart defects should experience that they can also be powerful and active within the scope of their possibilities and physical limitations. The majority of children and adolescents do not have to give up physical education and school sports events, but can and should develop self-confidence, courage and body awareness as well as their personality through sports. This happens through the protected framework of the sports groups. The offer aims to give children long-term access to age-appropriate club sports.
Challenges encountered? What has worked? What didn't work?	During the corona pandemic, many activities could not take place. The reconstruction of sports groups and established projects is sometimes difficult.

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In what way this Best Practice promotes social interaction and integration?	The BVHK promotes the integration of children and adolescents with heart disease into society. With the help of an advice hotline, affected families are supported in dealing with authorities, applications for care allowances and legal matters. The association represents the interests of children in the German health care system, in health care policy and is the contact for medical associations. Through networking, there is an exchange of experience among affected parents.
Additional comments or information	None

Annex IV: Best Practices from Greece

General information	
Name/title of the Best Practice	Sports Medicine Laboratory
Period of realisation *[Timeframe of the practice (period/duration). Is it finished?]*	1992 - ongoing
Type *(program, project, activity, event, multimedia, etc.)*	program
Sources of information *(where information can be found about this best practice)*	https://sportsmedlab.gr/en/ & https://www.phed.auth.gr/en/laboratories/laboratory-sport-medicine & https://cardiacrehab.gr//en
Administering organisation *(name & address)*	Department of Physical Education & Sport Science Aristotle University Of Thessaloniki (Thermi, AUTH DPESS, Thessaloniki, 57001)
Provide information: o *Contact details: name & email* o *Certification/accreditation* o *Financing: how is the organization funded?*	Director: Evangelia Kouidi, Professor e-mail: kouidi@phed.auth.gr
Country of origin/Location of the program	Thessaloniki, Greece

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Other countries participating	The Aristotle University of Thessaloniki has participated in many Erasmus+ research programmes with other European countries related to chronic diseases issues from which have gained valuable inputs. Some of them are: GOODRENAL Project (https://goodrenal.eu/), My Way project (https://www.myway-project.org/), Sweaty Hearts (https://www.sweatyhearts.eu/)
Partnerships or collaboration involved (e.g., institutions, organizations, associations, communities)	There are international collaborations with corresponding centers abroad like Lund University and St George's University Hospitals, which knowledge and experience is shared. Also, the implementation of this program is largely based on the support of the Municipality of Thessaloniki with which since 2000 are signed annual cooperation agreements, are also signed by other neighboring Municipalities, such as the Municipality of Evosmos. A multidisciplinary team of trained gymnasts, cardiologists, occupational physiologists, nutritionists and psychologists and social support specialists design individualized therapies and strategies to reintegrate patients into a better quality of life, with better physical fitness and prevention of recurrence to heavier stages and strategies to prevent heart complications and future recurrence of heart attacks (heart attack).
Target group/beneficiaries	• hemorphosis patients • patients with secondary disease • patients with heart disease deficiency • children with oncological diseases • children with building inspection • patients with pulmonary disease • personalized in a disabled body • patients with complete diabetes
Parameters	
Short description of initiative/Best Practice	For the past 25 years, physical rehabilitation programs are being implemented in the Sports Medicine Lab in patients with chronic heart disease and end stage chronic kidney disease under hemodialysis at the AHEPA Hospital's renal unit.

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	The Sports Medicine Laboratory is a modern Laboratory (ISO 2008), with state-of-the-art equipment for the non-invasive evaluation of the cardiorespiratory system. More than 200 patients are trained free of charge each year as part of a program contract with the Municipalities of Thessaloniki and Evosmos in Municipal Gyms and at AHEPA Hospital. Exercise rehabilitation programs are conducted by qualified physical education instructors, under the supervision of members of the Laboratory and in scientific collaboration with Clinics and Laboratories of the Medical School. The programs include exercises, emotional support and lifestyle changes so as to reduce the risk of a disease recurring or developing, such as eating a healthy diet, maintaining a healthy weight, and quitting smoking.
Goals and objectives of initiative/Best practice	The goals of rehabilitation programs include establishing a personalized plan that will help patients regain their stamina and strength, preventing their condition from getting worse, reducing the risk of future complications, improving their health and quality of life.
Key components and activities of initiative/Best practice	The prescription of the exercise is based on the medical status of the patient, the functional competence and the goals of the patient. After initial training in the lab, all patients are exercised in subgroups at municipal gyms. Each subgroup consists of 10 patients, and each exercise session includes various aerobic and static exercises, dance, pilates, zoumba, step-aerobic and hydro-gymnastics. For safety there are telecardiology applications, such as inter-telephone transmission of electrocardiogram from gyms to the Sports Medicine Lab.
Duration of the Best Practice/program	Ongoing program from 1992
Required resources or equipment	N/A
Staffing requirements	N/A
Costs for the participants, if any	The programs are offered free
Services that are/were developed *(i.e. counselling, capacity building, teaching, mentoring, supporting, accompanying,*	Counselling, teaching, mentoring, supporting, training, etc.

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participant involvement in planning and decision making, training, coaching, etc.)	
Evidence and Effectiveness	
Has the Best Practice/program been evaluated?	Yes
If yes: Impact/Results of the Best Practice on the target group/beneficiaries	The staff of the Laboratory has conducted a large number of studies regarding the effect of long-term innovative therapeutic exercise programs and the assessment of anatomical and functional adaptations of exercise in patients. The outcome of these evaluations is reported in researches and publications available on the website. The results concern the improvement of the operation of almost all the systems of the body.
If no: Subjective opinions/comments about the Best Practice/program and its impact on the target group (i.e., from participants, parents; if available)	
Recommendations for implementation In what way can children with a chronic disease and/ or post-traumatic stress disorders benefit from this best practice?	• Improvement of muscle strength and endurance, as patients with chronic diseases experience muscle atrophy due to the disease and motility. • Improving the function of the heart both at rest and in physical exertion. • Prevention or slowing down the course of atherosclerosis by both direct and indirect mechanism (reduction of risk factors. • Better regulation of blood pressure. • Psychological support, reductions of depression, strengthening of the feeling of self-confidence, development of well-being, optimism and self-esteem.
Individualisation and social interaction	
How is the supply adapted to individual needs (participants or beneficiaries)?	The prescription of the exercise is based on the medical status of the patient, the functional competence and the goals of the patient.
Challenges encountered? What has worked? What didn't work?	N/A

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In what way this Best Practice promotes social interaction and integration?	Increasing the capacity for physical work and improving their psychosocial status, makes patients more capable in their daily activity, helps them in their social reintegration, with the end result of improving their quality of life.
Additional comments or information	N/A

General information	
Name/title of the Best Practice	Alliance for Health - Exercise, Developing exercise programs as a means of preventing and rehabilitating chronic diseases - intervention programs
Period of realisation *[Timeframe of the practice (period/duration). Is it finished?]*	2007-2013
Type *(program, project, activity, event, multimedia, etc.)*	program
Sources of information *(where information can be found about this best practice)*	http://www.exerciseforhealth.gr/index.php
Administering organisation *(name & address)*	University of Thessaly, Greece Karies 42100, Trikala
Provide information: o *Contact details: name & email* o *Certification/accreditation* o *Financing: how is the organization funded?*	Vassilios Gerodimos, assistant professor of the Department of Physical Education and Sports at the University of Thessaly bgerom@pe.uth.gr
Country of origin/Location of the program	Greece
Other countries participating	No
Partnerships or collaboration involved (e.g., institutions, organizations, associations, communities)	University of Thessaly, the Ministry of Health and Social Solidarity
Target group/beneficiaries	1) doctors, health professionals (physiotherapists, nurses etc.) and exercise professionals, 2) normal - healthy population and people with chronic diseases,

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	3) public and private providers of health and exercise services (regions, municipalities, hospitals, health centers, rehabilitation centers, gyms, etc.).
Parameters	
Short description of initiative/Best Practice	In Greece, both the organization of exercise programs for the prevention and rehabilitation of chronic diseases, as well as the participation of the population itself in such activities, are limited. Considering the above, this program was designed to promote the importance of exercise as a means of preventing and rehabilitating chronic diseases.
Goals and objectives of initiative/Best practice	The program aims to promote the importance of exercise as a means of preventing and rehabilitating chronic diseases
Key components and activities of initiative/Best practice	Program includes five actions: 1. Development and production of a Book with exercise guidelines for healthy people and people with chronic diseases. 2. Construction of a website (www.exerciseforhealth.gr) related to exercise and health. 3. Networking of public, municipal and private bodies that offered health and exercise services. 4. Four training seminars, which were addressed to doctors, health and exercise professionals, on the subject of exercise as a means of preventing and rehabilitating chronic diseases. 5. "Exercise Days" (one per Region). At this event, visitors have been informed about the beneficial effects of exercise on health. They had the opportunity to try different forms of exercise depending on the "profile", but also to be evaluated on various indicators of health and fitness.
Duration of the Best Practice/program	2007-2013
Required resources or equipment	N/A
Staffing requirements	N/A
Costs for the participants, if any	free

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Services that are/were developed *(i.e. counselling, capacity building, teaching, mentoring, supporting, accompanying, participant involvement in planning and decision making, training, coaching, etc.)*	capacity building, mentoring, supporting, accompanying, training, education, teaching, events, etc. Training resources and educational material for both professionals and general audience (beneficiaries): http://www.exerciseforhealth.gr/index.php?mod=content&cid=plithismos & http://www.exerciseforhealth.gr/index.php?mod=content&cid=epagelmaties
Evidence and Effectiveness	
Has the Best Practice/program been evaluated?	During the "Exercise Days" event (one per Region) have been informed about the beneficial effects of exercise on health. They also had the opportunity to try different forms of exercise depending on the "profile", but also to be evaluated on various indicators of health and fitness.
If yes: Impact/Results of the Best Practice on the target group/beneficiaries	N/A
If no: Subjective opinions/comments about the Best Practice/program and its impact on the target group (i.e., from participants, parents; if available)	N/A
Recommendations for implementation In what way can children with a chronic disease and/ or post-traumatic stress disorders benefit from this best practice?	Childhood is a special period of human life, characterized by rapid changes at the physical, mental and psychological level. It is important to emphasize that, in this age period, habits or attitudes are adopted (regarding physical activity and nutrition), which may affect our health in the future, positively or negatively. Physical activity and exercise are inextricably linked to the balanced and harmonious development of children.
Individualisation and social interaction	
How is the supply adapted to individual needs (participants or beneficiaries)?	It was considered necessary to evaluate the athletes, before starting an exercise program, in order to ensure the correspondence between the exercise program and the capabilities of the participants. The evaluation process included a) medical examination and recording

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	of medical history and b) evaluation of the functional capacity and physical condition (endurance, strength, mobility, etc.) of the participants.
Challenges encountered? What has worked? What didn't work?	Not any
In what way this Best Practice promotes social interaction and integration?	All events and implemented activities promoted fun, valuable life skills, teamwork spirit, relationship development. In that created environment, children experienced joy of athletics without excessive pressures and they created friends.
Additional comments or information	N/A

General information	
Name/title of the Best Practice	Healthy Kids
Period of realisation *[Timeframe of the practice (period/duration). Is it finished?]*	2007 - ongoing
Type *(program, project, activity, event, multimedia, etc.)*	Website and social media
Sources of information *(where information can be found about this best practice)*	http://www.healthykids.gr/cms/ & https://www.facebook.com/HealthykidsGR/?ref=embed_page
Administering organisation *(name & address)*	The Department of Physical Education and Sport Science, University of Thessaly Karies 42100, Trikala
Provide information: o *Contact details: name & email* o *Certification/accreditation* o *Financing: how is the organization funded?*	Dr Vassiios Gerodimos Healthykids@pe.uth.gr
Country of origin/Location of the program	Greece
Other countries participating	No
Partnerships or collaboration involved (e.g., institutions, organizations, associations, communities)	No

Target group/beneficiaries	Children and general population
Parameters	
Short description of initiative/Best Practice	The "healthykids" actions were started in 2007 by scientists of various cognitive areas, with Dr. Vasilios Gerodimos, Assistant Professor and aims, through continuous information and education, to adopt healthy exercise and diet behaviors by the Greek population. Through the website, the e-magazine, exercise days, summer camp, educational health education programs and speeches in schools and other organizations, the scientific team promotes lifelong exercise and healthy eating.
Goals and objectives of initiative/Best practice	The mission of the program is to improve nutrition and the adoption of daily physical activity by students and in general by all residents of Western Thessaly, through scientifically documented information and continuous education. • Informing students about the modern dimensions that Physical Education and sports have taken, as well as the applications of IT in this field. • The awareness of students, parents and teachers on issues, according to the most modern scientific findings that link exercise and physical activity with health and quality of life. • The education of the specific population groups, in proposed physical activities and indicated nutritional and healthy habits. • Familiarizing the public with the use of the internet to find information on exercise - sports and health education.
Key components and activities of initiative/Best practice	• Evaluation of the levels of childhood obesity, eating habits and physical activity of students of the 5th grade, selected by sampling from primary schools in the prefectures of Trikala and Karditsa. • Construction of a relevant website, with health education topics, advice and standard exercise and nutrition programs, links to other relevant websites on the world wide web.

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	• Publication and distribution of an information sheet, with scientific topics and suggestions for practical application regarding: a) physical activity b) nutrition and c) healthy behaviors in daily life. • Conducting two Scientific Conferences, which were addressed to the parents and students of the two prefectures.
Duration of the Best Practice/program	2007 - ongoing
Required resources or equipment	N/A
Staffing requirements	N/A
Costs for the participants, if any	N/A
Services that are/were developed *(i.e. counselling, capacity building, teaching, mentoring, supporting, accompanying, participant involvement in planning and decision making, training, coaching, etc.)*	Teaching, mentoring, educational resources, trainings, events, etc.
Evidence and Effectiveness	
Has the Best Practice/program been evaluated?	No
If yes: Impact/Results of the Best Practice on the target group/beneficiaries	
If no: Subjective opinions/comments about the Best Practice/program and its impact on the target group (i.e., from participants, parents; if available)	Very positive comments on the social media. Also, the great impact of this initiative is obvious from the high participation of children, family members and friends in various organised athletic events, trips, etc as well as through the high participation of children in the summer camp.
Recommendations for implementation In what way can children with a chronic disease and/ or post-traumatic stress disorders benefit from this best practice?	Through various dedicated for this target group athletic activities that are offered. Children can find joy through physical activities and from interaction with their peers.
Individualisation and social interaction	
How is the supply adapted to individual needs (participants or beneficiaries)?	Individual needs have been identified through evaluation surveys contacted in the school population and through research.
Challenges encountered? What has worked? What didn't work?	N/A

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In what way this Best Practice promotes social interaction and integration?	Through info days, various outdoor activities and events, organisation of trips, the summer club school, workshops and webinars that are provided, etc. People can come closer to each other, share views, exchange experience, etc.
Additional comments or information	Many researches have been carried out through relevant surveys in the school population of Western Thessaly, with the aim of detecting the existing situation regarding: • childhood obesity (measurements of body mass, height, calculation of the Body Mass Index). • children's eating habits (with a specially designed questionnaire). • children's physical activity (with a specially designed questionnaire). Questionnaires and results are uploaded on the site.

Annex V: Best Practices from Portugal

General information	
Name/title of the Best Practice	Resistentes [Resistants]
Period of realisation *[Timeframe of the practice (period/duration). Is it finished?]*	2012 to present day
Type *(program, project, activity, event, multimedia, etc.)*	Project
Sources of information *(where information can be found about this best practice)*	https://www.ligacontracancro.pt/resistentes/ https://www.facebook.com/resistenteslpcc https://www.instagram.com/resistentes_lpccnrn/
Administering organisation *(name & address)*	Liga Portuguesa Contra o Cancro [Portuguese Association Against Cancer] Av. Columbano Bordalo Pinheiro 57-3°F, 1070-061 Lisboa
Provide information: o *Contact details: name & email* o *Certification/accreditation* o *Financing: how is the organisation funded?*	Liga Portuguesa Contra o Cancro; info@ligacontracancro.pt None Donations; association fees
Country of origin/Location of the program	Portugal
Other countries participating	None

Partnerships or collaboration involved (e.g., institutions, organizations, associations, communities)	North Regional Nucleus of Liga Portuguesa Contra o Cancro; Paediatric Service of the Portuguese Institute of Oncology in Oporto; National Association of Football Coaches
Target group/beneficiaries	Children with cancer
Parameters	
Short description of initiative/Best Practice	The main activity is to provide football lessons to children and adolescents with cancer. Other activities, such as tours, parties and events, are also provided.
Goals and objectives of initiative/Best practice	- Provide sports practice to children and adolescents, users of the Paediatrics Service; - Strengthen the self-esteem of children and adolescents with cancer; - Promote moments of conviviality between the families of these children and adolescents; - Establish contacts and interact with Sports Groups; - Offering scholarships for children and adolescents with cancer; - Provide social support for children and adolescents with cancer; - Support for paediatric cancer research.
Key components and activities of initiative/Best practice	Physical activity through structured football lessons.
Duration of the Best Practice/program	2012 to present day
Required resources or equipment	Sportswear, football/futsal pitch and balls.
Staffing requirements	None (usually football coaches from any level)
Costs for the participants, if any	Information not available.
Services that are/were developed *(i.e. counselling, capacity building, teaching, mentoring, supporting, accompanying, participant involvement in planning and decision making, training, coaching, etc.)*	Training, teaching, counselling, capacity building and supporting.
Evidence and Effectiveness	
Has the Best Practice/program been evaluated?	No
If yes: Impact/Results of the Best Practice on the target group/beneficiaries	n/a

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If no: Subjective opinions/comments about the Best Practice/program and its impact on the target group (i.e., from participants, parents; if available)	The project is well-established in the north region of Portugal and the activities are relevant and seemingly appropriate. However, no information about frequency and duration of the activities was found.
Recommendations for implementation In what way can children with a chronic disease and/ or post-traumatic stress disorders benefit from this best practice?	By improving their physical activity levels, socialize with other children in the sporting context and having fun.
Individualisation and social interaction	
How is the supply adapted to individual needs (participants or beneficiaries)?	Information not available. However, it is expected that activities are planned considering the individuals intensity threshold, since a national coaching association is involved.
Challenges encountered? What has worked? What didn't work?	Information not available.
In what way this Best Practice promotes social interaction and integration?	By organizing group training sessions and other social activities.
Additional comments or information	None

General information	
Name/title of the Best Practice	Espaço Familiar/Sala de brincar [Family space/Playroom] (+ physical activity sessions)
Period of realisation *[Timeframe of the practice (period/duration). Is it finished?]*	2013 to present day (+ from May 2022 to unclear timing)
Type *(program, project, activity, event, multimedia, etc.)*	Program (+ project)
Sources of information *(where information can be found about this best practice)*	https://fundacaoronaldmcdonald.com/venha-conhecer-nos/os-nossos-projectos/sala-de-brincar-ronald-mcdonald/ https://www.sns.gov.pt/noticias/2022/05/06/projeto-para-criancas-internadas/ https://www.facebook.com/fundacaoronaldmcdonald/?ref=page_internal
Administering organisation *(name & address)*	Fundação Infantil Ronald McDonald [Ronal McDonald's Children Foundation]; Lagoas Park, Edifício 7 – Piso 2 2740-244 Porto Salvo

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Provide information: o *Contact details: name & email* o *Certification/accreditation* o *Financing: how is the organisation funded?*	Fundação Infantil Ronald McDonald; fundacao.infantil@pt.mcd.com None Donations
Country of origin/Location of the program	USA/Portugal
Other countries participating	64 other countries worldwide
Partnerships or collaboration involved (e.g., institutions, organizations, associations, communities)	Santa Maria Hospital (Lisbon); São João Hospital (Oporto); dance studios
Target group/beneficiaries	Children inpatients in the Paediatric Service of the Santa Maria Hospital (Lisbon) and São João Hospital (Oporto) and their parents.
Parameters	
Short description of initiative/Best Practice	The family space/playroom is a program that provides a room in the hospital for children to play (it can be physical activity or other activity, such as arts, videogames, and others) every day from 8:00 to 20:00. Every Monday at 15:00, the family space/playroom provides physical activity sessions (e.g., dance, tennis, yoga, golf) for children and their parents.
Goals and objectives of initiative/Best practice	- Promote positive experiences, through fun and relaxation; - Maintain the children's school routine during the hospital period; - Reduce stress for children and families; - Improve sleep quality; - Improve the way children and parents cope with the hospital situation; - Reduce post-traumatic stress.
Key components and activities of initiative/Best practice	Snoezelen room; physical activity area; play area.
Duration of the Best Practice/program	2013 to present day (+ from May 2022 to unclear timing, for the physical activity sessions)
Required resources or equipment	Large room in the hospital, toys, balls, mattresses, tables, chairs, drawing material, rackets, and others.
Staffing requirements	Teacher or volunteer to dynamize activities and supervise room.
Costs for the participants, if any	None

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Services that are/were developed *(i.e. counselling, capacity building, teaching, mentoring, supporting, accompanying, participant involvement in planning and decision making, training, coaching, etc.)*	Training, teaching, counselling, capacity building and supporting.
Evidence and Effectiveness	
Has the Best Practice/program been evaluated?	No
If yes: Impact/Results of the Best Practice on the target group/beneficiaries	n/a
If no: Subjective opinions/comments about the Best Practice/program and its impact on the target group (i.e., from participants, parents; if available)	The Family space/Playroom is an important program supporting hospitalized children and their parents. Its impact in this population is relevant and renowned by the community. Its physical activity component is less known and clear. However, providing different physical activities once a week for free among hospitalized children is a good example on how to make a difference.
Recommendations for implementation In what way can children with a chronic disease and/ or post-traumatic stress disorders benefit from this best practice?	Essentially by having fun, socializing, and moving. Having a space that take their minds from the hospital setting.
Individualisation and social interaction	
How is the supply adapted to individual needs (participants or beneficiaries)?	Information not available.
Challenges encountered? What has worked? What didn't work?	Information not available.
In what way this Best Practice promotes social interaction and integration?	By bringing children together under the play paradigm and by organizing physical activity sessions every Monday for children and their family.
Additional comments or information	None

General information	
Name/title of the Best Practice	TiChroN virtual pet
Period of realisation *[Timeframe of the practice (period/duration). Is it finished?]*	2019-2022 (the app is still available)

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Type *(program, project, activity, event, multimedia, etc.)*	Project (multimedia - APP)
Sources of information *(where information can be found about this best practice)*	https://interreg-sudoe.eu/prt/comunicacao/atualidade-sudoe/359-anos-de-interreg-tichron-uma-maneira-de-melhorar-o-dia-a-dia-de-criancas-com-doencas-cronicas https://www.facebook.com/tichron/ https://play.google.com/store/apps/details?id=org.fundacionctic.tichron&hl=pt&gl=US&pli=1
Administering organisation *(name & address)*	Universidade do Minho (PT partner); Largo do Paço 4704-553 Braga (PT partner address)
Provide information: o *Contact details: name & email* o *Certification/accreditation* o *Financing: how is the organisation funded?*	Universidade do Minho (PT partner); sudoetichron@gmail.com (consortium email) None EU funding (for the project)
Country of origin/Location of the program	Available online in English, Spanish, French and Portuguese
Other countries participating	France and Spain
Partnerships or collaboration involved (e.g., institutions, organizations, associations, communities)	CTIC – Centro Tecnológico (ES), ACCOMIP / REPOP – Association de Prise en charge concertée des obésités en Midi-Pyrénées (FR), MEDES (FR), SCS-IDIVAL – Cantabrian Health Service (ES), Future Balloons (PT)
Target group/beneficiaries	Children with obesity, diabetes and asthma
Parameters	
Short description of initiative/Best Practice	Development of an application to improve monitoring of chronic illnesses in children.
Goals and objectives of initiative/Best practice	The objective of TiChroN is to improve the comprehensive care of children and teenagers with chronic diseases through the design and implementation of new technologies that: - Allow the empowerment of children and teenagers regarding their own health care; - Develop within the educational areas a positive atmosphere, where the health and well-being of children and teenagers with chronic pathologies are systematically supported and promoted; - Improve the results in the state of health of children and teenagers with chronic diseases, minimizing the

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	impact on their daily lives and normalizing the clinical and vital process.
Key components and activities of initiative/Best practice	Four tools are developed: a game, an e-learning platform, a bot and a tele-consultation system.
Duration of the Best Practice/program	2019-2022 (the app is still available)
Required resources or equipment	Smartphone
Staffing requirements	None
Costs for the participants, if any	None
Services that are/were developed *(i.e. counselling, capacity building, teaching, mentoring, supporting, accompanying, participant involvement in planning and decision making, training, coaching, etc.)*	Counselling, capacity building and participant involvement in planning and decision making.
Evidence and Effectiveness	
Has the Best Practice/program been evaluated?	Information not available
If yes: Impact/Results of the Best Practice on the target group/beneficiaries	n/a
If no: Subjective opinions/comments about the Best Practice/program and its impact on the target group (i.e., from participants, parents; if available)	The potential is great as children may increase their health literacy in a fun way. However, it is limited to theoretical knowledge and its practical usage may be questionable.
Recommendations for implementation In what way can children with a chronic disease and/ or post-traumatic stress disorders benefit from this best practice?	The project provides children, families, and caregivers with optimized tools for care and early action in case of the appearance of anomalies in their health status. This includes information about physical activity.
Individualisation and social interaction	
How is the supply adapted to individual needs (participants or beneficiaries)?	The APP is individualized by disease (obesity, diabetes, and asthma) and the bot AI considers the children responses adapting to their needs.
Challenges encountered? What has worked? What didn't work?	Information not available.
In what way this Best Practice promotes social interaction and integration?	It does not. It is focused on self-care.
Additional comments or information	None

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