world abilitysport

Conference Abstracts

2023 World Abilitysport Conference on Physical Activity for Health for People with Cerebral Palsy and other Neurological Conditions

Edinburgh 20-21 October 2023

Day 1: Friday the 20th of October

1. **Identifying and prioritising strategies to optimise community gym participation for young adults with cerebral palsy: an e-Delphi study**

Ms Georgia McKenzie (presenter), Dr Claire Willis, Ms Alexa Yao, Ms Freya Munzel, Dr Rachel Kennedy, Prof Nora Shields

La Trobe University, Melbourne, Australia, and Murdoch Children's Research Institute, Melbourne, Australia

Objectives/Aims

Community gyms are a preferred, safe and feasible space to be exercising for young adults with cerebral palsy, yet participation rates remain low. This study aimed to identify and prioritise strategies to optimise physical activity participation in the community gym setting for young adults with cerebral palsy.

Design/Summary

With two consumer research partners, an e-Delphi method was conducted over three rounds with four stakeholder groups (young adults with cerebral palsy, their families, gym or exercise professionals, and health professionals).

Method/Justification

Strategies for change were identified by stakeholders in round 1. In rounds 2 and 3, strategies for change were rated on importance for implementation using a 7-point Likert scale (1 being lowest importance, 7 being highest). Consensus was achieved if ≥70% of participants identified a strategy as high importance.

Results

Seventy participants (20 young adults, 10 family members, 19 exercise professionals, 21 health professionals) identified 83 strategies for improving gym participation. Of these, 44 strategies met consensus for 'high importance'. The highest priority strategies related to changing the physical environment, addressing cost barriers, gym staff training, and developing partnerships between sectors.

Conclusion

Addressing physical accessibility of gym environments, cost of attendance, and gym staff skills and support were agreed by the stakeholder groups as priorities in future resource allocation and research translation. Social support in the gym was important to young adults but further research is needed to identify how to best operationalise its provision.Clinicians and community leisure facilities must work with consumers to implement strategies in their local contexts.

2. Exploring the needs and wants of adults with cerebral palsy who use wheelchairs to participate in physical activity - A qualitative study

Mr James Czencz1, Assoc Prof. Margaret Wallen2, Prof. Peter H Wilson1, Prof. Christine Imms3

1Healthy Brain and Mind Research Centre, School of Behavioural and Health Sciences, Australian Catholic University, Melbourne, Australia; 2School of Allied Health, Faculty of Health Sciences, Australian Catholic University, North Sydney, Australia; 3Healthy Trajectories: Child and Youth Disability Research Hub, The University of Melbourne, Murdoch Children's Research Institute, Melbourne, Australia

Objectives/Aims

This study explores the perspectives of adults with cerebral palsy (CP) who use wheelchairs, and their support persons, regarding their wants and needs for physical activity. Adults with more severe CP are underrepresented in the literature and guidance on physical activity is sparse . The goal is to improve well-being and participation in aspects of life important to adults with CP who use wheelchairs.

Design/Summary

Qualitative research using interpretive description.

Method/Justification

5 adults with CP and 4 support persons, including workers and parents, have so far participated in semi-structured interviews. Recruitment remains ongoing. Interviews are audio recorded and transcribed verbatim. Researchers are conducting reflexive inductive thematic analysis of the transcripts to identify themes.

Results

Preliminary analysis suggests that individuals with CP who use wheelchairs have a strong desire to engage in physical activity and seek inclusive options tailored to their needs in their community. Lack of inclusive options, society bias and misconception regarding disability, as well as physical limitations, often lead to feelings of exclusion. Participants found adaptive equipment facilitated participation in physical activities. Taking part in physical activity has numerous health benefits which were subjectively reported and include reduction in pain, and fatigue as well as enhancing day-to-day life, improved social connections, and enabling independence. Participants emphasised the need for more physical activity options for individuals who used wheelchairs.

Conclusion

Early findings show the importance of providing inclusive options to promote physical activity for individuals with CP who use wheelchairs. Themes generated from this study will guide practical, effective, and acceptable physical activity interventions for adults with CP who use wheelchairs.

James Czencz, Nora Shields, Margaret Wallen, Peter H. Wilson, Thomas B. McGuckian & Christine Imms (2022) Does exercise affect quality of life and participation of adolescents and adults with cerebral palsy: a systematic review, Disability and Rehabilitation, DOI: 10.1080/09638288.2022.2148297

3. **Aerobic exercise in adolescents and adults with cerebral palsy show altered systemic metabolic responses**

Sudarshan Dayanidhi, Guadalupe Meza, Stefan Reitzner, Sebastian Edman, Linnea Corell, Annika Kruse, Emma Hjalmarson, Rodrigo Fernandez-Gonzalo, Jessica Norrbom, Ferdinand Von Walden

Shirley Ryan AbilityLab, Chicago, USA; Karolinska Institute, Stockholm, Sweden

Objectives/Aims

Adolescents and adults with cerebral palsy (CP) have significantly increased sedentary behaviors and are at increased risk for reduced metabolic health with aging compared to typical developing (TD) individuals. Exercise is an effective way to improve metabolic health. Consequently, we wanted to evaluate the effect of a one-time aerobic exercise bout on systemic (peripheral blood mononuclear cell) metabolism in individuals with cerebral palsy

Design/Summary

Prospective interventional study

Method/Justification

Forty-six subjects participated in this study (TD 30, CP 17). Both groups were an average of 23 years of age (TD 23.5 (9.6), CP 23.3 (6.5)). All subjects participated in a 45-minute aerobic exercise bout of either running (TD) or frame running (CP) at an perceived exertion of 15-16 on the Borg scale. Physical activity measures were measured at baseline and blood-based lactate measures, venous blood gas exchange, blood draws were performed at baseline, immediately post-exercise and after an hour of recovery. Peripheral blood mononuclear cells (PMBCs) were isolated at these three timepoints using standard methods and stored in liquid nitrogen. PBMCs were thawed gently, cells counted and high-resolution respirometry was performed using standard protocols for carbohydrate metabolism. Maximal respiration (phosphorylation capacity) of PBMCs were measured in the presence of substrates for mitochondrial electron transport chain complex I+II-mediated respiration. One-way ANOVAs and pairwise T-tests were used for comparing different timepoints.

Results

Preliminary results are reported for seventeen subjects (8-9/group). Maximal phosphorylation capacity of PBMCs in TD increased across the three timepoints (Baseline 23 (8), Exercise 25 (8), Recovery 46(16)) pmol O2/million cells/s, $p<0.05$). In individuals with CP PBMCs respiration did not show a similar increase (Baseline 33 (12), Exercise 23 (6), Recovery 35(10) pmol O2/million cells/s). However, PBMC respiration immediately after exercise was significantly lower compared to an hour after exercise ($p<0.05$).

Conclusion

Individuals with cerebral palsy show altered systemic metabolism in response to aerobic exercise. Further research is needed on cellular responses to aerobic exercise in individuals with CP.

4. Altered ventilatory response to incremental exercise in individuals with cerebral palsy

Linnéa Corell1, Emma Hjalmarsson1, Rodrigo Fernandez-Gonzalo2, Jessica Norrbom3, Annika Kruse1, Eva Pontén1, Ferdinand von Walden1

1Department of Women´s and Children´s Health, Karolinska Institutet, Stockholm, 2Department of Laboratory Medicine, Karolinska Institutet, Stockholm, 3Department of Physiology and Pharmacology, Karolinska Institutet, Stockholm

Objectives/Aims

This study aimed to investigate the ventilatory response to incremental exercise with gradually increasing load in individuals with cerebral palsy (CP) compared to typically developed (TD) controls.

Design/Summary

Cerebral palsy is the most common motor dysfunction during childhood. Previous studies have shown that individuals with CP have reduced maximal oxygen uptake in comparison to TD controls. In this study, the cardiorespiratory response is evaluated during an incremental exercise bout performed on a wide treadmill with a Frame Runner for CP or on a regular treadmill for TD.

Method/Justification

Fourteen (6 male) individuals with CP, Gross Motor Function Classification System (GMFCS) level II/III/IV/V (n=1/5/7/1), and 30 (14 male) TD participants performed a lactate threshold test. Blood lactate, pCO2 and cardiorespiratory parameters including heart rate (HR), respiratory frequency (RF), tidal volume (VT), minute ventilation (VE) and ventilatory efficiency (VE/VCO2) were measured. Data was analyzed using a repeated mixed model.

Results

Our results show that individuals with CP have decreased VE ($p=0.006$) despite increased RF at a given intensity compared to TD ($p=0.01$). In addition, the CP group had a higher VE/VCO2 ratio ($p<0.0001$) throughout the test. The two groups behaved differently regarding lactate ($p=0.0003$) and pCO2 ($p=0.07$) during the test.

Conclusion

This study suggests that individuals with CP have a deficient ventilatory response to incremental exercise with gradually increasing load with increased RF, low VE, and a tendency for pCO2 accumulation in comparison to TD. The reduced ventilatory function during incremental exercise implies the importance of training interventions for individuals with CP. As a complement to physical activity, we suggest that respiratory exercises should be included in order to improve ventilatory function.

5. A systematic review of the effectiveness of lifestyle interventions for YPwCP cerebral palsy to improve physical health and cognitive outcomes

Jo Cossington, Thomas Mitaras, Liana Nagy, Helen Dawes, Shelly Coe

Oxford Brookes University and the University of Exeter

Objectives/Aims

The objective of this systematic review was to explore the evidence for the most effective nutrition and physical activity (PA) interventions for children and young people with cerebral palsy (CP) that physical health and cognitive outcomes.

Design/Summary

This review followed the Preferred Reporting Items for Systematic Review and Meta-Analysis guidelines.

Method/Justification A search of the electronic databases MEDLINE, CINAHL and PubMed was conducted for original articles (January 2022, updated May 2023). Searches were restricted to quantitative studies that included children and adolescents (6-18 years old) with a diagnosis of CP. Studies included were those that could be considered lifestyle interventions and had PA and/or dietary components with outcomes that benefit physiological health and cognitive outcomes and could be implemented in home and/or in school settings. Two reviewers independently screened titles and abstracts of the articles based on the inclusion/ exclusion criteria. Covidence software enabled blinding between the reviewers. Full text screening determined eligible studies.

Results The searches resulted in 5413 studies, 5382 were excluded, 31 studies remained for full-text screening and 16 met inclusion criteria. Quality checks identified one study as being low quality, leaving 15 for narrative synthesis. Thirteen of these studies focused on PA and three on nutrition. Two nutrition studies found vitamin D levels significantly increased from baseline to end of the interventions. Additionally, Theis found leucine was effective in increasing muscle strength and volume. Heterogeneity across the PA studies made it difficult to compare effectiveness due to very different methods and outcomes. A 9-week treadmill walking program found improvement in participants' aerobic capacity with significant changes in heart rate during sessions. An online cycling program also saw an increase in cardiovascular fitness post-intervention. Similarly, walking and leg ergometer exercise programs led to significant improvements in cardiorespiratory adaptation and VO2 increase. Active video game play with intensity over 40% of heart rate reserve also showed a positive effect on cognitive function. Strength training programs ranging from 8 weeks to 6 months resulted in increases in bone health, knee strength, and flexibility. Combining aerobic and strength programs led to improvements in strength and submaximal absolute and relative VO2. However, an 8-month aerobic and anaerobic program saw a decrease in capacity and muscle strength at 4-months follow-up.

Conclusion Due to the heterogeneity of the studies conclusions about the effectiveness of the programs cannot be made. Further high-quality studies are required to needed to determine the impact of physical activity and nutrition on physiological health outcomes. Additionally, this review highlighted the lack of nutrition and dietary studies in this population group.

Kilpinen-Loisa, P., Nenonen, H., Pihko, H., & Mäkitie, O. (2007). High-dose vitamin D supplementation in children with cerebral palsy or neuromuscular disorder. Neuropediatrics, 38(4), 167–172. https://doi.org/10.1055/s-2007-990266

Karagiannis, A., Nisiotou, J., Challa, A., & Moulas, A. N. (2021). Use of Vitamin D Bolus in Fortified Juice for Improving Vitamin D Status in Children with Cerebral Palsy. Advances in experimental medicine and biology, 1339, 257–264. https://doi.org/10.1007/978-3-030-78787-5_31

6. "Youth Experience Matters": development of a Delphi study on priorities for participation in physical activity by adolescents with physical disability

*Karen Brady 1,2, Damien Kiernan1, Elaine McConkey1, Eva O'Gorman1, Suzanne McDonough2, Claire Kerr3, Jennifer Ryan2, *Ailish Malone2*

1Central Remedial Clinic, Vernon Avenue, Clontarf, Dublin 3 Ireland; 2RCSI University of Medicine and Health Sciences, 123 St Stephen's Green, Dublin 2, Ireland; 3Queen's University Belfast, University Road. Belfast. BT7 1NN

Objectives/Aims

Youth Experience Matters aims to understand "what really matters" for participating in physical activity, from the perspectives of adolescents with physical disability.

The objective of this presentation is to share experience on developing and raising awareness of a national Delphi consensus study, through involvement of 1) patients and the public, 2) clinical services, 3) the wider community of sporting organisations, disability support groups and charities. "

Design/Summary

"Youth Experience Matters: Participation in physical activity - what really matters to adolescents with physical disability" is a national study of adolescents aged 13-17 with physical disability in Ireland, aiming to describe current participation in physical activity and achieve consensus on the "top 10 priorities" for participation in physical activity, as developed and chosen by the young people themselves. The study is ongoing. This presentation will focus on public, patient, professional and stakeholder involvement in developing the protocol, raising awareness for recruitment, and bridging between clinical and community services and support networks. Specific strategies included the development of the study's website, visits to clinical sites and sporting events, an "interactive wall" with a rotating weekly question where young people could share their views visually, podcasts / radio shows, and social media led by the clinical and academic partners. When the study is concluded, the consensus on "top 10 priorities" will provide a basis for developing interventions aiming to empower, encourage, and sustain future physical activity participation in a meaningful way by young people with physical disability.

Method/Justification

Building links between community and sporting organisations, and clinical services, is crucial for research that aims to improve and sustain participation by young people with physical disabilities, so that they can gain the health and participatory benefits of physical activity. We hope that this presentation will be interesting and useful to others who are developing research projects on participation.

7. Action Observation for an inclusive sport motor learning in childhood

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Objectives/Aims

We aim to conceive, by means of literature revision, an evidence-based model for promoting inclusive motor learning of sport skills in children with typical development and cerebral palsy (CP)

Design/Summary

It is a critical discourse analysis based on a literature scoping review.

Method/Justification

We have carried out a scoping review based on the use of imitation learning model in sport and the use of action observation in children with CP.

Results

Sports provide a very interesting arena to study Action Observation (AO) effects on learning outcomes as well as neurobiological mechanisms that mediate or might explain these outcomes, as the mirror neuron system. From the literature, we know that there is growing evidence about the use of the observational practice by coaches and teachers for improving and enhancing motor skills. Several studies have reported how the physical performance of baseball, basket, gymnastics, or tennis athletes can be enhanced after AO training [1]. Although within sports it has been used only in children and/or adults with TD, the AO training it is recommended also for the improvement of motor function in in children with CP [2], since it has shown to be an effective rehabilitative approach [3] despite this, the AO has never been used in the sport learning in children with CP.

Conclusion

The converging evidence of the crucial role of the action observation in motor learning in sport skills in typically developing children and in motor function in children with CP, open a new research frontier on the use of AO as an inclusive model for promoting motor learning of sport skills.

[1]De Stefani et al, 2020, PLoS ONE 15(8): e0237697. DOI: 10.1371/journal.pone.0237697; [2]Sgandurra et al, 2013, Neurorehabil Neural Repair. 2013, 27(9):808-815. DOI: 10.1177/154596831349710; [3]Novak et al. Curr Neurol Neurosci Rep. 2020;20(2):3. doi:10.1007/s11910-020-1022-z

8. Running Free: The Impact of Frame Running on the Perceived Psychosocial Wellbeing and Quality of Life of Experienced Athletes with Cerebral Palsy (CP)

Dr Hamish Johnson; Dr Martine Verheul; Dr Amanda Martindale

Human Performance Science Research Group, University of Edinburgh

Objectives/Aims

For experienced athletes with disabilities, including CP, there is little research investigating the impact of sport participation on their psychosocial wellbeing and quality of life, and currently no research exploring the impact of frame running. The purpose of this study was to provide initial insight into the perceived impact of frame running participation on the psychosocial wellbeing and quality of life of experienced athletes.

Design/Summary

A cross sectional qualitative research design.

Method/Justification

Nine participants with CP, who varied in frame running experience and competitive level (i.e., local to international competitions) completed a web-based survey consisting of open-ended questions related to constructs of psychosocial wellbeing and quality of life. A hybrid of qualitative analysis methods was used, with each response analysed using thematic analysis, incorporating an inductive, and then deductive approach using the ICF framework.

Results

The results suggest that frame running participation has had and continues to have a positive influence on the athletes' psychosocial wellbeing and quality of life. The athletes reported new and enhanced life experiences through frame running and highlighted the importance of frame running socially. Participation was reported to provide the opportunity to build and develop friendships worldwide giving a sense of inclusion, belonging, and enabling social confidence, and thus enhancing social development. Furthermore, athletes perceived participation to have enhanced their psychological development with improved self-esteem, development of self-concept and self-confidence, which were reported to positively impact quality of life and health outcomes.

Conclusion

Frame running participation is perceived to have a positive influence on athlete's social and psychological development which can be important for the athlete's quality of life. Future longitudinal research investigating the psychological impact of would be frame running would be beneficial for the sport and add to the growing frame running literature base.

9. Classification in Para Sport: From Idea to Implementation

Martine Verheul1, Nicola Tennant2, Craig Carscadden3, Marietta van der Linden4

1Human Performance Science, The University of Edinburgh, 2Frame Running Scotland, 3World Abilitysport, 4Centre for Health, Activity and Rehabilitation Research, Queen Margaret University

Objectives/Aims

The aim of this study is to illustrate and reflect on the classification research and translation process, using the example of frame running.

Design/Summary

Critical Reflection Action Research

Method/Justification

Classification is fundamental to fair competition in disability sports. Traditionally, in the absence of evidence on the impact of impairments on sports performance, classes were often based on medical opinion. In 2007, the International Paralympic Committee stated that sports classes should be based on scientific evidence, which spurred a rapidly growing area of inter-disciplinary research.

Since then, a growing number of academics have worked closely with international sport federations (ISFs) and/or international organisations of sports for the disabled (IOSDs) to review and improve or replace existing classification systems. Most of this work has been guided by the research framework for evidence-based classification (Tweedy and Vanlandewijck, 2011; Tweedy et al., 2014).

Results

This presentation will focus on the para athletics event of frame running and will describe how scientific evidence was gathered and translated into a new classification system, and how this classification system was implemented after training of classifiers. The presentation will reflect on challenges experienced and highlight the importance of dialogue between various stakeholder groups.

Conclusion

Developing or improving a classification system is critically dependent on inter-disciplinary collaboration throughout the process, from initial planning to implementation.

Tweedy, S.M., Vanlandewijck, Y.C. (2011). International Paralympic Committee position stand—background and scientific principles of classification in Paralympic sport. British Journal of Sports Medicine, 45, 259-269.

Tweedy, S.M., Beckman, E.M. and Connick, M.J. (2014), Paralympic Classification: Conceptual Basis, Current Methods, and Research Update. PM&R, 6, S11-S17. DOI: 10.1016/j.pmrj.2014.04.013

10. Standardised and on-court activities in Wheelchairrugby, comparison between athletes with Cerebral Palsy and athletes with other health conditions

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1Klimmendaal, Arnhem, The Netherlands; 2Technical University Delft, The Netherlands; 3World Wheelchair Rugby; 4Peter Harrison Centre for Disability Sport, Loughborough, UK; 5Department of Rehabilitation, Radboud University Medical Center, Donders Institute for Brain, Cognition and Behaviour, Nijmegen, Netherlands

Objectives/Aims

Compare standardised activities in athletes with coordination impairment (CI) with athletes with other impairment types, who compete in the same sports class. Hypothesis: based on the current classification rules in wheelchairrugby, there should be no differences.

Design/Summary

cross sectional

Method/Justification

35 elite athletes have been included at the World Championships 2022 and the Musholm Cup 2023. Four with CI, 31 with strength impairment and limb length deficiency. Athletes had all possible classification scores in wheelchair rugby. We expect to include additional athletes with CI at the Amsterdam Quad Rugby Tournament in June 2023.

Results

The following off-court activities were measured: Sprint tests, left and right turn on the spot, X-figure with and without pick-up and dribbling of the ball, one- and two-handed pass for maximal distance and for precision.

Primarily results show a lower maximum linear velocity and a lower angular velocity in turns in athletes with CI compared to athletes with other impairment types in the same sport class. Athletes with CI showed more decrease in angular velocity than athletes with other impairment types in the X-test with the ball. There was a strong correlation between classification score and throwing distance, both for athletes with and without CI (r=0.79), but a weak correlation between classification score and throwing accuracy (r= 0.12-0.48).

Results will be extended in June 2023.

Conclusion

Differences were found between athletes with and without CI in the same class. CI seems to have impact on both linear velocity and on angular velocity in turns. This impact seems to increase in angular velocity in multitasking. Furthermore, we found a relation between classification score and throwing distance, but not with precision throwing. Further statistical analysis in a larger sample of athletes with CI should indicate if throwing is impacted differently by CI versus compared to other impairment types.

11. Classification and Para sport: athletes, support staff and classifiers' trust in the process

Iain Gowans

Loughborough University

Objectives/Aims

Using participants' trust levels, which elements of the classification process are the most vulnerable to manipulation?

Design/Summary

Online Survey, open from 19 April 2022 until 27 May 2022

Method/Justification

225 participants: athletes (n=115), support staff (n=62) and classifiers (n=48).

Results

Findings included low levels of trust in support staff and a difference between athletes' and classifiers' perceptions of classifiers' capacity.

Conclusion

Further research should examine contributory factors for low trust in support staff, and differences between athletes' and classifiers' confidence levels in classifiers' capacities.

Education and training plans for athletes, support staff and classifiers should aim to improve knowledge through role-specific messaging and increase understanding of individuals' responsibilities relating to the classification process.

12. Towards the use of instrumented lower limb coordination measures for sport classification in Frame Running

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Objectives/Aims

Para sport classification systems are of fundamental importance to the legitimacy of Para sport competitions (Mann et al. 2021). The current study aims to contribute to the further development of frame running (FR) classification by comparing coordination in FR athletes and a non-impaired control group (NI) during the performance of a novel lower limb tapping task.

Design/Summary

Between-subjects design

Method/Justification

NI participants (n = 16) were recruited through convenience sampling. FR athletes (n = 21) were recruited at an international FR competition, and in the UK. All participants performed three lower limb tapping tasks (unipedal with each limb and alternating bipedally) at maximal speed for five seconds. Time between foot contacts (ITI) was analysed, along with variability of performance (SD), fastest tapping ITI achieved, and total number of taps. Comparisons between the FR and NI groups were conducted using independent sample t tests and Mann-Witney U - tests.

Results

FR athletes differed significantly ($p<.05$) from the NI group in all ITI measures for both limbs during unipedal and bipedal conditions. The FR group showed a lower average and maximum tapping speed and were more variable in their performance than the NI group, and also achieved fewer taps than the NI group in all conditions.

Conclusion

The novel lower limb tapping task used distinguished between NI and FR groups using specific coordination measures. This is the first ratio scaled measure used in FR athletes for the further development of the evidence-based classification system. Future research will focus on level of impairment and impact on FR performance to further develop FR classification.

Mann, D. L., Tweedy, S. M., Jackson, R. C., & Vanlandewijck, Y. C. (2021). Classifying the evidence for evidence-based classification in Paralympic sport. Journal of Sports Sciences, 39(sup1), 1–6. https://doi.org/10.1080/02640414.2021.1955523

13. A systems thinking approach to the inclusion of children with disabilities in Little Athletics in Australia

Kerry West 1, Simone Pearce 2, Dominique Moritz 2, Abby Haynes 1, Bill Bellew 3, Cathie Sherrington 1

1Institute for Musculoskeletal Health, , University of Sydney/Sydney Local Health District, Sydney, Australia, 2School of Law & Society, University of Sunshine Coast, Maroochydore, Australia, 3Prevention Research Collaboration, University of Sydney, Sydney, Australia

Objectives/Aims

To use a systems thinking approach to identify the influences on participation of children with disabilities in Little Athletics in Australia.

Design/Summary

Systems mapping using a collaborative multidisciplinary team approach. This team included people with backgrounds in health and exercise science, law, sport administration and lived experience with Little Athletics and disability.

Method/Justification

A three stage approach was used: 1. evidence-based mapping (conducting a rapid evidence review and consensus-building to develop an initial map); 2. stakeholder workshops to share ownership and refine the map; and 3. synthesising knowledge in a final integrated systems map with stakeholders who included Little Athletics staff and administrators, and families and young people with disability who had participated in Little Athletics.

Results

The final systems map identified influences at four levels: intrapersonal level (eg, type and extent of disability), family and interpersonal level (eg, family support, social connections), community/organisational level (eg, access to facilities and equipment, structure and rules of competition) and macro policy level (eg, government policy and funding of sport). Potential intervention points for the project were integrated into the map, including developing a new structure for Little Athletics competitions and the appointment of 'Inclusion Officers' to facilitate and champion inclusion of children with disability in athletics events.

Conclusion

A systems mapping approach allowed us to understand a complex multi-system problem and identify key leverage points where intervention could be targeted. Interventions at the personal, interpersonal, community and macro system level are currently being planned and/or implemented.

14. The benefits of Martial Arts practice for those with different abilities

Dr Charles Spring and David Lee

University of Derby and Breaking Down Barriers to Martial Arts

Objectives/Aims

To highlight the benefits of Martial Arts training to students with SEND at primary schools in the UK.

Design/Summary

A range of evidence of the effectiveness of martial arts in producing affective, cognitive and behavioural benefits has been identified in numerous studies. Self-esteem, (Fuller, 1988), a more positive response to physical challenges (Richman and Rehberg, 1986; Trulson, 1986), increased autonomy (Duthie et al, 1978) and assertiveness coupled with emotional stability (Konzak and Boudreau, 1984). Other studies point to the effectiveness of traditional martial arts in reducing aggression and indicate reductions in anxiety and depression (Nosanchuk, 1981; Cai, 2000). Breaking Down Barriers to Martial Arts is an intervention that has been run by The Disability Martial Arts Association (DMAA) in the United Kingdom from 2007-2018 and since 2018 by Breaking Down Barriers to Martial Arts. It targets schools with higher than usual levels of disabled students from across the spectrum of disability, learning difficulties to wheelchair users, sight disabilities to students who have behavioural problems. The idea is to be completely inclusive and look at what a person can do not what they cannot do. It is also about introducing the children and young adults to the idea of what martial arts are, their diversity and the possibilities that they offer individuals of different ability. The opportunity to highlight the work being done by this organisation would be welcomed and also highlight current research being undertaken by the group towards gaining further evidence for these benefits.

Method/Justification

The presentation would highlight work that has been done by the group since 2007 and what is currently being proposed for further research. It does appear that many are unaware of Breaking Down Barriers to Martial Arts and the impact it has had on a number of students that have engaged with it over the years. The presentation will use several case studies to highlight this.

Fuller, J. R. (1988) Martial Arts and Psychological Health. British Journal of medical Psychology. https://doi.org/10.1111/j.2044-8341.1988.tb02794.x

Konzak, B., & Boudreau, F. (1984) Martial arts training and mental health: An exercise in self-help. Canada's Mental Health, 32(4), 2–8. Lakes, K. and Hoyt, W. T., (2004) Promoting Self-Regulation through school based martial arts training. Journal of Applied Developmental Psychology. 25(3) 283-282 DOI:10.1016/j.appdev.2004.04.002

Nosanchuk, T. A. (1981). The way of the warrior: The effects of traditional martial arts training on aggressiveness. Human Relations, 34(6), 435–444. Sage. https://doi.org/10.1177/001872678103400601

Richman, C. L. and Rehberg, H. (1986) The development of self-esteem through the martial arts. International Journal of Sports Psychology, 17(3), 234-239.

Trulson, M. (1986) Martial Arts Training: A Novel 'Cure' for Juvenile Delinquency. Human Relations. Sage. https://doi.org/10.1177/001872678603901204

15. Measuring physical literacy in people with disabilities: Development and measurement properties of the Physical Literacy Profile Questionnaire PLP-Q

Hércules Ribeiro Leite, Rafaela Guimarães Ferreira, Mariane Gonçalves de Souza, Luana Cristina da Silva, João Victor Barbosa Oliveira, Karen Cristina Siqueira Chaves, Ricardo Rodrigues de Sousa Júnior, Georgina L. Clutterbuck*

Graduate Program in Rehabiliation Sciences, Department of Physical Therapy, Universidade Federal de Minas Gerais

Objectives/Aims

1. to develop a questionnaire to measure PL for people with disabilities: the 'Physical Literacy Profile Questionnaire (PLPQ)' and 2. to investigate the content validity, internal consistency and test-retest reliability of the PLPQ in its target population.

Design/Summary

Psychometric study. A committee of seven physiotherapists involved in sports-focused interventions developed the prototype PLPQ. 50 health professionals and 50 parents/caregivers of people with (6-21 years old) with disabilities were recruited to evaluate the PLPQ's content validity. 109 parents and caregivers of individuals with disabilities (mean age 10.17 ± 3.96 years old) with disabilities (cerebral palsy, autism spectrum disorder, Down syndrome, spina bifida, and myopathies) were recruited to evaluate the questionnaire's internal consistency.

Method/Justification

50 of the participants involved in internal consistency evaluation also participated in the test-retest reliability evaluation. The development committee developed the PLPQ in line with elements included under the Australian Physical Literacy Framework. The PLPQ included 25 items where children and/or caregivers were asked to report individual's performance on a scale of 0 (do not perform), 1 (performs partially), and 2 (perform). To evaluate content validity, the PLPQ was sent to professionals and parents and caregivers who answered questions about each item's relevance, comprehensiveness and comprehensibility. Negative responses would result in instrument modifications. To evaluate test-retest reliability, parents and caregivers answered the PLPQ twice. Internal consistency was calculated by Cronbach's alpha (α) and test-retest reliability by the intraclass correlation coefficient (ICC), followed by 95% confidence interval.

Results

All items were considered relevant, comprehensive and comprehensible by all professionals and caregivers. The final version of PLPQ was then consolidated in 24 items related to PL domains. PLPQ final version presented good internal consistency (α=0.93) and test-retest reliability (ICC= 0.84, CI95%:0.74-0.91).

Conclusion

The PLPQ is a relevant, comprehensive and comprehensible assessment of physical literacy which is consistent and reliable.

16. Exploration of the perceived health and wellbeing impact of dance for people with multiple sclerosis

Eleanor English, Martine Verheul

Human Performance Science Research Group, University of Edinburgh

Objectives/Aims

Initial research suggests dance benefits the health and wellbeing of people with multiple sclerosis, however, the evidence base is small and focuses on clinical assessment of physical outcomes. This study aimed to explore the perceived mental, physical, and social health and wellbeing impact of participation in dance classes for people with multiple sclerosis.

Design/Summary

Cross-sectional mixed-method design with a survey and interviews

Method/Justification

An online survey was distributed to disability- and multiple sclerosis-specific dance classes and multiple sclerosis therapy centres and organisations. Nine women (mix of age ranges), with various multiple sclerosis sub-types, responded to the survey. Six respondents currently attend dance classes whilst three attended previously. Online semi-structured follow-up interviews were completed by five survey respondents (mean age 61.8 (SD: 8.4) years) with various multiple sclerosis sub-types and from different dance classes. Analysis used descriptive statistics and reflexive thematic analysis through a phenomenological lens.

Results

Survey respondents reported few adverse effects and the majority reported acute and long-term improvements in mental wellbeing and various physical symptoms and motor skills, most notably in balance, coordination, and tiredness/fatigue. Interview themes highlighted dance classes led to positive feelings of joy and a sense of empowerment, enhanced social inclusion through connecting with others in a safe space, and improved physical abilities which allowed increased participation and confidence in daily and leisure activities.

Conclusion

Findings support recommending dance to improve health and wellbeing for people with multiple sclerosis but emphasise the importance of a biopsychosocial approach when designing dance classes and interventions to foster psychosocial and physical health improvements. A proposed model attributes health and wellbeing benefits to the music, exercise through creative movement, and community aspects of dance classes, and highlights the interaction of mental wellbeing on physical wellbeing leading to increased movement confidence. These relationships should be confirmed in future research.

17. The feasibility of Frame Running as an exercise option for people with Multiple Sclerosis with impaired mobility and balance: A pilot study

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Objectives/Aims

To explore the feasibility, acceptability, and preliminary efficacy of Frame Running (FR) for people with multiple sclerosis (pwMS).

Design/Summary

A single-arm, repeated measures design was adopted with assessments at baseline and following a 12-week FR intervention (one hour session/week).

Method/Justification

Eight pwMS (6 females, 2 males) with moderate-to-severe walking impairments were recruited. Recruitment, retention, and attendance rates were recorded. Physical function was assessed using the 6-minute FR test (6MFRT) and an adapted shuttle FR test (SFRT). Changes in patient-reported outcome measures were explored using the Godin Leisure Time Exercise Questionnaire (GLTEQ), Multiple Sclerosis Walking Scale (MSWS-12), Fatigue Scale for Motor and Cognitive Functions (FSMC), and Exercise Self-Efficacy Scale (ESES). The Canadian Occupational Performance Measure (COPM) assessed the self-perceived ability to perform activities of daily living. Participants' experiences of FR were captured during semi-structured interviews. Quantitative and qualitative data were analysed using descriptive statistics and thematic content analyses, respectively.

Results

Regarding feasibility outcomes, recruitment, retention, and attendance rates of 47.1%, 75.0%, and 86.7% were achieved, respectively, with no adverse events reported. Small effect sizes were observed for changes in performance in the 6MFRT (d=0.37) and SFRT (d=0.30), as well as patient-reported measures including the MSWS-12 (d=0.27), FSMC (d=0.20), and ESES (d=0.46). A medium effect size was observed for GLTEQ (d=0.73). Most participants (80%) reported changes in performance and satisfaction with their activities of daily living that exceeded established clinically meaningful changes. Qualitative data highlighted FR to be both safe and enjoyable, with the social aspect and camaraderie developed amongst participants representing key highlights.

Conclusion

FR presents a feasible and enjoyable exercise option for pwMS and may have potential to improve measures of physical function and the ability to perform mobility-related daily activities. Further research is warranted to ascertain the longer-term sustainability and efficacy of FR amongst pwMS.

18. Frame running: an exercise option for people with Parkinson's?

Martine Verheul

Human Performance Science Research Group, The University of Edinburgh

Objectives/Aims

This presentation will review the benefits of exercise for people with Parkinson's as reported in the literature, and the hypothesised mechanism(s) by which exercise improves Parkinson's disease, with the aim of exploring the potential of frame running for people with Parkinson's.

Design/Summary

Narrative Literature Review

Method/Justification

Parkinson's is a neurodegenerative disease that is common in older adults. Its main symptoms are changes in movement (e.g., rigidity), which result in a lack of balance for many people with Parkinson's. Fear of falling is a barrier to engaging in exercise for many individuals with Parkinson's, especially in later stages of the disease. As frame running provides a means to exercise without a risk of falling, it is a logical exercise option for people with more advanced Parkinson's. However, it is pertinent to review how exercise affects people with Parkinson's, and the role it can play in the treatment of Parkinson's symptoms.

Results

As Parkinson's disease progresses, there is a correlation between physical fitness and disease rating. The effects of many types of exercise have been studied, although much evidence is of low quality. Meta-analyses (mostly >1000 participants) found improvements in strength, balance, gait and cognition. There is agreement that exercise can slow down disease progression, although there is currently no clear agreement on the most beneficial type of exercise. It is believed that exercise can reduce the dopaminergic damage in the brain that characterises the disease through the promotion of healthy growth of nervous tissue. In addition to slowing down the disease progression, exercise is also likely to reduce complications (e.g., fractures) and social isolation.

Conclusion

The evidence suggests that benefits of exercise are multi-faceted and disease modifying for people with Parkinson's. Exercise is seen as a promising treatment in combination with pharmacological treatment. Thus, frame running is expected to benefit people with advanced Parkinson's.

18. Physical activity interventions for people with moderate-to-severe traumatic brain injury: a rapid systematic review and meta-analysis

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Objectives/Aims To identify direct evidence of the effects of physical activity on health outcomes in people with moderate-to-severe TBI. This review aims to inform the applicability of the WHO guidelines to people with moderate-to-severe TBI and support their adaptation into clinical practice guidelines.

Design/Summary Rapid systematic review with meta-analysis

Method/Justification Four databases (CENTRAL, SPORTDiscus, PEDro, Ovid MEDLINE) were searched from inception to October 8, 2021. Studies were included if they were randomised controlled trials, including people of any age with moderate-to-severe TBI, investigating physical activity interventions compared to either usual care, a physical activity intervention with different parameters, or a non-physical activity intervention. Outcomes of interest were physical function, cognition, quality of life, mortality, comorbid conditions, mood, participation and physical activity. We calculated mean difference (MD) or standardised mean difference and 95% confidence intervals (95%CI) using a random-effects model to pool estimates. The GRADE approach was used to assess the certainty of the evidence.

Results Twenty-three studies were included incorporating 812 participants (36% females, majority working-age adults, time post-TBI in studies ranged from 56 days (median) to 16.6 years (mean)). A range of physical activity interventions were evaluated in rehabilitation (n=12 studies), community (n=8) and home (n=3) settings. We pooled data from the end of the intervention for eight outcomes. Participation in a virtual reality physical activity intervention improved mobility more than standard balance training (2 studies, 80 participants, MD=2.78, 95%CI 1.40 to 4.16; low certainty evidence). There was uncertainty of effect for the remaining outcomes, limited by small sample sizes, diverse comparators and a wide range of outcome measures.

Conclusion This review consolidates the evidence base for the prescription of physical activity for people with moderate-to-severe TBI. There remains a pressing need for the development of clinical practice guidelines to support clinical decision-making when prescribing physical activity to people with moderate-to-severe TBI.

19. Athletes with cerebral palsy improve leg strength within 6 weeks and arm strength and jump performance within 12 weeks via maximal strength training

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Objectives/Aims

Optimal resistance training parameters remain largely unknown for adults with cerebral palsy (CP), particularly athletes training for peak sports performance (1). This study examined the effects of maximal strength training utilising free-weight multi-joint compound exercises on upper and lower body performance in athletes with CP.

Design/Summary

Single group pre-post repeated measures study with waitlist control.

Method/Justification

Eleven sub-elite to elite athletes (28.2 (9.5) years; m=10, f=1; GMFCS I=8, II=3; volunteer sample) completed a 12-week twice-weekly supervised intervention periodised into three 4-week blocks with 4-6 sets of 2-8 repetitions at 75-97% one-repetition maximum (1RM). Lower body performance was assessed via isometric mid-thigh pull (IMTP), countermovement jump (CMJ), and reactive strength index modified (RSImod), and upper body performance via unilateral 1RM chest press and unilateral seated shot-put (USSP). Main effects of time were determined via repeated measures ANOVA, with adaptation timeframe examined via planned comparisons between intervention weeks 1-6 and 7-12.

Results

IMTP peak force increased by 406.9 (293.4) N ($F=14.35$, $p<0.0001$) with most improvements achieved by week 6 ($t=2.52$, $p=0.015$). Affected limb 1RM chest press, CMJ height and RSImod improved by 5.3 kg, 3.0 cm, and 0.08 (ratio), respectively, by week 12 ($F=10.48$, 7.93, and 7.89, respectively, $p=0.0001$-0.003), while USSP did not change ($F=0.86$, $p=0.44$).

Conclusion

Athletes with CP demonstrate similar adaptation timeframe and magnitude to non-disabled athletes following twice-weekly maximal strength training, improving lower body strength within 6 weeks, and jumping performance and upper body strength within 12 weeks. RSImod is sensitive to change in this population and can be used to monitor training response. USSP, meanwhile, may lack sensitivity for this purpose; instead, kinetic analysis and sport-specific performance measures should be considered.

1. Runciman P. et. al. Effects of exercise training on performance and function in individuals with cerebral palsy: A critical review. SAJRSPER 38:177-193, 2016

20. Transforming the health and wellbeing of non-ambulant adults with cerebral palsy through motorised cycling

Dr. Carlee Holmes 1.2, Professor Dinah Reddihough 2, Professor Prue Morgan 2.3, Professor Nora Shields 2.4, Dr. Kim Brock 1, Georgia McKenzie 1.5

1 St. Vincent's Hospital Melbourne, 2 Murdoch Children's Research Institute, 3 Monash University, Frankston, 4 Olga Tennison Autism Research Centre, La Trobe University, 5 La Trobe University, Melbourne

Objectives/Aims

a) to pilot the use of a home-based motorized cycling intervention in non-ambulant adults with cerebral palsy (CP); b) to obtain preliminary qualitative data determining the tolerance, safety and perceived outcomes of the cycling intervention within the home.

Design/Summary

A mixed methods pilot intervention study

Transforming the health of non-ambulant adults with CP is challenging, especially for those with significant disabilities encompassing the musculoskeletal system, cognition, behaviour and communication. The high incidence of progressive musculoskeletal issues, skeletal fragility, fracture risk and mental health issues such as anxiety may further impede their participation in physical activity (1, 2). Adults with high levels of physical disability may experience minimal purposeful and functional active limb movement, abnormal biomechanical forces due to postural asymmetries, limited postural control, coupled with access limitations, necessitating alternate methods for engaging in physical activity. A motorised movement (cycling) device, accessed from a person's wheelchair provides an option to move for non-ambulant adults with CP.

Method/Justification

10 non-ambulant adults with CP will undergo a 4-week period of home motorised cycling. Due to the level of disability of participants, all sessions will be facilitated and supervised. Use and satisfaction will be recorded.

Evidence based interventions to ensure health access and equity are required to support non-ambulant adults with CP.

Results

Data will be available at the time of the conference.

Conclusion

Hypothesis: Home motorized cycling for adults with severe CP will (1) be an acceptable form of movement and physical activity, (2) be well tolerated , and (3) have the potential to improve health outcomes (physical and mental).

1. Peterson, et al (2021) Am J of Phys Med & Rehabil. 100(10)

2. Holmes et al (2021) Pediatr Phys Ther. 33(2)

21. The effects of sport or physical recreation for adults with physical or intellectual disabilities: a systematic review

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Objectives/Aims

To evaluate effects of sport or physical recreation for adults living with disabilities.

Design/Summary

Systematic review with meta-analysis of included randomised controlled trials

Method/Justification

Studies were identified from six electronic databases which were searched from inception to May 2022. Eligible trials included adults living with a physical or intellectual disability, comparing sport or physical recreation to non-active control. Primary outcomes were participation, mobility, and quality of life. Meta-analyses were conducted using random effects models applying GRADE approach to rate certainty of evidence.

Results

Seventy-four trials (n=2,947 participants; mean age 55 years; 66% living with physical disability from neurological degenerative health conditions) were included. No trials evaluated sport; the top three recreation activities were traditional Chinese exercise (35%), yoga (27%) and dance (18%). Mean dosage was 65mins/session, twice weekly for 13 weeks. Most (86%) interventions were led by people with experience and/or training in the recreation activity, only 37% reported leader experience and/or training working with people with disabilities. Health professional involvement was reported for 38% interventions, with physiotherapists most common.

Participation was measured predominantly as attendance (mean attendance=81%, 30 intervention groups). Recreation activities improved mobility (SMD 0.38, 95%CI 0.07 to 0.69, participants=469, comparisons=11) and walking endurance (MD 40.3m, 95%CI 19.5 to 61.1, participants=801, comparisons=24) with low certainty evidence; and improved balance (Berg Balance Scale, 0-56 points; MD 3.4 points, 95% CI 2.3 to 4.4, n=906) and quality of life (SMD 0.20, 95%CI -0.11 to 0.51, participants=574, comparisons=18) with very low certainty evidence.

Conclusion

Physical recreation likely confers multiple benefits for people living with disabilities regardless of the activity chosen, thus offering a potentially enjoyable and scalable strategy to increase physical activity. Several gaps in the evidence were identified where evidence generation is urgently needed including sport and recreation interventions delivered in inclusive community settings.

22. Exploring the benefits of 12 weeks of RaceRunning for children and adolescents with moderate to severe Cerebral Palsy.

Lauren McDougall, Dr Danielle Girard, A/Prof Emma Beckman, A/Prof Ray Russo, Emily Leadbeater, Dr Jocelyn Kernot, A/Prof Kade Davison

Alliance for Research in Exercise, Nutrition and Activity, University of South Australia; School of Human Movement and Nutrition Sciences, University of Queensland; Women's and Children's Health Network

Objectives/Aims

This study aimed to explore the benefits for psychosocial and physical wellbeing, from participation in a structured 12 week RaceRunning (RR) intervention for children and adolescents (6-13 years) with moderate to severe Cerebral Palsy (CP) and their parents.

Design/Summary

This qualitative study used semi-structured interviews to explore the participant experience of a structured sport-based intervention.

Method/Justification

Seven 6-13-year olds (male =5) with Gross Motor Functional Classification Scores (GMFCS) III and IV participated in the study. Participants attended one or two, 1-hour group RR sessions led by an Accredited Exercise Physiologist each week for 12 weeks. Participants and their families were also encouraged to use a RR frame outside of these sessions. After 12-weeks, parents (n=7) and participants (n=2) participated in semi-structured interviews which were analysed thematically.

Results

Three key themes were identified. The first was 'Connection', with participation providing the children with an opportunity to make meaningful connections with others and included sub-themes of 'friendship', 'family' and 'belonging'. The second was 'Outcomes', with the subthemes of 'physical', 'psychological' and 'social' outcomes with specific benefits reported such as increased leg strength and physical endurance, feelings of freedom, emotional growth and improved social skills. The third key theme was 'Engagement', with the participants appreciating the opportunity to engage in an accessible sport. This included the sub-themes of 'access' and 'motivation', reflecting the relative ease of using the frames and the enjoyment in doing so.

Conclusion

RaceRunning is a suitable form of accessible sport for children with Cerebral Palsy, with GMFCS levels III and IV, providing a unique opportunity to overcome impairments to participation and significantly impact health and wellbeing. Participants report a range of perceived physical and psychosocial outcomes as a result of participating in a structured sports-based intervention. Future research could look at larger cohorts, explore longer-term engagement, and impact on physical and psychosocial development.

23. Validation of the six-minute Frame Running test as a cardiopulmonary exercise test in individuals with cerebral palsy

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1 Department of Women´s and Children´s Health, Karolinska Institutet, Stockholm, Sweden; 2 Amsterdam UMC location Vrije Universiteit Amsterdam, Department of Rehabilitation Medicine, Amsterdam, The Netherlands; 3 Department of Laboratory Medicine, Karolinska Institutet, Stockholm, Sweden; 4 Department of Physiology and Pharmacology, Karolinska Institutet, Stockholm, Sweden

Objectives/Aims

To investigate validity of the six-minute Frame Running test (6-MFRT) as a test of maximal aerobic capacity for individuals with cerebral palsy (CP).

Design/Summary

Cardiorespiratory fitness is measured by maximal or peak oxygen uptake (VO2peak) which is the most used tests to evaluate endurance capacity. CP means an activity limitation that can result in lower fitness, which increase the risk of impaired health. In order to evaluate cardiorespiratory training, valid and feasible exercise tests are needed. In this cross-sectional study, VO2peak during 6-MFRT, where maximal distance covered during six minutes is the outcome was compared with gold standard method of measuring maximal oxygen uptake, which is with incremental workload (e.g., treadmill test) to maximal exhaustion in a sports laboratory.

Method/Justification

Sixteen participants (7 male, 9 female; mean age 23±7 years) with CP, classified with Gross Motor Function Classification System (GMFCS) II-V performed a 6-MFRT on a 200m oval track, and a Frame Running Incremental Treadmill test (FRITT), performed on a wide treadmill. Lactate levels measured in blood, peak oxygen uptake (VO2peak), peak heart rate (HRpeak), peak respiratory exchange ratio (RER = VCO2/VO2), and self-rated exertion were compared between the 6-MFRT and FRITT. In addition, the distance covered and VO2peak during the 6-MFRT were compared.

Results

A strong correlation was observed between VO2peak during the 6-MFRT and FRITT (r=0.94, 95% CI; 0.80 to 0.98 p<0.0001) as well as between distance and VO2peak during the 6-MFRT (r=0.71, 95% CI 0.29 to 0.90, p=0.0045). No significant differences were observed in mean VO2peak values between the 6-MRT (31.88±9.72 ml/kg/min; 1.76±0.72 L/min) and FRITT (34.52±9.69 ml/kg/min; 1.93±0.80 L/min) (p>0.05) or in other cardiorespiratory parameters nor blood lactate.

Conclusion

The 6-MFRT distance can be used for estimation of maximal aerobic capacity. It is practical to perform and offers a good alternative to more complicated laboratory-based tests.

24. Effect of a 14 week Frame Running training program on cardiorespiratory fitness and psychosocial functioning

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Objectives/Aims

Frame Running is a new para-athletic sport for people with mobility impairments. The sport could improve cardiorespiratory fitness because high heart rates can be achieved during training. The aim of this study is to investigate changes in cardiorespiratory fitness and psychosocial functioning after a 14-week training program (once a week) in children who start Frame Running.

Design/Summary

Prospective pre-post intervention design.

Method/Justification

Starting Frame Running athletes (age 6 to 18) were recruited via their trainer. Cardiorespiratory fitness was measured with the 6 Minute Frame Running Test (6MFRT) and the Shuttle Frame Running Test (SFRT) at baseline and at the end of a training program. Psychosocial functioning was measured with the Psychosocial Impact of Assistive Devices Scale (PIADS). Non-parametric tests (Wilcoxon signed rank test) were used for statistical analyses

Results

Eight participants (5 boys), median age 10.5 years (range 6-17), diagnosed with CP (n=4), syndromes (n=3) and SMA (n=1), functioning as GMFCS level II (n=7) and III (n=1) were included so far.

The median distance on the 6MFRT improved from 791 m (range 420-1080 m) to 818 m (range 640-1076) (n.s.) and the median shuttle score on the SFRT improved from 10.75 (6.5-20.0) to 11.75 (7-22) (n.s.).

The median score after training for the domain competence of the PIADS was 0.92, for the domain adaptability 1.0 and for the domain self-image 0.75, which differs significantly from score 0/'no change' (p=0.018). The highest median scores were for the items independence and well-being (both 2.0) and happiness, self-esteem, self-confidence and participation (all 1.5).

Conclusion

Psychosocial functioning in starting Frame Running athletes increased after a training program, as does fitness, although not significantly. Possibly the training frequency is not high enough and/or the training period is not long enough. Moreover, the number of participants is still small. New participants are still being enrolled.

25. Could physical inactivity explain gross motor function decline in young people with cerebral palsy, GMFCS IV? A longitudinal intervention study.

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Objectives/Aims Following early developmental gains, non-ambulatory adolescents with cerebral palsy (CP) experience clinically significant declines in gross motor functioning which are associated with serious adverse health outcomes. The causes are poorly understood. However, gross motor decline may be due, at least partially, to long-term habitual physical inactivity. This study aimed to evaluate the effect of a performance-focused Para swimming program on gross motor functioning in untrained, non-ambulatory adolescents with CP who are at risk of gross motor decline; and to evaluate the extent to which swimming participation and changes in gross motor function were maintained over a 4-year period during which motor declines are predicted.

Design/Summary Concurrent multiple-baseline design (MBD) with subsequent 3-year longitudinal intervention study. Repeated measures were conducted during a baseline phase, followed by four alternating training and withdrawal phases. Participants were then monitored 3 further training years. MBD data were analysed using interrupted time-series simulation (ITSSIM) analysis. Longitudinal data were evaluated using a generalised additive model and compared against a predicted motor decline model.

Method/Justification Two males (aged 15 and 16 years) and one female (aged 16 years) with quadriplegic CP, all insufficiently active and GMFCS Level IV undertook 4 training seasons of performance-focused swimming training, which aimed to improve competitive swimming performance. Training was delivered by a multi-professional team of physiotherapists, exercise physiologists and swim coaches, and comprised land-based and swimming training. Outcome measures were Gross motor function (GMFM-66); swim performance (velocity); training load (RPE minutes/wk).

Results Initial improvements in GMFM-66 scores in response to training were significant ($p=<0.001$), and training withdrawal resulted in significant declines on two occasions ($p=0.005$; $p=0.01$). Longitudinal data demonstrate that improvements were maintained for 4 years with continued training, in contrast to the projected trajectory of motor decline. Participants accumulated physical activity volumes commensurate with guidelines.

Conclusion Para sport is an effective context for youth with CP to accumulate health-enhancing volumes of physical activity. This is the first study to demonstrate that sports participation may have the capacity to prevent clinically significant gross motor declines in non-ambulatory adolescents with CP.

1. Dutia, I.M., et al., Evaluating the Effects of Performance-Focused Swimming Training on People with Cerebral Palsy Who Have High Support Needs - A Study Protocol Using Single-Case Experimental Design. Brain impairment, 2020. 21(2): p. 217-234. 2. Hanna, S.E., et al., Stability and decline in gross motor function among children and youth with cerebral palsy aged 2 to 21 years. Developmental Medicine & Child Neurology, 2009. 51(4): p. 295-302.

26. Supporting lifelong physical activity participation and chronic disease prevention among individuals with cerebral palsy [WORKSHOP]

Presenters:

1. *Mark D. Peterson, PhD, MS: Department of Physical Medicine and Rehabilitation, University of Michigan, United States*
2. *Sarah E. Reedman, PhD: Queensland Cerebral Palsy and Rehabilitation Research Centre, QLD, Australia*
3. *Iain Dutia, PhD: The University of Queensland, QLD, Australia; Australian Catholic University, QLD, Australia*

Background: People with cerebral palsy (CP) are at much higher risk of chronic noncommunicable diseases compared to people without CP. Many of these conditions are related to low physical activity levels and high sedentary behavior. Importantly, people with CP often want to be active but face many environmental and contextual barriers. This workshop will focus on new and challenging issues around chronic disease and physical activity across the lifespan in people with cerebral palsy, from early childhood to older adulthood. Presenters from the United States and Australia will discuss: (1) how noncommunicable diseases cluster in people with CP and change in prevalence with ageing, (2) lifestyle interventions aimed at preventing or treating multiple noncommunicable diseases in adults with CP, (3) early intervention aimed specifically at physical activity behaviors in young children with CP, and (4) the role of competitive sport in optimising health outcomes for people with CP who have high support needs.

Presenter: Professor Mark Peterson; 25 minutes

- Ageing trajectories of noncommunicable diseases in adults with CP from the US.
- The association between psychological disease, noncommunicable disease clustering and chronic pain in adults with CP
- Physical activity and lifestyle medicine for preventing/targeting multimorbidity in persons with CP

Presenter: Dr Sarah Reedman; 25 minutes

- Active Start Active Future: results of a pilot feasibility study of an inclusive early intervention to promote physical activity participation and swap sedentary behaviour for active time in 4-7 year old children with CP in GMFCS levels I-V

Presenter: Dr Iain Dutia; 25 minutes

- Challenges and opportunities in Para sport for people with CP who have high support needs
- The ParaSTART program: the role of competitive sport for optimising health outcomes in people with CP at GMFCS level IV and V.

Interactive Discussion and Panel Questions; 15 minutes

27. Floatsation -Revolutionary floating device for all abilities [WORKSHOP]

Martin Mansell PLY Martin@Floatsation.com Floatsation.com

Objectives/Aims

Benefits of independent movement in water for all abilities - EVERY ONE CAN FLOAT

Summary

Floatsation provides an opportunity for independent movement all individuals irrespective of their impairment or disability providing maximum support where appropriate Disabled and none Disabled. It can be used by occupational therapist, physiotherapist in developing physical activity programme in the water.

During COVID Floatsation provided individuals with the opportunity to float in water in a domestic bath/hot tub when access to pools were closed. This work has led to community occupational therapy/Leeds/Yorkshire and Essex adopting Floatsation as an alternative bath aid. Floatsation devices can be taken to the hydrotherapy/ swimming pool to be used as appropriate facilitating inclusion into the community. One project in Essex “Sport for Confidence" is a combination of sports coaches/ occupational therapists working together to support the inclusion people with severe complex needs (severe cerebral palsy). There is a multitude of proven physical benefits with swimming, immersion in water also offers many therapeutic benefits making it an ideal activity for many people with cognitive and mobility impairments. Floatsation improve the accessibility of swimming for those who struggle to support themselves in the water, making them feel safe, secure, and able to enjoy the unique sensation of being in water taken for granted by many non-disabled people.

Justification

The rate of participation in swimming among disabled people lags far behind the rest of the population. According to Sports England’s Active People Survey, 2,912,800 non-disabled adults in the UK swim once or more per week, compared to just 331,500 UK adults with a disability. Through investment in specialist equipment, we are tackling this inequality and working towards a more equitable society where everybody is able to lead a happy, healthy fulfilling life.

Results

Increase self-confidence, increase spatial awareness, decreases staffing resources, facilitates inclusion where inclusion may not have been possible.

Conclusion

Floatsation can be used by anyone in any swim/therapy and even at home in the bath to facilitate mobilisation and increase agility and self-confidence for the individual and support personnel whilst being fun and dignified and not looking like a medical aid.

Lyndsey Barrett Lyndsey@sportforconfidence.com

https://www.sportforconfidence.com/

28. Understanding the importance of inclusive sport: thinking beyond the label of disability [WORKSHOP]

Graham A. Condie
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Abstract

Increasingly, the world is becoming more accepting of disabled people, realising the importance of making sport inclusive for people with disabilities. However, much of the understanding of adapting and making different activities inclusive to disabled people is still lacking. Many programmes fail to consider the fundamental philosophical principles which underpin and reinforce people with disabilities' rights to experience self-determination, companionship, choice, control and self-expression in sport. Therefore, within this workshop, audience members will have an opportunity to increase their understanding of inclusive and adaptive sport, in addition to how they can improve the rights and opportunities of people with disabilities back in their own home countries, regions and states. The workshop will firstly consider what it means to have a disability through looking at it from different angles. The workshop will then consider some of the philosophical principles which underpin disabled people's rights to sport. Finally, the workshop will then allow the audience members to put some of the theory into practice by participating in a mini-game of Boccia.

Author's Bio

Graham is a PhD Student at the University of Edinburgh, exploring the influence of sport on individuals with Cerebral Palsy's identities and wellbeing. His research interests are in disability, the experience of living with a disability, and how leisure can affect people's well-being. He is also interested in Therapeutic Recreation.

29. The perspectives of athletes and key stakeholders on taking part in, delivering, and implementing Frame Running in the community, a qualitative study.

G.P. McEwan1, G. Andreopoulou2 , E. Curnow1, K. Jagadamma1, M.L. van der Linden1

1 Queen Margaret University, 2 University of Edinburgh, Scotland

Objectives/Aims

To examine the perspectives of athletes and key stakeholders on taking part in, delivering, and implementing Frame Running in the community

Design/Summary

Qualitative study, with a phenomenological perspective, using semi-structured interviews and focus groups

Method/Justification

Data were generated during semi-structured interviews with ten athletes with moderate-to-severe walking impairments (aged 6-20 years old, ?2 years Frame Running experience) and four parents of athletes. Focus groups (n=2) were also conducted with in total six coaches and one sports administrator (1-9 y Frame Running experience). Interviews and focus groups were audio-recorded and transcribed verbatim before being analysed independently by two researchers using concurrent deductive and inductive content analysis. The analysis was based upon two primary (barriers and facilitators) and four secondary (personal, social, environmental, and policy) themes.

Results

Barriers to implementation were mainly identified on social (e.g., lack of Frame Running publicity, club and track fees), environmental (e.g., frames: cost, transport, storage, and set-up), and policy (e.g., classification: ineligible impairment types, lack of support from national athletics organisations) levels, with getting used to the frame and discomfort being the main personal barriers. Facilitators were mostly on the personal (e.g., opportunity to be active, moving at speed, freedom, fun, health benefits) and social (competition, social aspects, importance of word of mouth and physiotherapists recommending Frame Running) levels. Education (or lack of) emerged as both a barrier and a facilitator.

Conclusion

Our findings highlight the role of education (amongst athletes, parents, coaches, national sports organisations, health professionals, and the general public) and communication (within and between these groups) as key factors to the successful implementation of Frame Running within the community.

30. A Low-cost FrameRunner bicycle for Para sport in South Africa

Dr Phoebe Runciman
Institute of Sport and Exercise Medicine, Stellenbosch University

Objectives/Aims

The aim of this study was to design a low-cost FrameRunner that's cheaper than existing international FrameRunners, for use in South Africa and other developing nations.

Design/Summary

Design a South African FrameRunner to international specifications.

Method/Justification

A main reason why FrameRunning as a sport is not growing in developing nation settings is the cost of a FrameRunner. This equipment is expensive for those living in developing settings. If a more affordable FrameRunner is produced, the sport may be able to spread to these developing nations as it has in developed nations. This FrameRunner should be designed to international specifications. This will allow the FrameRunner to be used to participate in international competitions.

Results

This FrameRunner conceptual design aimed to be as low cost as possible. The design must meet international specifications. The FrameRunner was designed to be adjustable to accommodate a variety of body sizes (1,40m-1,93m). The adjustability of the frame allows a wide variety of individuals to use a single FrameRunner. Using standard parts also contributes to reducing the price of the equipment. Standard parts are easier to find and cheaper than developing them.

Conclusion

This conceptual design for a FrameRunner is simplistically designed with high adjustability. This allows for various individuals to use the same FrameRunner. Force calculations show that the deflection of the frame is within tolerance.

31. Sport4Impact, adapted sports for every child

E. Muselaers, MSc, PPT; M. van Eck, PhD, PPT; P. van Schie, PhD, PPT; E. Boeker, PhD, MD; Prof. A. Buizer, PhD, MD

1 Amsterdam UMC, Rehabilitation Medicine, Amsterdam, Netherlands; 2 Emma Children's Hospital, Amsterdam UMC, Amsterdam, Netherlands; 3 Amsterdam Movement Sciences, Rehabilitation and Development, Amsterdam, Netherlands.

Objectives/Aims

To investigate the experiences with the 'Sportpoli' for all stakeholders. The participation of children and adolescents with physical disabilities in physical activity is complex; a cluster of many factors exist that hinder or promote physical activity. The Sportpoli is a cooperation between several academic hospitals in the Netherlands and the Esther Vergeer Foundation which helps children with a chronic disease or disability to participate in sports. The Sportpoli links wishes and capabilities of these children to available regular sport clubs in their neighborhood.

Design/Summary

A qualitative descriptive design, with thematic analysis. The study was approved by the Institutional Medical Ethical Screening Committee (Amsterdam UMC).

Method/Justification

Semi-structured interviews (with children, parents, referring professionals, trainers of sports clubs and employees of the Sportpoli) were conducted, recorded and transcribed verbatim using MAXQDA (v2020). Two independent researchers analyzed the data using an inductive approach and central themes were constructed. The F-words model and/or the Re-aim model were used as a background scheme.

Results

Preliminary results showed that all stakeholders had mainly positive experiences with the Sportpoli. Parents had the feeling a burden was taken out of their hands. Children just liked the fact that they were performing sports. Referring professionals were positive about the fact that children actually started performing sports, whereas advice without help of the Sportpoli did not result in participation in sports. However, they would like to improve knowledge (communication) about which children are performing sports or not after mediation of the Sportpoli. Trainers of sports clubs sometimes lack knowledge about the goal of the Sportpoli. Employees would like to improve the search engine in which they can find sports for children and would like to professionalize the procedure of referral.

Conclusion

The Sportpoli seems a powerful method to increase participation in sports for children with a disability with positive experiences of all stakeholders. Future research should focus on long term effects.

32. A health and wellbeing service development for adults with Neuromyelitis Optica Spectrum Disorder (NMOSD)

Liana Nagy1,2, Baerbel Christou1, Yvonne Sharawakanda1, Anna Francis1, Isabel Leite1, Jackie Palace1

1 Oxford University Hospitals: The Department of Clinical Neurology; 2 Oxford Brookes University: The Centre for Movement, Occupational and Rehabilitation Sciences

Objectives/Aims

To outline the development of a wellbeing service offered to patients with NMOSD. This service is focused on: i) educating patients on key topics related to NMOSD such as healthy lifestyle, pain, fatigue, anxiety, ii) promoting engagement in physical activity, iii) social connection and peer support from other patients with this rare condition.

Summary

The presentation will briefly describe NMOSD and how the condition impacts activity participation on a day-to-day basis. It will then outline the process of developing a multidisciplinary wellbeing service for adults with NMOSD and it will also describe the content and structure of the service which benefits from Physiotherapy, Occupational Therapy, Nursing and Neurologist input. Finally, it will report on strengths and limitations as a result of patients' and MDT feedback, and it will propose further aspects to be developed.

Justification

NMOSD is a rare condition with limited therapeutic input in the UK. The collaborative development of a wellbeing service is a valuable initiative with potential of enhancing patient health and wellbeing.

1. Palace J, Leite MI, Jacob A. A practical guide to the treatment of neuromyelitis optica. Pract Neurol. 2012 Aug;12(4):209-14. doi: 10.1136/practneurol-2012-000237. Erratum in: Pract Neurol. 2012 Oct;12(5):342. Leite, Isobel [corrected to Leite, Maria Isabel]. PMID: 22869762.

2. Nechemia Y, Moreh E, Weingarden H, Bloch A, Givon U, Vaknin-Dembinsky A, Schwartz I, Meiner Z, Zeilig G. Effectiveness of multi-disciplinary rehabilitation for patients with Neuromyelitis Optica. J Spinal Cord Med. 2016 May;39(3):311-6. doi: 10.1179/2045772315Y.0000000060. Epub 2016 Mar 24. PMID: 26446695; PMCID: PMC5073758.

3. Dong-Mei S, Lin-lin L, Kun J, Lin-jie Z, Li-Min L, Jing W, Yuan Qi, Hai-jie L, Chun-Xiao W, Li Y. Multidisciplinary rehabilitation for adults with Neuromyelitis Optica spectrum disorders: a pilot study. J Rehabil Med 2019; 51: 00–00

Posters

1 Feasibility Study of the Sports Stars Brazil Program: Modified Sports Intervention in Adolescents with Cerebral Palsy [VIRTUAL]

Luana Cristina da Silva, Flávia Natal Ribeiro Beleza, Palloma Pereira Santos, Paulo Victor de Freitas Aguilar, Ricardo Rodrigues de Sousa Junior, Hércules Ribeiro Leite.

Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, Minas Gerais, Brazil

Objectives/Aims

The aim of this study was to report the results of a feasibility study using the Sports Stars Brasil program in adolescents with Cerebral Palsy (CP).

Design/Summary

This was a feasibility experimental study.

Method/Justification

The sample consisted of adolescents (13-18 years old) with CP. The intervention involved group training in advanced motor skills, conducted for 1 hour per day, once a week, for 8 weeks. The assessments were carried out before and after the intervention using the Canadian Occupational Performance Measure (COPM), Mini-Balance Evaluation Systems Test (Mini BESTest), and the Test of Gross Motor Development-Second Edition (TGMD-2). Feasibility measures were also collected. Descriptive analysis was used.

Results

Four adolescents diagnosed with CP, with a mean age of 14(0.5) years and classified as level I and II in the Gross Motor Function Classification System (GMFCS), were included. The scores in the pre/post-intervention assessments were 4 (2.2)/5.8 (3.2) (performance) and 4.4 (2.3)/6.2 (3.2) (satisfaction) in goals related to participation in physical activities in COPM, and 67 (11.6)/73.8 (7.2) in TGMD-2. Additionally, the participants reported being satisfied with 8 out of 11 feasibility questions. They agreed with all 5 questions about the credibility and acceptability criteria of the intervention. However, two of them indicated that it was "difficult" to understand the therapist's instructions, and three reported some injuries during the intervention period.

Conclusion

The Sports Stars Brazil protocol showed positive results in a group of adolescents with CP. However, some adaptations need to be made. Future studies with greater robustness should be developed to evaluate the effectiveness of this intervention on this population.

1. R. de Sousa Junior, R. Camargos AC, Clutterbuck GL, R. Leite H. Effectiveness of Modified Sports for Children and Adolescents With Cerebral Palsy: A Pragmatic Study Protocol. Pediatric Physical Therapy [Internet]. 2022 Jan 1;34(1):81–7.

2. The benefits of Martial Arts practice for those with different abilities [VIRTUAL]

Dr Charles Spring and David Lee

University of Derby and Breaking Down Barriers to Martial Arts

Objectives/Aims

To highlight the benefits of Martial Arts training to students with SEND at primary schools in the UK.

Design/Summary

A range of evidence of the effectiveness of martial arts in producing affective, cognitive and behavioural benefits has been identified in numerous studies. Self-esteem, (Fuller, 1988), a more positive response to physical challenges (Richman and Rehberg, 1986; Trulson, 1986), increased autonomy (Duthie et al, 1978) and assertiveness coupled with emotional stability (Konzak and Boudreau, 1984). Other studies point to the effectiveness of traditional martial arts in reducing aggression and indicate reductions in anxiety and depression (Nosanchuk, 1981; Cai, 2000). Breaking Down Barriers to Martial Arts is an intervention that has been run by The Disability Martial Arts Association (DMAA) in the United Kingdom from 2007-2018 and since 2018 by Breaking Down Barriers to Martial Arts. It targets schools with higher than usual levels of disabled students from across the spectrum of disability, learning difficulties to wheelchair users, sight disabilities to students who have behavioural problems. The idea is to be completely inclusive and look at what a person can do not what they cannot do. It is also about introducing the children and young adults to the idea of what martial arts are, their diversity and the possibilities that they offer individuals of different ability. The opportunity to highlight the work being done by this organisation would be welcomed and also highlight current research being undertaken by the group towards gaining further evidence for these benefits.

Method/Justification

The presentation would highlight work that has been done by the group since 2007 and what is currently being proposed for further research. It does appear that many are unaware of Breaking Down Barriers to Martial Arts and the impact it has had on a number of students that have engaged with it over the years. The presentation will use several case studies to highlight this.

Fuller, J. R. (1988) Martial Arts and Psychological Health. British Journal of medical Psychology. https://doi.org/10.1111/j.2044-8341.1988.tb02794.x

Konzak, B., & Boudreau, F. (1984) Martial arts training and mental health: An exercise in self-help. Canada's Mental Health, 32(4), 2–8. Lakes, K. and Hoyt, W. T., (2004) Promoting Self-Regulation through school based martial arts training. Journal of Applied Developmental Psychology. 25(3) 283-282 DOI:10.1016/j.appdev.2004.04.002

Nosanchuk, T. A. (1981). The way of the warrior: The effects of traditional martial arts training on aggressiveness. Human Relations, 34(6), 435–444. Sage. https://doi.org/10.1177/001872678103400601

Richman, C. L. and Rehberg, H. (1986) The development of self-esteem through the martial arts. International Journal of Sports Psychology, 17(3), 234-239.

Trulson, M. (1986) Martial Arts Training: A Novel 'Cure' for Juvenile Delinquency. Human Relations. Sage. https://doi.org/10.1177/001872678603901204

3. **Supporting young adults with disability to be active in the gym: Perspectives from the leisure and recreation industry**

Ms Georgia McKenzie, Dr Rachel Kennedy, Dr Claire Willis, Prof Nora Shields

La Trobe University

Objectives/Aims

Social support is consistently reported as a key facilitator of community-based physical activity for young adults with disability. This study aimed to identify what social supports are currently available in community gym settings, and how they are implemented by gym facilities.

Design/Summary

A qualitative study using an interpretive description approach was completed.

Method/Justification

Twenty-five gym and exercise professionals from community gym settings, representing diverse organisational roles (e.g. floor staff, gym operators), completed semi-structured interviews about social supports and their organisational practices.

Data analysis was completed in two stages. First, data relating to types of social support were mapped to pre-identified social support categories. Second, reflexive thematic analysis was undertaken within each type of social support

Results

Social support was implemented either as part of standard practice, or as a purposeful inclusion support. Synthesis of the data produced two major themes relating to social support in community gym settings; (1) Getting in the door, getting started, and ongoing participation: how and when social support is provided for young adults with disability in the gym, and (2) Factors influencing implementation of social support strategies: people, partnerships, and policies.

Conclusion

Provision of social support was variable across local government areas, and within facilities of the same leisure operators. A number of innovative social supports were identified. The people, partnership, and policy factors should be considered within local contexts when seeking to scale up social support strategies within the leisure sector.

4. The effects of sport and physical recreation for children with physical disabilities: a systematic review

Kerry West 1, Cathie Sherrington 1, Juliana S Oliveira 1, Wing S Kwok 1, Heidi Gilchrest 2, Leanne Hassett 1

1 Institute for Musculoskeletal Health, The University of Sydney/Sydney Local Health District, Sydney, Australia; 2 School of Public Health, The University of Sydney, Sydney, Australia

Objectives/Aims

We aimed to identify the current evidence base on the effects of sport and physical recreation for children with physical disabilities.

Design/Summary

Systematic review including randomised controlled trials and other study designs (using quantitative methodologies) of sport and physical recreation involving children 18 years of age or under with physical disabilities. PROPSERO registration: CRD42020159283

Method/Justification

We searched 6 electronic databases combining population and intervention MESH headings and free text words. We extracted data on disability and sport/recreation type and the range of outcomes evaluated using the International Classification of Functioning, Disability and Health (ICF) framework.

Results

From 29,741 trials, 13,576 papers underwent title and abstract review and 450 full text review with 79 papers (from 71 studies) included for data extraction. Cerebral Palsy was the most common disability studied (40 papers) with mixed disabilities (24 papers) and Developmental Coordination Disorder (6 papers) also reported. There were 20 different types of sports and physical recreation activities studied. The most common were dance (15 papers), swimming/aquatic activities (10 papers) and mixed sport programs (23 papers). Only two studies specifically evaluated wheelchair sports/activities (dance and tennis). Only 18 were described as randomised controlled trials, mostly with small sample sizes. The most common study design was pre-post measures (36 papers). Outcome measures were predominantly at the impairment (36 papers) and activity level (54 papers) of the ICF framework. Participation level measures of outcome (beyond attendance) were only specifically reported in 13 papers.

Conclusion

Participation in sport and physical recreation is important for children in assisting them to achieve physical activity recommendations. The current evidence-base to establish the benefits of sport and physical recreation for children with physical disabilities is poor. More rigorously designed research is needed exploring a wider range of sports and activities and including a broader range of disabilities. Outcomes need to include participation-level measures.

5. The effect of aquatic therapy on motor skills and spasticity in children with physical disabilities

Eliska Vodakova 1, Patrik Klan 2, Ondrej Jesina 1, Martin Kudlacek 1

1 Faculty of physical culture, Department of Adapted Physical Activity, University Palacky, 2 Faculty of health science, Department of rehabilitation, University Palacky

Objectives/Aims

Activities in the aquatic environment are among the recognized and preferred physical activities due to their positive and therapeutic effects. By involving people with disabilities in these physical activities, we expect their positive impact on a whole range of components of health and quality of life. The aim of the presented project will be to assess the influence of a 3-month intervention program with a therapeutic effect in the aquatic environment on the motor skills of children with physical disabilities and the level of spasticity.

Method/Justification

We involved 10 children with different types of physical disabilities aged 6-7 in the research. The research strategy is based on case study principles and procedures. The program itself consists of interventions twice a week for 3 months. Individual lessons then last 45 minutes. We will verify the effect of this intervention on gross motor skills using the Gross Motor Function Measure Test, the Tardieu scale for spasticity, the Modified Functional Reach Test and the Water Orientation Test.

Results

So far, the results of pilot studies in children with the quadruparetic form of DMO show that regular therapy in the aquatic environment has an effect on improving motor skills and reducing spasticity. The biggest improvement in 6-7 weeks of the implemented program. We see the greatest improvement in rotations and coordination-balance activities. The level of spasticity also decreased.

Sajedi Sabegh, M., Nasermelli, M. H., & Ganji Namin, B. (2021). The effect of eight weeks aquatic therapy on quality of life, movement performance and pain in men with fibromyalgia. The Scientific Journal of Rehabilitation Medicine, 10(3), 496–507. https://doi.org/10.32598/sjrm.10.3.10

True, L., Pfeiffer, K. A., Dowda, M., Williams, H. G., Brown, W. H., O'Neill, J. R., & Pate, R. R. (2017). Motor competence and characteristics within the preschool environment. Journal of science and medicine in sport, 20(8), 751–755. https://doi.org/10.1016/j.jsams.2016.11.019

Vos-Vromans, D. C. W. M., Ketelaar, M., & Gorter, J. W. (2005). Responsiveness of evaluative measures for children with cerebral palsy: The gross motor function measure and the pediatric evaluation of disability inventory. Disability and Rehabilitation, 27(20), 1245–1252. https://doi.org/10.1080/09638280500076178

6. Children with cerebral palsy exhibit reduced skeletal muscle respiratory capacity

Sebastian Edman1, Linnéa Corel1l, Johanna Lanner2, Eva Pontén1 & Ferdinand von Walden1

1 Department of Women's and Children's Health, Karolinska Institute, Stockholm, Sweden;
2 Department of Physiology and Pharmacology, Karolinska Institute, Stockholm, Sweden

Objectives/Aims

To determine skeletal muscle respiratory capacity in children with cerebral palsy (CP).

Design/Summary

Muscles in children with CP are generally smaller, weaker, and more easily fatigued than muscles from typically developed (TD) children. Here we set out to examine whether the increased fatiguability of skeletal muscle in CP is reflected in a lower capacity of mitochondria to utilize oxygen.

Method/Justification

Muscle biopsies were obtained during planned orthopedic surgery and were immediately put in mitochondrial preservation media, dissected free of connective tissue, and chemically permeabilized using digitonin incubation. The muscle samples were then weighed (1-2mg), followed by mitochondrial respiratory capacity assessment during beta-oxidation, complex I- and complex II oxidation. Respiratory capacity was assessed using an Oroboros oxygraph-2k.

Results

Our preliminary findings (3 CP and 2 TD) suggest that muscles from children with CP have approximately 35% lower maximal respiratory capacity compared to muscles from TD children (37 vs 57pmol O2 x mg-1 muscle, p=0.07). Interestingly, this discrepancy was larger for respiration through complex I at 21pmol O2 x mg-1 muscle (range 19-28) for CP vs 39pmol O2 x mg-1 muscle for TD children (range 38-39; p<0.05). In contrast, succinate oxidation via complex II exhibited a much greater intragroup variation with 32pmol O2 x mg-1 muscle (range 17-56) for CP vs 46pmol O2 x mg-1 muscle (range 39-54; p=0.26) for TD children.

Conclusion

Our preliminary results show that children with CP have 35% lower maximal respiratory power in skeletal muscle as compared to TD children. The reduced power seems to be consistently reflected in complex I function as all tested children with CP exhibit a much lower capacity than TD children. By contrast, respiratory capacity through complex II exhibits a much larger variation in children with CP.

7. **The effect of Frame Running on physical fitness in young people with moderate-to-severe walking impairments, a feasibility study**

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1 The University of Edinburgh, 2 Gloucestershire University, 3 Queen Margaret University Edinburgh, 4 Royal College of Surgeons in Ireland

Objectives/Aims

The aims of this study were to examine a) the feasibility and acceptability of Frame Running (FR) and b) the feasibility of conducting a study on the effect of FR on cardiometabolic disease risk factors and functional mobility.

Design/Summary

A feasibility study with a single intervention arm

Method/Justification

Participants took part in FR sessions once a week over a 12-week period. Assessments took place at baseline and 12 weeks. Frame Running feasibility outcomes included training session attendance, adverse events and Frame Running drop-out, while for study feasibility study recruitment rate, outcome measure completion rate and study drop out were recorded. Other outcomes included resting heart rate (HRr) and blood pressure (BPr), knee extensor strength (KEstr), calf and thigh circumference (CCcalf, CCthigh), the Canadian Occupational Performance Measures (COPM),the shuttle FR test (SFRT) and 6-minute FR tests.

Results

Forty-eight young people with moderate-to-severe mobility impairments who had tried FR were approached about the study. Twenty-eight (58%) provided consent, but baseline and follow-up data were only collected for 16 (median age 10) due to the COVID-19 pandemic. Mean FR training attendance was 70%. Two stopped with FR club sessions during the study period and of these one also withdrew from the study. No serious adverse events were reported. Outcome measure completion rates ranged from 66% (6minFRT) to 97% (KEstr). The COPM and SFRT were only collected at one site for 5 participants (100% completion rate). Reasons for missing data included participants not liking sticky tape, and logistical reasons. Effect sizes (Cohen's d) > 0.3 indicating improvement post intervention were found for HRr, CCcalf, KEstr and COPM.

Conclusion

Frame Running training is a feasible and safe for people with moderate-to-severe mobility impairments. The present data on outcome measures completion and effect sizes will inform future appropriately powered studies.

8. The Therapeutic value of snooker

Liz Fletcher, Occupational Therapist; Andy Chapman, Occupational Therapist; Bob Hill, Manager World Professional Billiards and Snooker Association

Sport for Confidence CIC; World Professional Billiards and Snooker Association

Aim To research the health, wellbeing and social benefits of playing snooker and demonstrate findings in a visually appealing guide which is useful for members of the health and sport sector.

Objectives Co-produce the guide with healthcare students on clinical placements; Collaborate with key stakeholders; Complete a literature review and showcase findings; Demonstrate how snooker can be used therapeutically and as an assessment and intervention tool; Provide signposting information, relevant to snooker, health and wellbeing

Summary The poster presentation will showcase aspects of the snooker guide, highlighting the benefits of snooker on health, wellbeing and quality of life. It will demonstrate what inclusive snooker is and how adaptable the game can be for individuals and groups. The existing evidence base will be shown and why further research could benefit lives.

We would like people to see how snooker can provide an important role when encouraging movement and physical activity. Snooker, when used therapeutically, provides a safe, inclusive environment which is encouraging, welcoming and creates a sense of belonging, providing a perfect environment for people to move from a sedentary lifestyle to moving more.

Justification Sport for Confidence are a Sport England system partner, part of the organisational objectives are to help link the sport and health sector. Bringing health and sports colleagues together by working with NGBs on a shared project enables both sectors to combine their collective intelligence. Healthcare professional are seen as essential to reduce physical activity in the Global Action Plan on physical activity (WHO 2018).

Result The therapeutic snooker guide has been published and downloaded over 1000 times. Students have provided positive feedback after engaging in their snooker focused clinical placements "I hadn't considered just how many physical health benefits there are to playing snooker, especially when the environment is inclusive". A speech therapist comments "I will be exploring snooker hubs now in the local area as I can see my clients could benefit massively". Sport for Confidence continue to jointly share the guide by attending events with the World Professional Billiards and Snooker Association.

Conclusion Snooker is not always given the attention it deserves, however this is a highly adaptable sport which has health, social and wellbeing benefits. Snooker provides people with an opportunity to be part of a group in which they feel included. The games deserves more attention and to be viewed through the health and wellbeing lens, rather a purely sporting or leisure lens.

Global action plan on physical activity 2018–2030: more active people for a healthier world. Geneva: World Health Organization; 2018. Licence: CC BY-NC-SA 3.0 IGO.

9. Reimagining golf clubs as Health Ageing Hubs

Anthony Blackburn, Founder of Golf in Society; Rachel Young, Research Lead, Advanced Wellbeing Research Centre; Liz Fletcher, Clinical Lead, Sport for Confidence

Golf in Society Social Enterprise; Sport for Confidence CIC; Advanced Wellbeing Research Centre

Aims/Objectives

This project will address the challenges associated with cognitive decline and frailty amongst older adults through the reimagining/repurposing of golf clubs as Health Ageing/Research Hubs. The aims of this project are to: Conduct a mixed methods evaluation of a 12-week programme of adapted golf coaching with integrated PT/OT for people with age related cognitive impairment and their caregivers.

Two distinct arms co-exist within this evaluation project: 'Physical impact' will measure physical impact of participation in the programme by people with age related cognitive impairment; 'Caregiver experience' will explore the caregivers' experience of the programme

Objectives: Recruit and consent eligible participants to the evaluation strand of the project; Conduct baseline and post-intervention measurements of strength and mobility to examine the physical impact of the programme upon older adults with cognitive decline

Explore the experience of programme participation with caregivers to gain insight into their perspective and impact upon self-reported wellbeing

Method Physiological and biomechanical baseline and post-intervention measurements at the Advanced Wellbeing Research Centre (AWRC) will examine the physical impact of the programme. Qualitative and self-report wellbeing data will be collected from caregivers to explore the experience of the programme from their perspective. This project will integrate internal expertise from the Sport Industry Research Group, Sports Engineering Research Group and Department of Allied Health Professions with external collaborators including Sport for Confidence who will deliver and govern the PT/OT programmes. Physical impact measurement: repeated sit to stand; timed up and go; hand grip strength; 10 metre walk test; 'Static balance'; 'Caregiver experience'

All quantitative test statistics will be tested for normality and transformed as necessary. Following this, simple inferential statistics (parametric or non-parametric, depending if transformation of variables was successful) will be calculated for each test statistic along with effect sizes.

Results The research is due to finish in Dec 2023. However this research project follows on from previous qualitative research. Therefore a summary of progress will be included on the poster and results included from the previous testimonials from 'Golf in Society' beneficiaries which indicate that they experience multiple benefits associated with the enterprise including reduced care-giver stress, improved physical capability and mood enhancement amongst participants.

Conclusion The 12 week program has been co-produced by professionals from an academic background, health and social care, local authority, ICBs/ICSs, third sector organisations. It incorporates learning for healthcare students throughout the program. All stakeholders will be kept informed of the progress and outcomes.

Sport for Confidence are a Sport England System Partner and will be sharing the learning and outcomes across the sport and health eco system.

10. A Low-cost FrameRunner bicycle for Para sport in South Africa

Dr Phoebe Runciman
Institute of Sport and Exercise Medicine, Stellenbosch University

Objectives/Aims

The aim of this study was to design a low-cost FrameRunner that's cheaper than existing international FrameRunners, for use in South Africa and other developing nations.

Design/Summary

Design a South African FrameRunner to international specifications.

Method/Justification

A main reason why FrameRunning as a sport is not growing in developing nation settings is the cost of a FrameRunner. This equipment is expensive for those living in developing settings. If a more affordable FrameRunner is produced, the sport may be able to spread to these developing nations as it has in developed nations. This FrameRunner should be designed to international specifications. This will allow the FrameRunner to be used to participate in international competitions.

Results

This FrameRunner conceptual design aimed to be as low cost as possible. The design must meet international specifications. The FrameRunner was designed to be adjustable to accommodate a variety of body sizes (1,40m-1,93m). The adjustability of the frame allows a wide variety of individuals to use a single FrameRunner. Using standard parts also contributes to reducing the price of the equipment. Standard parts are easier to find and cheaper than developing them.

Conclusion

This conceptual design for a FrameRunner is simplistically designed with high adjustability. This allows for various individuals to use the same FrameRunner. Force calculations show that the deflection of the frame is within tolerance.

11. Physical Education Teachers' Opinions on Teaching Students with Physical Disabilities in Scotland's Mainstream Schools

Ross A. Galloway and Martine H. G. Verheul

Human Performance Science Research Group, University of Edinburgh

Aim

This study aimed to investigate the opinions of Scottish physical education (PE) teachers on teaching students with physical disabilities (SWPD) in mainstream schools.

Design

Cross-sectional online survey

Method

Physical education teachers (N = 113; probationary year to 10+ years teaching) and final-year physical education students with placement experience (N = 11) were recruited by sharing a survey link via university group email, an alumni network and by contacting Scottish secondary schools. The survey included multiple choice, Likert (agreement) scale and open questions.

Results

Almost all respondents (97%) reported to have experience teaching SWPD. Most (86%) reported finding including SWPD in their lessons challenging. Many reported that their teacher education had insufficiently equipped them with the knowledge (50%) and experience (64%) on how to include SWPD in PE lessons, with some reporting no prior training. Current and recent graduates tended to feel better prepared. Only 35% of respondents reported to receive sufficient support to effectively include SWPD in their PE practice. Respondents reported a lack of funding, assistance, and equipment. When asked about positive aspects, respondents reported added value for the SWPD, the peers within the class and for themselves. When describing their overall perspective, PE teachers expressed their commitment to inclusion.

Conclusion

The right for SWPD in Scotland to be educated in mainstream schools alongside their peers means that PE teachers in mainstream education must provide inclusive lessons. Teachers are committed to inclusion, but many lack the relevant training and/or support. National and local authorities must ensure appropriate training and resources (staffing and equipment) to enable effective inclusion of SWPD in PE lessons.

12. Long-term sport or exercise commenced before 16 years of age reduces adverse body composition outcomes in cerebral palsy

Jennifer R.M. Fleeton, Ross H. Sanders, Yorgi Mavros, Ché Fornusek

The University of Sydney School of Health Sciences, Discipline of Exercise and Sport Science, Faculty of Medicine and Health, The University of Sydney, Camperdown, New South Wales, Australia

Objectives/Aims

Bone mineral density (BMD) and appendicular lean mass (ALM) deficits are common in people with cerebral palsy (CP), increasing sarcopenia and osteoporosis risk (1), while sport/exercise participation before age 16 improves adult peak bone mass accretion (2). This study investigated the effects of high-level sport/exercise participation commenced before age 16 on body composition in ambulatory adults with CP.

Design/Summary

Cross-sectional observational pilot study

Method/Justification

Body composition was measured via dual-energy X-ray absorptiometry in 26 adults (m=19; f=7; GMFCS I-III) grouped via self-reported activity level into Low (<150 minutes moderate-vigorous activity weekly; n=10), Post-16 (active but commenced participation after 16; n=6), and Pre-16 (active and commenced participation before 16; n=10). Between-group Z-score differences were assessed via Kruskal-Wallis one-way ANOVA, with post-hoc comparisons via Mann-Whitney U-test.

Results

Whole body, spine and hip BMD Z-scores were significantly higher in Pre-16 (1.020 (0.639), 1.210 (1.102), and 0.450 (1.325), respectively) versus Low (-0.500 (0.715), -0.840 (0.957), and -1.020 (1.059), respectively) ($p<0.001$-0.008). Thirteen participants, including four competitive athletes, had low BMD, and 15, including eight athletes, had moderate-significant ALM deficits, versus age- and sex-specific reference populations.

Conclusion

Ambulatory adults with CP who exceed physical activity guidelines and commenced participation before age 16 have higher BMD than those who are sedentary or commenced participation after age 16. Sport and exercise across the lifespan are critical to ameliorate adverse body composition outcomes common in CP, however, some athletes remain at-risk and require targeted combined resistance training and dietary interventions in addition to sport training to address low ALM and BMD.

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13. Scottish Disability Sport (SDS) Get Active Referral Programme

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Objective

To describe and analyse trends in the data on the Scottish Disability Sport (SDS) Get Active Referral Programme

Design

Cross-sectional study using real-world data

Methods

Data from the SDS Get Active Referral Programme from 2016 to 2022 was extracted from SDS records. Postcodes of individual's home address were used to the derive the Scottish Index of Multiple Deprivation (SIMD) quintiles. The primary outcome was defined as whether or not the individual was supported to get more active (Y/ N).

Results

Data from 152 individuals (median age 9, range 3-64, thirteen over 17) were available. Seventy (46%) were supported get more active through sport and 69 (45%) were not. Nine were signposted or given information. Physiotherapists (n=122,79%) and occupational therapists (n=21, 14%) were the main referrers. Cerebral palsy (CP) was the most common health condition (n=44, 29%). Physical impairment was noted for most (n=129, 85%), intellectual impairment for 49 (32%) and visual impairment for 14 (9%). Swimming (n=23), wheelchair sports (n=18), Boccia (n=10) and Football (n=11) were the most common sports. *Higher* success rates of the programme were found for those aged 6 and under (67% vs. 7-16ys; 33%), *not* having an intellectual impairment (52% vs 33%), and those living in the least deprived area (SIMD 5; 58% vs SIMD 1; 41%). Sixty-eight % of individuals with CP were supported into sport.

Conclusion

These data provide a comprehensive insight in the SDS Get Active Referral Programme, highlighting a range of factors which can influence its success rate.

14 Effect of heated garments on performance of para-athletes with Cerebral Palsy

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Purpose

This applied project evaluated the use of heated garments during passive rest on subsequent sprint and jump performance in para-athletes with cerebral palsy (CP).

Methods

On six occasions, two sprinters with CP and one with neurological impairment (NI) completed a standardised active warm-up followed by 0 min passive rest (WU), 10 min passive rest with (10H) and without (10NH) heated trousers, and 20 min passive rest with (20H) and without (20NH) heated trousers. The final condition involved active warm-up whilst wearing heated trousers (HWU). Participants removed the garments and performed two single-leg countermovement jumps (CMJ) to record jump height. Flying 30 m sprint (F30) was completed to measure speed. Skin temperature (Tsk) was measured via iButtons attached to the thigh, and thermal sensation was reported on a visual scale.

Results

Tsk increased from pre-warm up to post-warm up to post-rest in all conditions, and thermal sensation was higher following heated than non-heated conditions. Participants with CP decreased F30 speed from WU to 20NH by 0.28 ± 0.17 m/s which reduced to a difference of 0.23 ± 0.16 m/s with 20H. Participant with NI maintained F30 speed across conditions (WU: 8.02 m/s, 20NH: 8 m/s) with an increase to 8.26 m/s following HWU. CMJ was lower on affected sides than non-affected sides (7.8 ± 6.7 vs. 14.5 ± 5.2 cm).

Conclusion

20-minutes passive rest is detrimental to sprint performance in para-athletes with CP, and this decline may be reduced but not restored by use of heated garments.