

Utilising Gymnastics Exercise as Rehabilitation for Children with Physical Disability

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Abstract:

Disabilities affect 650 million people worldwide [1]. Of this number, up to 150 million of these are children [2]. These numbers are inclusive of both physical and intellectual disabilities.

In Ireland 8,532 children with physical disabilities attended the services of Enable Ireland in 2019 [3]. Enable Ireland is a registered charity contracted by the Irish Health Services Executive (HSE) to provide services to children and adults with disabilities. [4] The purpose of this paper is to examine the possibility that rehabilitation for children with physical disabilities can be augmented with gymnastics exercise in a fun, progressive manner and reduce stress and anxiety at home.

I circulated questionnaires to coaches, children and parents/caregivers attending the Gymnastics Ireland, GymAble classes. I also requested the assistance of a colleague who trains coaches in the UK and South Africa in Disability Gymnastics, to circulate the questionnaires internationally.

The questionnaires were designed to determine subjective and objective opinions regarding improvement in the children's strength, flexibility, co-ordination and balance as well as enjoyment levels. The questionnaires were circulated using Survey Monkey.

Results showed that both physical and psychosocial benefits were observed in the children taking part in the GymAble classes by the children themselves, their parent/caregivers and the coaches of the classes. There are strong indications that gymnastics exercise could be utilised as rehabilitation for children with physical disabilities.

Acknowledgements

I am grateful for the generosity of all the children, parents/caregivers and coaches of the Irish GymAble programme and of Disability Gymnastics in the UK and South Africa who took the time to take part in my surveys. Their input has been invaluable to me.

I want to thank Ciaran Gallagher, CEO of Gymnastics Ireland and Aimi Baker, Participation Manager, Gymnastics Ireland for their assistance, co-operation and permission for me to contact Gymnastics Ireland GymAble clubs.

In addition, I am very grateful to Hazel Coates of the British Disability Gymnastics Committee for her assistance in circulating my surveys to the UK and South Africa.

I also want to extend my gratitude to Dr. Shawn Pourgol, MBA, DC, DO, PhD, for giving me the opportunity to carry out this research.

Finally, I want to thank my wife Clare who is the senior GymAble coach for Cork Acro Gymnastics Club for her input and her never ending support of me in all I do.

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Introduction:

Overview

In the Republic of Ireland it is normal for a child with physical disabilities to have very limited access to physiotherapy led rehabilitation. The Irish Health Services Executive (HSE) contracts the assistance of Enable Ireland to provide physiotherapy and/or occupational therapy to children with physical disabilities. This service is provided for the children from diagnosis up to 8 years of age. During this time the children receive 6 hours of physiotherapy led rehabilitation per year. This is carried out 1 hour per week for a six-week block. Following this age the children are no longer provided with those services. After 8 years of age the children are monitored once per year for maintenance and equipment.

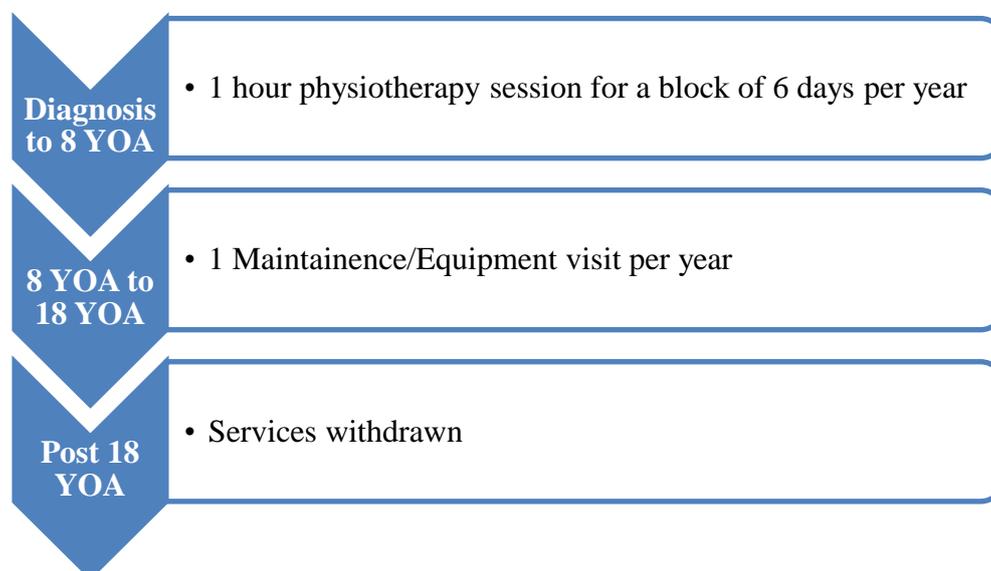


Figure 1: Process flowchart for children with physical disabilities with Enable Ireland

To supplement this, the children have a daily regime of rehabilitation exercises that need to be completed at home. This invariably has led to anxiety and frustration on behalf of the children and parents/caregivers [4]. The practice of using parents/caregivers to do home rehabilitation has increased over the past 15 years. However, it has been shown that compliance has at times been poor due to the anxiety levels and stress in the home. [5] [6] [7] [8]

Gymnastics is a fun sport that has demonstrated many physical and psychosocial benefits for children. [9] [10] It is a sport with growing popularity and in Ireland it has 36,000 members nationally. [11] As well as the physical health benefits, being part of a gymnastics club also provides psychosocial benefits such as friends, social interaction, increased confidence and a sense of inclusion by being a member of a sports club. [9]

Some of the children attending the regular classes have siblings with a physical disability. These siblings may have felt either unable to participate or left out due to their disability. This was recognised by clubs and steps and training was initiated to make gymnastics more inclusive. In Ireland, the national governing body for gymnastics (Gymnastics Ireland) launched the GymAble programme. Training was provided to coaches and with the support of Gymnastics Ireland, classes were started for children with physical disabilities. Separate classes were organised for children with intellectual disabilities, however this is outside the scope of this study. In other countries similar classes are running under the title of Disability Gymnastics.

The children taking part in the GymAble classes for physical disabilities are mostly affected by cerebral palsy however some are stroke victims, who have suffered strokes either in utero or shortly after birth. Others are children who are amputees, paraplegic and triplegic.

Within a number of months it was noticed and commented on by the children's personal physiotherapists that the children had improved in ability much quicker than expected. It was also stated that the children were enjoying the classes. Parents/caregivers commented that they observed the children performing exercises that were very similar to the children's home rehabilitation exercises and felt that on the days that they attended their gymnastics classes they were able to omit their regular evening home exercise session. Some parents/caregivers stated that their evening home exercise sessions were often timed close to the children's bedtime and at times, this made compliance difficult due to the child being tired. As some of the children required early bedtimes the exercise sessions had to be timed between their evening meal, school homework and bedtime. It was stated that the GymAble classes relieved some of the anxiety and stress at home.

As the aims of the classes are inclusivity, participation and fun it was never the intention of those running the classes to take scientific measurements before and at intervals throughout the year. This made it impossible to scientifically measure any gains the children would have made. For that reason, my study is based on subjective and object observation and opinion taken from the children (subjective), their parents/caregivers (objective) and the coaches (objective).

In 1994 the World Health Organisation (WHO) recognised that rehabilitation for children with disabilities was lacking on a global scale. A guide for rehabilitation programme managers was published. [12] In order to maximise the availability and outreach of rehabilitation services, more flexible and community based services emerged. This included, home and school based programmes as well as training of primary health care workers, family members or community rehabilitation workers in core elements of rehabilitation. The aim of the community bases rehabilitation was to utilise the available resources in the social context while motivating communities to work with persons with disabilities and remove barriers to participation and inclusion. [13]

In addition to the above the Convention on the Rights of Persons with Disabilities, the first legally binding treaty that reaffirms that all persons with all types of disabilities must enjoy all human rights and fundamental freedoms, was published in 2008. [14]

The documents listed above recognise the rights of children with physical disabilities to inclusion and rehabilitation. The WHO rehabilitation guidelines go so far as to promote local, community based rehabilitation programmes. [13] However, it is of the utmost importance that such programmes are delivered by suitably qualified and trained personal.

Children with physical disabilities living in Ireland

The 2016 Irish census [15] included information of disabilities. Data was gathered on the number of males and female and types of disabilities that people living in Ireland were affected by.

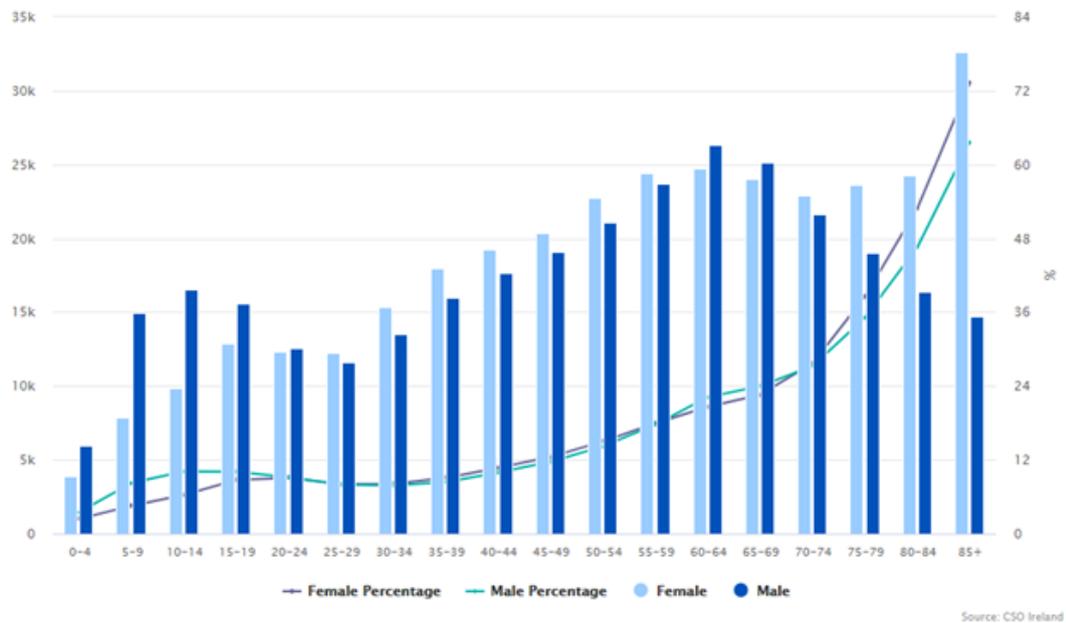


Figure 2: Number and Percentage of Males and Females with a Disability 2016

The census provided data on the family status of the person with disability. It can be seen in the figure 3 below that the percentage of children with a disability and the type of disability that affects them. Difficulties relating to physical disabilities have been highlighted.

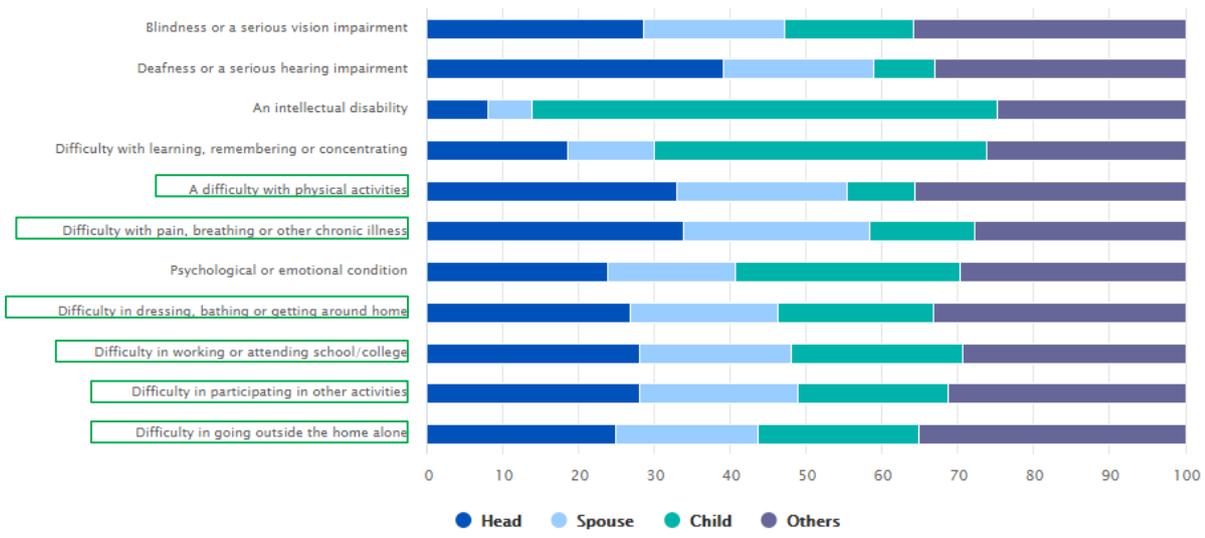


Figure 3 Type of Disability by Status in Family

Figure 4 below illustrates the number of people affected with a physical disability that substantially limits basic physical activities. Figure 4 has broken down the number of people by age. It should be noted that since this information is from the 2016 census the children represented here (under 19 years of age) are now four years older. In addition, more children have been born and if the percentages of the 2016 census were carried forward then 4 out of 10 (40.9%) [15] of all people with disability would have trouble with basic physical disability.

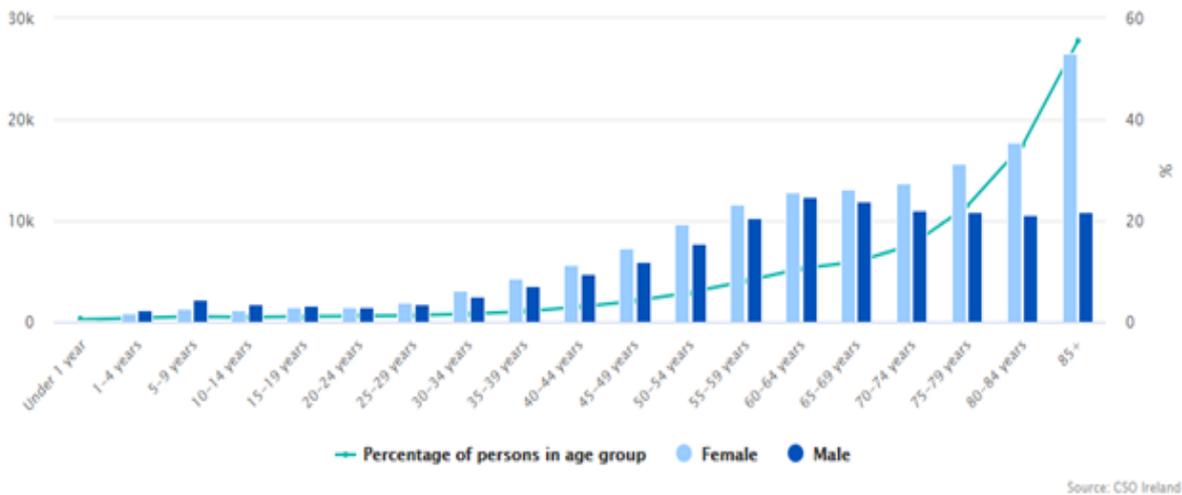


Figure 4: Physical disability that substantially limits physical activities broken down by age

From the data provided above we can calculate that in 2016 there were in Ireland, approximately 11,360 children aged from under one year up to nineteen years of age who were affected by a physical disability, which substantially limited their physical activities.

Participating in leisure or other activities affected 6 out of 10 (60%) people with physical disabilities according to the 2016 census. [15] Using the numbers calculated above in Figure 3, it can be calculated that over 6,800 children were included in this data.

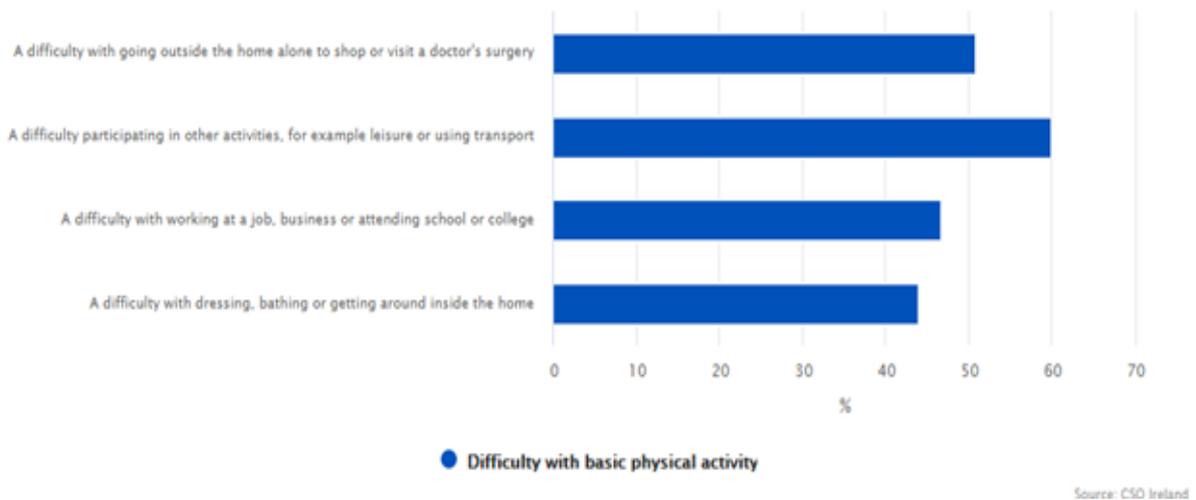


Figure 5 Difficulties experienced by persons that substantially limits basic physical activities 2016

Having reviewed the current structures for the rehabilitation of children with physical disabilities in the republic of Ireland the aim of this study is to determine if gymnastics exercises can be utilised as rehabilitation for children with physical disabilities. It has been long recognised that rehabilitation is important for children with physical disabilities and furthermore, optimizing home and community participation of children with physical disabilities is an important outcome of rehabilitation. [17]

In addition to the potential physical benefits, psychosocial benefits should also be considered. Children with physical disabilities grow to be youths with physical disabilities. Physical function, communication or speech problems can contribute to a lack of social engagement and ability to make friends for children with physical disabilities. [18] Social participation with friends fosters development of meaningful relationships, life skills and psychosocial well-being, [19] however for children and youths with physical disabilities the number and frequency of activities done with friends differ based on self-perceived competence as a friend. [19]

According to the European Commission, being part of a sports club has the following benefits, healthy bodies and minds, social skills, self-esteem, skill building and tolerance. [20] Having friends is an important component in childhood development. Children with large groups of friends have been associated with gains in school performance. [21] Making friends and having interaction with people in a sporting environment outside of your family is beneficial to the child. It will raise their self-esteem and raise their self-perceived competence as a friend.

Literary review

Searches were made on PubMed/Medline, Google Scholar, Physiopedia, the Journal of Disability and Rehabilitation, the Journal of Paediatric Physical Therapy, the Journal of Qualitative Health Research, the Journal of Cardiology in the Young, the Journal of Child Development, the Journal of Developmental Medicine and Child Neurology and the Scandinavian Journal of Medicine in Sport.

Additional research was carried out through the websites of the International Labour Organization, the European Commission, the United Nations Department of Economic and Social Affairs, the Irish Central Statistics Office, the World Health Organisation, Health Sports and Irish Gymnastics.

Information from two books, “Gymnastics, How to Make a Champion” and “Physical Activity and Health, a Report from the Surgeon General” was also utilised.

The search terms used were, children with physical disability, physiotherapy for children with physical disability, children with physical disabilities in Ireland, rehabilitation for children with physical disabilities, participation in leisure, health benefits of gymnastics and benefits of being a member of a sports club.

In all, over 2,450,000 papers were identified. A large group of these papers dealt with the psychological aspects of both the parents/caregivers and of the child with a physical disability and were discarded from the search. Another large group of studies dealt with children with intellectual disabilities and was also discarded from this study. Other large groups dealt with the provision of facilities and care, the development of disability scales, coping mechanisms for parents/caregivers, participation of children with physical disabilities in recreation and leisure and stress levels of parents/caregivers to name but a few.

As illustrated above, there has been intense research done on the area of children with physical disability. However, no study was discovered that looked at the use of exercise to supplement conventional physiotherapy. The link between physical activity and health has been well established. [22] [23] [24] The main treatment recommended for children with physical disability and sought by parents/caregivers is physiotherapy. [25] One study on a fitness program for children with disabilities that focused on group strength and endurance exercises found that the children showed improvement after taking part on a twice weekly basis over a 14 week period. It also demonstrated that it was safe and feasible to have children with physical disabilities take part in this type of exercise. [26] The study went on to state that further studies are needed to determine the most effective training intensity, duration, and activities. [26]

There is a lack of specific exercise guide-lines for individuals with many chronic diseases and disabilities. [27] Studies in this area will enable exercise professional to develop exercise programmes that are individually tailored to meet each child’s need. [27]

Aims

The aim of this study is to determine if gymnastics exercise could be utilised as rehabilitation for children with physical disabilities. The study design was to determine if the children, their parents/caregivers and/or their coaches observed physical and/or psychosocial benefits from taking part in a structured gymnastics exercise class. If so, it is hoped that this study will go some way towards identifying gymnastics exercises as safe, fun, effective and club based exercise for children with physical disabilities, as well as having rehabilitation capabilities.

Method

Three questionnaires were designed. These were circulated with permission from Gymnastics Ireland to all Irish clubs involved in the GymAble programme. In addition, assistance was sought from colleagues in Northern Ireland and the UK to circulate the questionnaires among similar programme in Northern Ireland, the UK and South Africa.

The gymnast's questionnaire is subjective in that the child has given their own opinion/feelings on the questions asked. The questions ranged from their feelings before starting their first class to what physical benefits (if any) they felt.

Both the parents/caregivers and the coaches questionnaires were objective. The parents/caregivers were asked for information on their observations regarding the physical benefits (if any) they observed in their children and any change (if any) in their child's psychosocial development over time. The coaches were asked for information on what they observed in the children. Questions ranged from how the coaches felt before their first class to the support they received, to what physical benefits (if any) they observed in the children over time.

The children involved in the classes were aged between 4 years of age and 14 years of age. The mean age was 8 years of age. Most of the children had been taking part in the classes for more than one year at the time of this study.

Survey Monkey was used to design, distribute and analyse the questionnaires.

Results

Gymnasts Survey: 12 responses

The gymnasts were asked 10 questions. They included questions designed to determine if the children had noticed any physical or psychosocial benefits from taking part in the class. In some questions the children could give more than 1 answer. The results are given below. (See figures 6 to 20)

Question 1: Why did you want to join the GymAble Class? The choices of answers were;

- I wanted to make new friends
- I wanted to try gymnastics
- My friends were doing gymnastics
- I didn't want to. Mom or Dad made me join.
- I wanted to try a new sport
- I wanted to improve my fitness

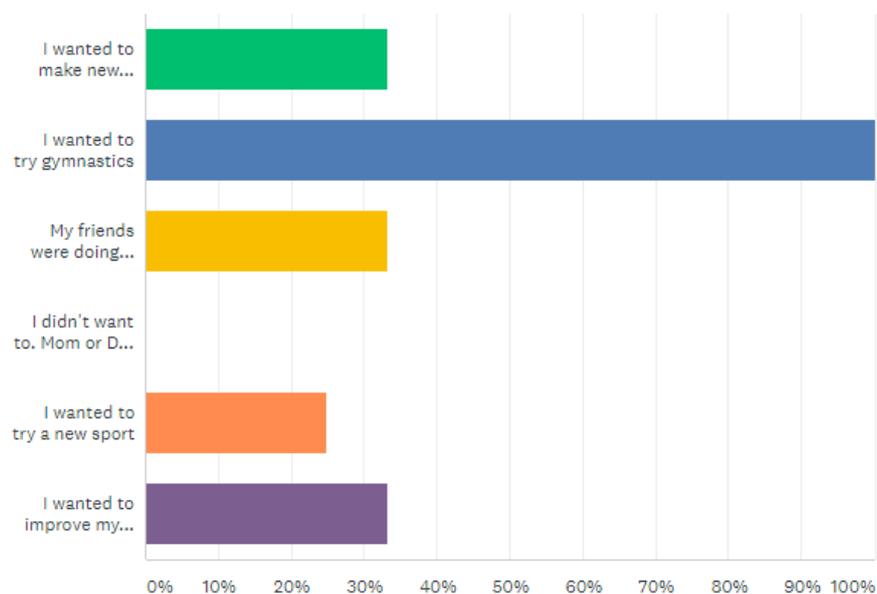


Figure 6: Results of question 1 “Why did you want to join the GymAble Class?”

The results of question 1 demonstrate that the main reason the children wanted to join the gymnastics class was to try gymnastics. Interestingly a significant number of the children surveyed (33.33%) had awareness of their physical fitness and stated that wanting to improve their fitness was also a reason, as well as making new friends and wanting to try a new sport.

Question 2: If you have a different reason, please give it here.

For this question, no additional reasons were given. There was no mention of rehabilitation by the children as a reason for joining the gymnastics class. As can be seen from the answer to question 1, the main reason the children joined the GymAble class was to try the sport of gymnastics (100%)

Question 3: How did you feel before your first class? The choices of answers were;

- Excited
- Sad
- Unsure
- Happy
- Very Happy

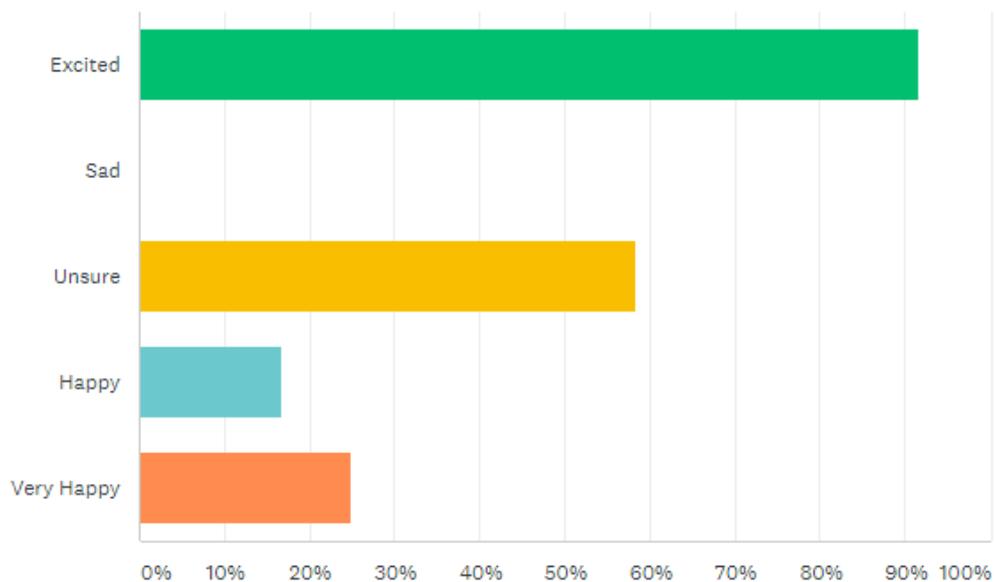


Figure 7: Results of question 3 “How did you feel before your first class?”

From these results it can be clearly seen that the children were excited about the prospect of joining a gymnastics club. There was however a significant amount of the children (58.33%) who felt unsure about the prospect of taking part in a gymnastics class. I suggest that some of the reasons for this feeling of being unsure could include lack of confidence, thinking the class may be too hard for them or fear of being hurt. Additional research would be required to determine the reasons for sure.

Question 4: Now how do you usually feel about your class? The choices of answers were;

- Excited
- Sad
- Unsure
- Happy
- Very happy
- A bit tired
- Very tired
- Feeling fine
- Feeling proud of myself

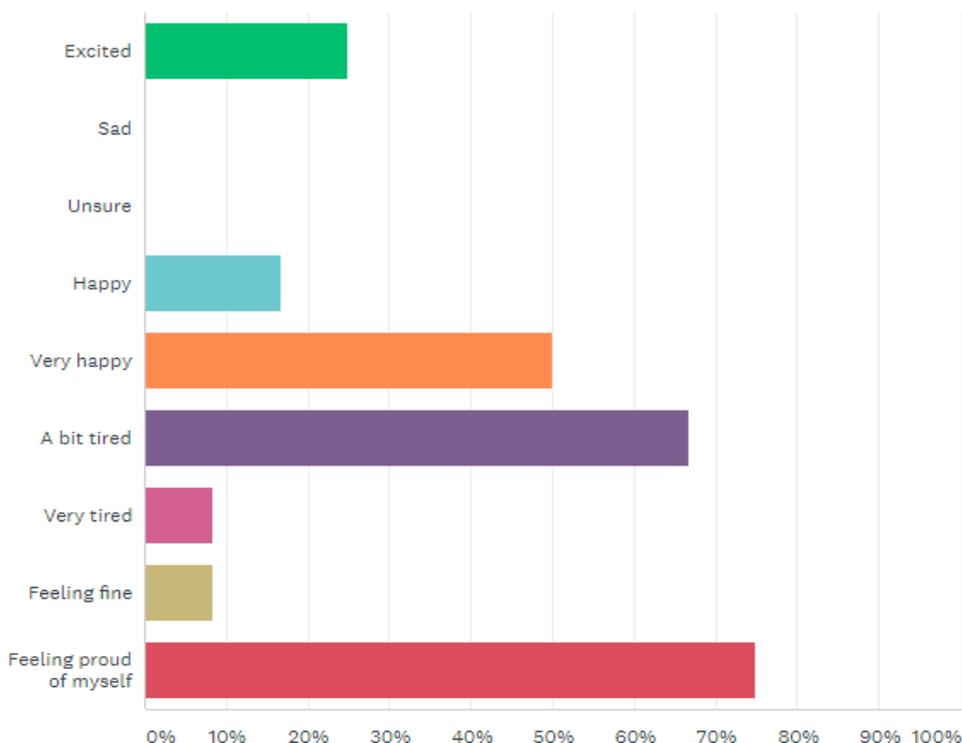


Figure 8: Results of question 4 “Now how do you usually feel about your class?”

The results of question 4 demonstrate that after participating in the GymAble classes for a period of time (3 months to 2 years) the children’s feeling had moved from excitement to pride at their accomplishment. They also felt a bit tired or very tired, (66.67% and 8.33% respectively) which is a normal effect of exercise.

Interestingly, the option of feeling unsure received no result. When you compare this to question 3 it can be seen that now the children have gained confidence in their ability. The result has moved from 58.33% to 0%.

Question 5: What did you like best about your class? This was an open question.

Answers included, “Having fun while exercising”, “moving and bouncing”, “Bouncing and new stands”, “The trampoline and making new friends”.

The result of this question demonstrates that the children were enjoying their class and having fun. They were interacting with the equipment and each other. There was also an awareness demonstrated in the answers that the children realised they were exercising. This is particularly important for children with physical disabilities as it promotes physical literacy. They are realising that exercise can be different from their regular rehabilitation sessions that can, at times be painful for the child.

Question 6: What did you like least about your class? This was an open question.

Answers included, “Nothing, I love all of it”, “Can get quite tired”, “Sometimes I don’t like to try new things”, “When the class ends”.

The answers to this question suggest that the children were active during their class to the extent that they were tired by the end of it. They loved their gymnastics class, however some would still have apprehension when faced with new challenges during their class.

Question 7: After some classes, did you feel that you got more confident with some of your gymnastics skills? This was a Yes or No question.

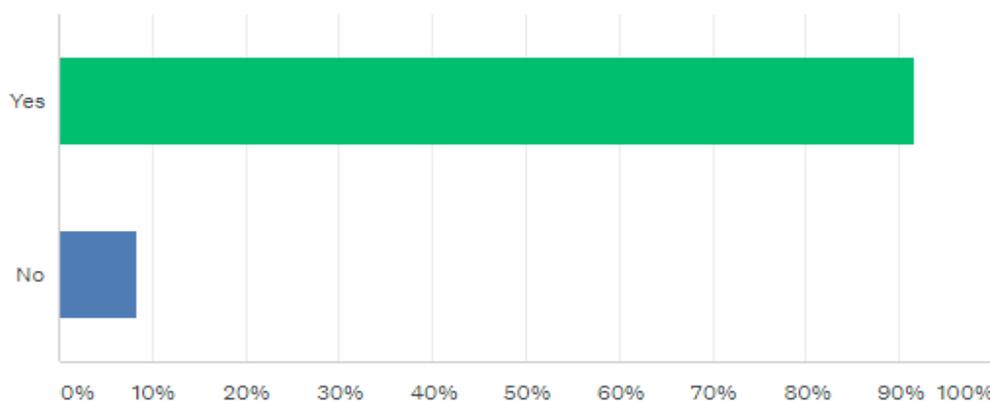


Figure 9: Results of question 7. “After some classes, did you feel that you got more confident with some of your gymnastics skills?”

After a period of time had been spent attending the gymnastics classes most of the children (91.67%) had gained confidence in their ability to succeed at the activities they were attempting. A small portion of the children (8.33%) did not feel more confident. It is not known how long these children were attending the class or the physical disability they had.

More research would be required to determine the reason that these children were lacking confidence and what could be done in the class to address this lack of confidence.

Question 8: Which of the following do you think has improved for you? The children could choose as many options as they wished. The options were;

- Muscle tone
- Flexibility
- Endurance
- Posture
- Gymnastics skills
- Balance
- Co-ordination

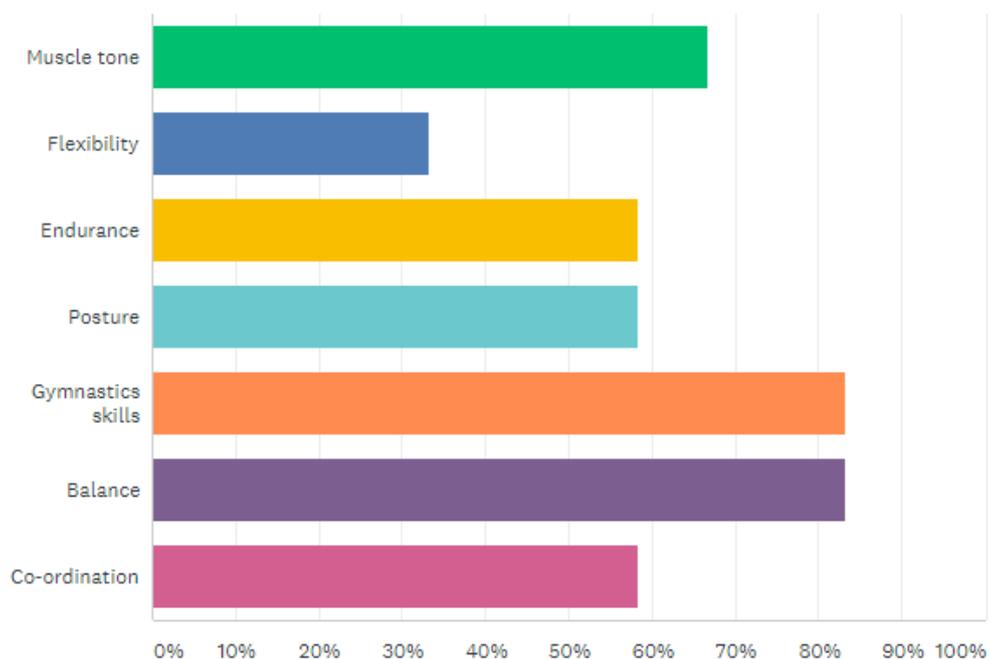


Figure 10: Results of question 8. “Which of the following do you think has improved for you”?

This question and the answers given speak to the utilisation of gymnastics exercise as rehabilitation for children with physical disabilities. These answers are subjective and reflect the children’s opinions regarding improvements they had noticed in themselves.

The largest improvements the children noticed was in their balance and gymnastics skills (83.33%), while improvement in muscle tone was noticed in a significant number of children (66.67%) followed by endurance and posture (58.33%). Improvement in flexibility was also noticed in the children (33.33%).

These results demonstrate that taking part in a gymnastics exercise class such as GymAble will improve the characteristics listed in question 8, for children with physical disabilities. It is accepted that scientific measures have not been taken for this study. However, the

experience of the children that they have made gains in the characteristics listed in question 8 must be considered. Later in this study the opinions of the parent/caregivers, coaches and the children's private physiotherapists/occupational therapists will be considered alongside the children's opinion.

Question 9: What else do you think has improved? This was an open question.

Answers included improvements in language skills, listening skill, concentration and confidence.

These results demonstrate an improvement for some of the children in their attention capability. Language skills have improved because they have to engage more with more people and their confidence has grown due to their experience of success at some skills/challenges.

Question 10: What do you feel was your best improvement? This was an open question.

Answers included improvements in strength, confidence, balance, and gymnastics skills.

These answers were very individual to the children. Interestingly, included in the answers to this question was an improvement in the children's confidence. This suggests that having low confidence can be a major factor for some children with physical disabilities. This in turn may be a factor preventing them from taking part or attempting new sports or experiences. A positive finding in this study is that the children's level of confidence was raised by partaking in their gymnastic class. Being involved, taking part and interacting with the coaches, other children and equipment helped give them positive experiences, which led to their level of confidence being raised. This could then lead to new experiences and interactions and a further lift to the children's level of confidence.

Parents/caregivers Survey: 13 responses

Question 1: The Gymnastics Ireland GymAble classes have been a success for your child. This answer options to this question were, “Agree, Disagree or neither agree nor disagree”.

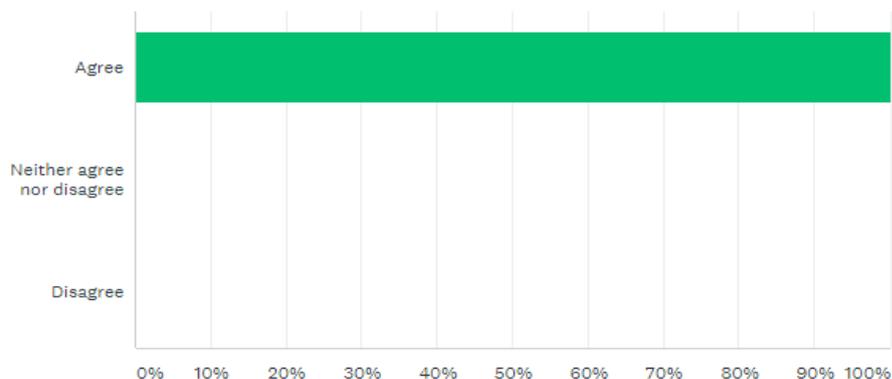


Figure 11: Results of Parents/caregivers question 1. “The Gymnastics Ireland GymAble classes have been a success for your child”.

The results of question 1 clearly demonstrate that the parents/caregivers of the children felt that the gymnastics classes were successful for their child. The term “success” was left open for each parent/caregiver to interpret themselves. It relied on the parent/caregiver’s initial reason for enrolling their child in the gymnastics class. (See question 8 below)

Whatever the reason that the parent/caregiver had for enrolling their child in the class, they felt had been achieved.

Question 2: It has opened up a new sport for children with disabilities and allowed them to show their ability while training as gymnasts in their local club. This answer options to this question were, “Agree, Disagree or neither agree nor disagree”.

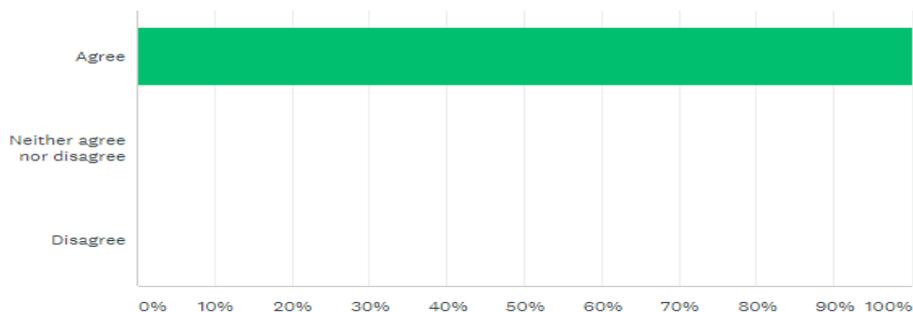


Figure 12: Results of parents/caregivers question 2. “It has opened up a new sport for children with disabilities and allowed them to show their ability while training as gymnasts in their local club”.

The results of question 2 clearly demonstrate that the parents/caregivers of the children felt that the classes had opened up a new sport for their child and allowed them to show their ability while training as gymnasts. This question and answer speaks to the children feeling that they are now gymnasts and partaking in gymnastics. They have a sense of belonging.

Question 3: My child has gained confidence and a sense of pride by being a member of their club. This answer options to this question were, “Agree, Disagree or neither agree nor disagree”.

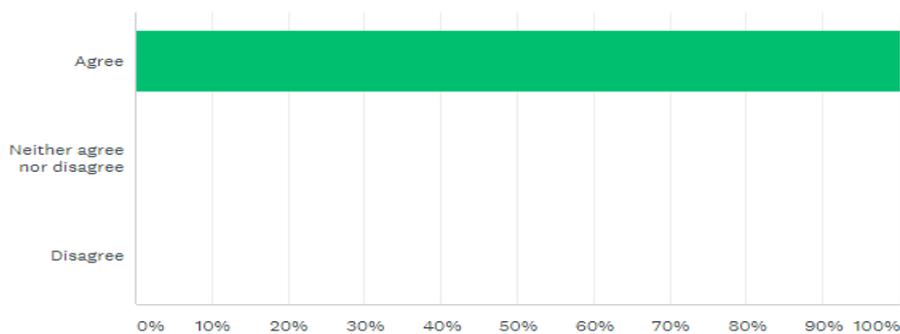


Figure 13: Results of parent/caregivers question 3. “My child has gained confidence and a sense of pride by being a member of their club”.

This result demonstrates that the parents/caregivers observed improvement in their child’s sense of confidence and pride at being a member of their club. This answer speaks to a psychosocial benefit for the child. The children feel that they are now gymnasts and a member of a club. Similarly to the results of question 2 above, this result demonstrates the child’s sense of belonging. The child feels proud of themselves and this is a benefit to their sense of self-esteem.

Question 4: My child enjoys taking part in the GymAble class. This answer options to this question were, “Agree, Disagree or neither agree nor disagree”.

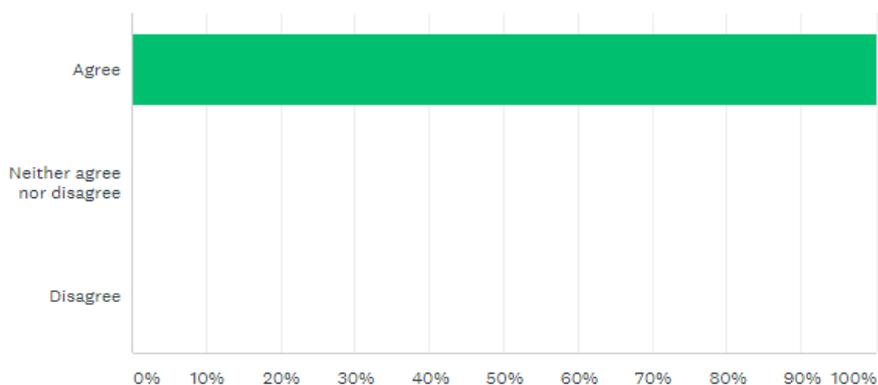


Figure 14: Results of parent/caregivers question 4. “My child enjoys taking part in the GymAble class.

This result demonstrates that the parents/caregivers observed that their child was having fun and enjoying their classes. The GymAble class was a fun and enjoyable experience for the children. Having fun and play is an important factor in a child’s development [28]. The class involved play and the children experienced fun and enjoyment, therefore this aided in the child’s development.

Question 5: Rehabilitation programmes done at home for children with disabilities is an essential part of the care of the child, however this can be difficult. A 2004 study by Nova South-eastern University, Ft. Lauderdale, Florida indicated that compliance with home programmes slipped for 66% of caregivers on occasion.

Some of the reasons given were: a. Parent/guardian’s fatigue. b. The child being unwilling to do the programme. c. Parent/guardian felt it was too stressful on them or on the child at times. d. Parent/guardian felt that the programme was being left to them to do all the time.

Has this been your experience at times? The choice of answer to this question was, “Yes” or “No”.

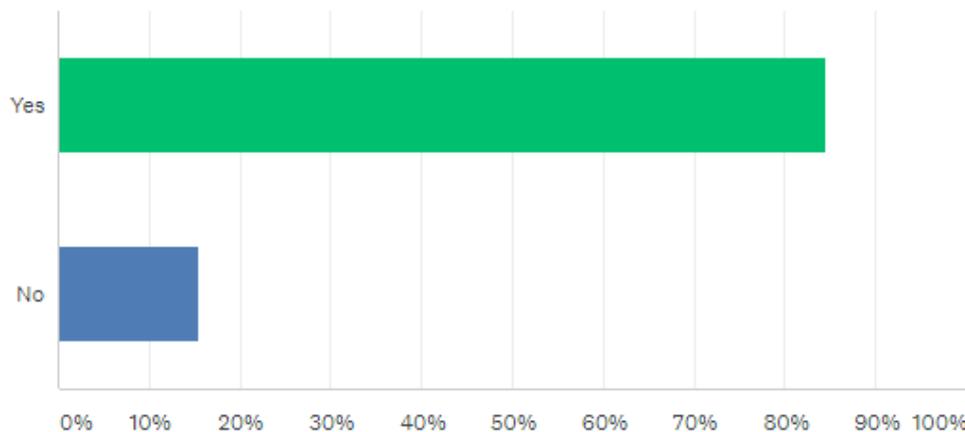


Figure 15: Results of parent/caregivers question 5. “Rehabilitation programmes done at home for children with disabilities is an essential part of the care of the child, however this can be difficult. A 2004 study by Nova South-eastern University, Ft. Lauderdale, Florida indicated that compliance with home programmes slipped for 66% of caregivers on occasion. Some of the reasons given were: a. Parent/guardian’s fatigue. b. The child being unwilling to do the programme. c. Parent/guardian felt it was too stressful on them or on the child at times. d. Parent/guardian felt that the programme was being left to them to do all the time. Has this been your experience at times?”

This question was based on results of a previous study which addressed to level of compliance with home exercise programmes and some of the reasons given for the non-compliance.

The results of this question demonstrated that a large proportion of parents/caregivers (84.62%) felt that it was true for them, while a smaller proportion (15.33%) felt that it was not true in their case.

It is evident from the Ft. Lauderdale study that home exercise programmes can lead to anxiety at home and compliance can slip. There is potential for non-compliance to have detrimental effects on the child’s condition or slow any progress that the child may achieve.

It is interesting to see that in this study there are a significant number of parents/caregivers (84.62%) for whom the same holds true.

Question 6: Some Caregivers have stated that taking part in the GymAble class eased their work load, because they did not need to do their entire individual home programme that evening.

Was this the case for you? The choice of answer to this question was, “Yes” or “No”.

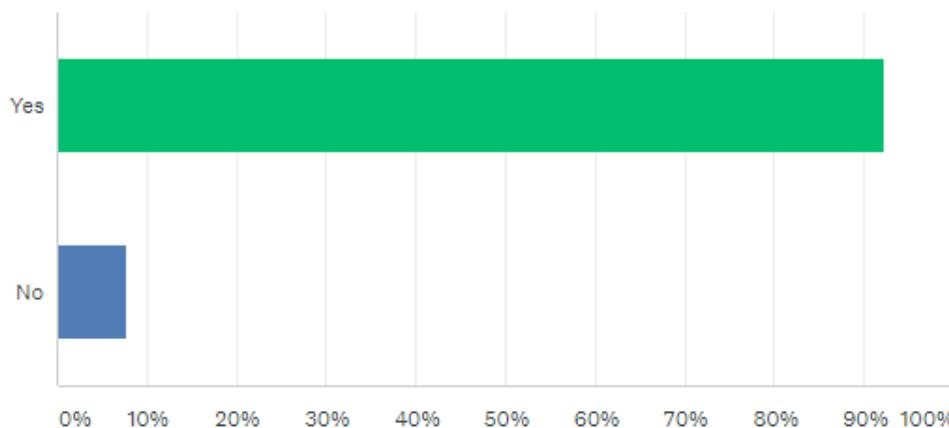


Figure 16: Results of parent/caregivers question 6. “Some Caregivers have stated that taking part in the GymAble class eased their work load, because they did not need to do some or all of their home programme that evening. Was this the case for you?”

This result demonstrates that the gymnastics classes were beneficial to the families as the parents/caregivers had observed that the children would have already completed some of the exercises from their home exercise programme during their class. They felt that they could then omit these exercises from their home programme for that day without diminishing any potential gains for the child (92.31%).

A smaller portion of parent/caregiver’s (7.69%) felt them still needed to complete the entire home exercise program that evening.

Question 7: Please tick the box if you feel your child gained any of the following characteristics by taking part in the GymAble classes. You can tick as many boxes as you wish.

Choices given were;

- Gained Strength
- Gained Muscle Tone
- Gained Flexibility
- Gained Endurance
- Improved Posture
- Improved Motor Skills
- Improved Balance
- Improved Co-ordination

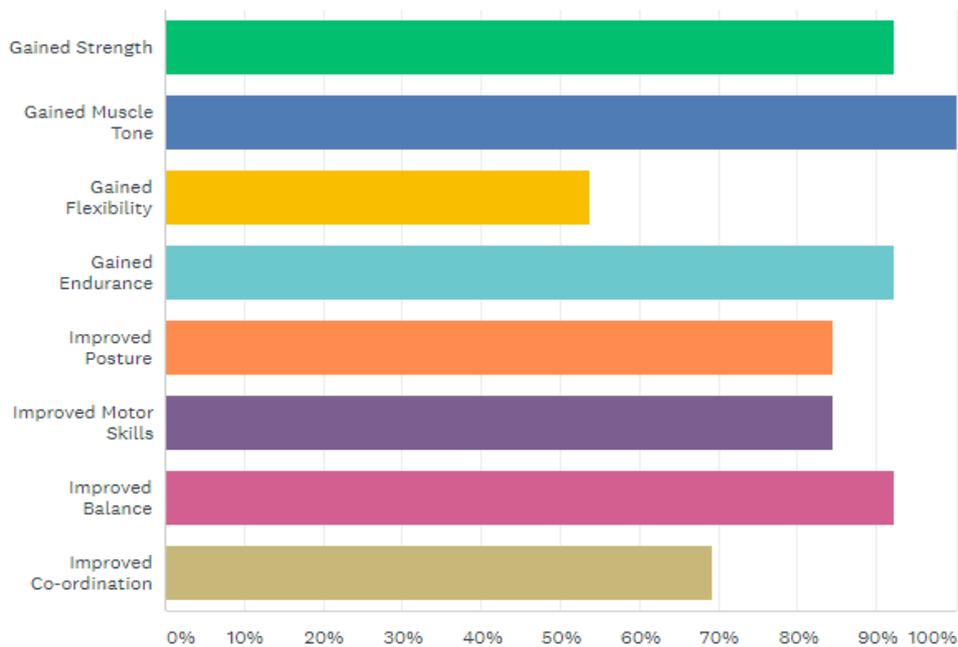


Figure 17: Results of parent/caregivers question 7. “Please tick the box if you feel your child gained any of the following characteristics by taking part in the GymAble classes. You can tick as many boxes as you wish.”

In order to consider utilising gymnastics exercise as rehabilitation, there needs to be a demonstration of improvement and gain. The results of question 7 clearly demonstrate that gymnastics exercise can achieve the required gains.

These results were objective. The gain observed by most of the parents/caregivers was in muscle tone (100%). A very high percentage of parents/caregivers observed gains in strength (92.31%). Improvements in endurance, posture and balance were also highly observed (92.31%, 84.62% and 92.23%) while gains in motor skills and co-ordination also scored highly (84.62% and 69.23% respectively). Gains in flexibility was also observed (53.85%) by parents/caregivers.

Scientific measurements of the gains were not taken, as these gains were not the focus of the gymnastics classes. The aim of the classes was on participation and fun. The gains observed were additional benefits. When this result is compiled with the children’s/gymnasts answers to their question 8 regarding subjective gains, we can now see stronger evidence of gains achieved in the characteristics listed above.

Question 8: What was the reason for you joining your child in the GymAble classes?

This was an open question.

Answers included, “to have fun”, “make new friends”, “exercise”, “to be part of a fun activity”, “to try something new”, “lots of benefits”. No parent/caregiver gave an answer of looking for additional rehabilitation sessions. The focus of the parents was on their child having fun and being involved in a new sport.

Question 9: In relation to the GymAble classes, please rank the following in order of importance to you for your child.

Options given were;

- Fitness
- Socialising
- Skill Learning
- Rehabilitation
- Making Friends
- Participation
- Independence

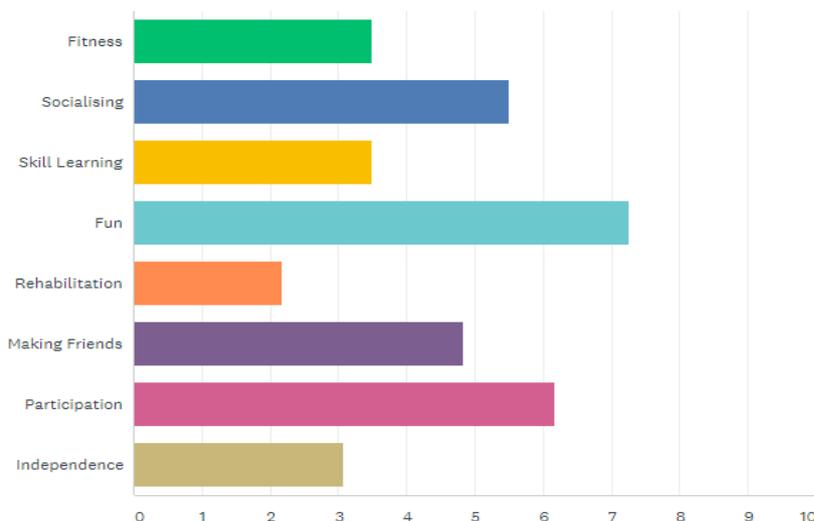


Figure 18: Results of parent/caregivers question 9. “In relation to the GymAble classes, please rank the following in order of importance to you for your child.

The results of question 9 illustrate the factors, according to importance that the parent/caregivers sought for their child when involving them in the GymAble class. Highest on their list of importance is fun followed closely by participation. Making friends, socialising and skill learning were important while of least importance to the parent/caregivers was receiving additional rehabilitation.

Additional rehabilitation sessions were not considered as a factor in the parents/caregivers decision to enrol their child in the gymnastics class. Getting involved in a new sport, participation and fun was their main focus. The gains the children received were an additional benefit.

Coaches Survey: 15 responses

Question 1: How did you feel about starting your Gymable class? Tick as many boxes as you think applies.

Options were:

- Excited
- Nervous
- Looking forward to a new challenge
- Confident
- Overwhelmed

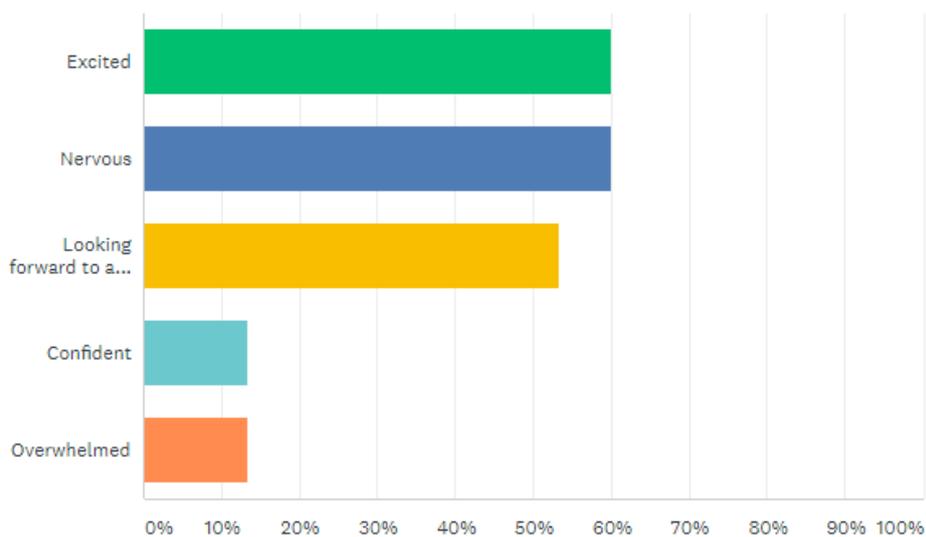


Figure 19: Results of coaches' question 1. "How did you feel about starting your Gymable class?"

This result illustrates that prior to starting the gymnastics class for children with physical disabilities the coaches were feeling excited, nervous and looking forward to the new challenge (60%, 60% and 53.33% respectively). Confidence was a small percentage (13.33%) while a similar number felt overwhelmed at the prospect (13.33%).

Question 2: What reason(s) did you have for starting a GymAble class? This was an open question.

Answers included, “to provide a sport for children with physical disabilities”, “inclusivity”, “knowing the benefits that gymnastics has for children” and “to meet demand”. “I think it is an important aspect of the gym and a great addition to the community.” “To create a link between mainstream and special Olympic programs”.

The variety of answers reflected the awareness by the coaches and the clubs of the need for inclusion and to provide the sport of gymnastics to children with physical disabilities. There was also an awareness of the potential benefits that could be gained by the children.

Question 3: What were your goals for the class? This was an open question.

Answers included, “fun”, “participation”, “create a safe and developmental environment for children with physical disabilities to experience gymnastics”, “maintain small class sizes”. The answers given to this question demonstrated that the coaches wanted to provide the children with a fun experience in a safe and developmental environment while they enjoyed gymnastics exercise. Making the children stronger, more toned or improving their self-confidence etc, was not given as a goal.

Question 4: Would you have started the class without the support and training provided by Gymnastics Ireland? This was an open question.

Answers were vastly of the opinion that coaches would not have started without the support of their governing body (89%). Some answers included, no, unsure, or it would have been much more difficult to do so. (11%)

The majority of the coaches (89%) were of the opinion that the support of their governing body through training, advice etc was vital to the starting and smooth running of their gymnastics classes for children with physical disability.

Question 5: In general, what gains (if any) have you noticed in the children taking part? Please tick as many boxes as apply.

Options given were;

- Improvement in muscle tone
- Improvement in muscle strength
- Improvement in posture
- Improvement in flexibility
- Improvement in endurance
- Improvement in gymnastics skills
- Improvement in co-ordination

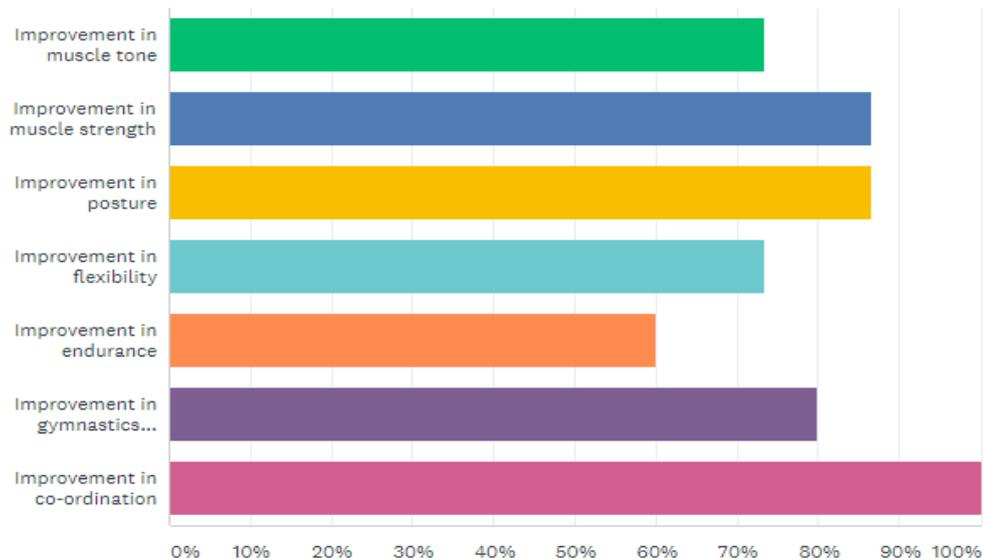


Figure 20: Results of coaches' question 5. "In general, what gains (if any) have you noticed in the children taking part?"

The results of question 5 are objective and show that improvement was observed by the coaches in all categories listed. Improvement in co-ordination was most noticeable by the coaches (100%) while very significant improvement in strength and posture was observed (86.67%). Significant improvement in gymnastics skills was observed (80%) as was flexibility and endurance (73.33% and 60% respectively). Very good improvement in muscle tone was also observed (73.33%). Overall, the coaches observed significant gains in the children. The amount of gain cannot be measured as before starting classes a base line was not measured. This was not seen as necessary at the time, as the focus of the classes was on participation, inclusivity and fun. This does not deflect from the observed improvement of the children both subjectively by the children themselves and objectively by the parent/caregivers and their coaches.

When these results are compiled with those of the children's survey question 8 and the parent/caregivers survey question 7 above, there is considerable evidence that through subjective and objective observations it can be demonstrated that gymnastics exercise can be utilised as rehabilitation for children with physical disability.

Question 6: What else have you noticed an improvement in (if anything)? This was an open question.

Answers included; "the child's confidence", (which was reflected highly). "Happiness" was mentioned as well as "the children's attention" and "the child's behaviour". Participation and communication skills were referred to as was improved social skills and a willingness to try new things. In one case there was a noticeable reduction in a child's level of anxiety.

The results of this question speak to some of the psychosocial benefits that the children gained from being involved in their gymnastics class.

Question 7: How can you make the class better for the children? This was an open question.

Answers included, completing additional training, updating challenges for the children. Adapting more equipment for use by children with physical disabilities. Develop more skills for the children to try. The sharing of ideas between clubs was also mentioned.

These results spoke to the need to keep challenging the children appropriately and producing more skills and equipment for the children. Avoiding boredom and maintaining fun.

Question 8: What feedback (if any) did you get from the children's parents? This was an open question.

Answers included, they loved the class for the children, feedback was very positive. Reference was also made to how much the children missed their class during the Covid 19 health restrictions.

The results of this question spoke to the enjoyment that the children felt during their gymnastics class. They “loved the class” and they missed not having their class during the pandemic. Here again we see evidence of psychosocial benefits gained by the children by attending their gymnastics class.

Question 9: What feedback (if any) did you get from the children? This was an open question.

Answers included, they loved the classes but felt tired afterwards. They looked forward to their classes, they loved gymnastics and they felt the class was fun. Some children wanted to come more often.

The answers to this question also demonstrate the psychosocial benefits that the children gained by participating in their gymnastics class.

Question 10: What feedback (if any) did you get from the children's physiotherapists/occupational therapists? This was an open question.

Answers included, the physiotherapists/occupational therapists were very impressed with the children’s progress. Really good improvement was noticed in the children. Very beneficial for their development. Using the beam for foot placement was very beneficial for children with Cerebral Palsy

The answers to question 10 demonstrate more evidence of the benefits to the children from participating in their gymnastics class. Physiotherapists and occupational therapists are trained and highly skilled at measuring improvement in physical ability. It was noticed and

commented on by some of the children's personal physiotherapists/occupational therapists that significant improvements were observed in the children. Some physiotherapists/occupational therapists visited the clubs to observe the classes for themselves.

When these results are compiled with the results already given in this study, it can be seen that there is a large quantity of evidence, both subjective and objective, that gymnastics exercise can be used as rehabilitation for children with physical disabilities.

Discussion

Having decided to start gymnastics classes for children with physical disabilities all coaches were provided with specific training by their governing body (Gymnastics Ireland). Following this training the coaches were feeling much more confident and none were feeling overwhelmed.

It is important to state that initial and continued training is crucial for coaches, in particular for those who teach children with physical disabilities. Parents/caregivers should ask appropriate questions about the club and coaches qualifications prior to enrolling their child in the class.

Play is important for children's development. [28] It is a well-known recommendation that everyone should partake in exercise on a regular basis. [29] [30] [31] It is equally important for children with physical disabilities to partake in regular exercise where possible. When people have fun they are more likely to stay involved and are more compliant with exercise. In addition, it is important for children to experience enjoyment and fun as part of their development. Children with physical disabilities can experience less fun and enjoyment during their developmental years [32].

It has been noted in this study that in Ireland children with physical disabilities receive very little rehabilitation. One block of 6 hours physiotherapy led rehabilitation per year, from the time they are diagnosed up to 8 years of age. At this time rehabilitation stops and only 1 hour of equipment maintenance is provided per year thereafter up until 18 years of age. Exercise that can be fun, safe, inclusive and have some physical and psychosocial benefits would be very beneficial to these children.

"Cara" is a national organisation striving for sports inclusion in Ireland. In 2019 they held a national seminar for inclusion. During the seminar reference was made to discussions held with children with physical disabilities where they were asked about their thoughts on sports inclusion. Some of their responses included the importance of being included, a sense of belonging and accomplishment and the importance of not labelling, but being seen as individuals [32].

The report went on to describe where speakers presented on topics such as “Sport has the power to change a child’s world” and Kate Feeney of the Cork Sports partnership presented on the thought invoking title of “Tell me and I forget, teach me and I remember, involve me and I learn” [32]. The clear message from this report spoke to the importance of activities for children with physical disability, that were both physically beneficial, but also of psychosocial benefit. Fun is enjoyable but it is also important as a social tool. Having fun with others has a positive effect on building trust and developing communication, it gives us an opportunity to connect and be creative. When we laugh together, this sends an external non-verbal message that says: “We are alike, we share values” [33] [34].

One of the main reasons given for non-compliance with the daily home rehabilitation programmes was that some of the exercises were painful for the child. [35] This lead to stress at home and avoidance. [6] Home exercise programmes are important for the maintenance and/or improvement of the child’s ability. Having compliance slip can be detrimental to the child’s progress. However, it can be easier at times for the parent/caregiver to skip a session here and there in order to ease the tensions at home. Being a caregiver has challenges and sometimes losing a battle might be required in order to win the war.

When a portion or portions of the child’s home rehabilitation programme is completed during their gymnastics class this can ease the necessity to repeat those exercises at home and therefore ease home anxiety. One of the advantages of a gymnastics class is that the child is having fun, gaining physical benefits as shown in the evidence given above, as well as the psychosocial benefits of being included, a sense of belonging and accomplishment and being seen as individuals.

One important factor in children being involved in a gymnastics class is their reason for joining, namely “fun”. Rehabilitation or physiotherapy was not the main reason for joining. The children just wanted to have fun, be part of a club and make new friends. The physical and psychosocial benefits were incidental. That is incidental, but highly beneficial to the child. It has been widely accepted and shown in the literature that exercise has significant physical and psychosocial benefits.

In 2002 Dr Pamela Wilson published a paper which stated that the “Surgeon General’s statement on the nondisabled population noted that less than 50% of individuals aged 12 to 21 years regularly engage in vigorous exercise. If the figures were extrapolated to the disabled population they would be much lower.

Individuals who have disabilities are known to have lower levels of fitness than the able-bodied population and are less likely to be active” [36]. Exercise programs have been developed and shown to be beneficial for children with physical disabilities such as cerebral palsy [37] [38]. These programs may be viewed by the child as more physiotherapy, because most involved repetitive resistance exercises designed to activate and strengthen a variety of muscle groups. There was little or no “fun factor”.

The 2015 study by Manon A T Bloemen discussed factors that could be barriers or facilitators for children with physical disabilities to take part in physical activities or sports. [38]

The following table summarises their findings.

Facilitators		Barriers	
Fitness	Endurance Biomechanical walking economy	Fitness	Fatigue Lack of energy & endurance Lack of motor skills Oxygen cost of walking Physical condition Lack of skills
Motivation	Enjoyment & happiness Opportunity to clear the mind Positive attitude towards being challenged Enjoying and having fun Learning new skills and experience	Motivation	Poor motivation Preferences for sedentary behaviour PA/sports not being fun Lack of interest, motivation or enjoyment “I’m not the sporty type”
Socialisation	Opportunity for social interaction Feeling accepted as part of a group	Age	Increasing age causes more fear Increasing age causes lack of motivation Increasing age Young age (<7yrs)
Abilities	Fundamental movement skills	Time	Lack of time Learning new skills is too time consuming Time taken to shower/change
Other	Asking for help Accepting disability Having perseverance Activity gives sense of freedom	Other	Awareness of differences from peers Resisting asking for help Feeling like an outsider/being ashamed Not accepting extent of disability How to use equipment Not knowing how to exercise Self-conscious/embarrassed Inconvenience of sweat Female gender

Table 1: Facilitators and barriers to physical activity and sport for children with disabilities.

The table above demonstrates that fitness, motivation, socialisation, abilities and other factors can impact either positively or negatively on a child with physical disability. Developing a positive attitude towards these factors can be a challenge, particularly if the child has not been engaged in recreational or sporting activities for some years. To develop a positive attitude towards these factors the child should be encouraged to participate in recreational activities and sport as young as possible. Depending on their condition or disability the activity/sport may have to be adapted to allow for inclusion. This is essential for the development of physical literacy in the child.

As previously stated, the amount of rehabilitation received by children with physical disability in Ireland is lacking. Cost can be a limiting factor in acquiring additional rehabilitation privately. An option for parent/caregivers is a gymnastics class such as the GymAble classes. As demonstrated by the evidence given above, the children who participate in these classes achieve both physical and psychosocial benefits.

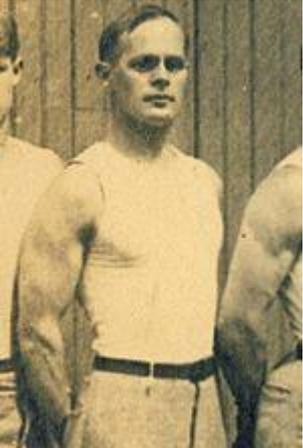
In addition the children don't think of it as rehabilitation as they are having too much fun. Another factor that may influence parent/caregivers involving their child in a gymnastics class could be the parent/caregiver thinking that the class may be outside of their child's ability. It is recommended that the parent/caregiver should investigate the capability of the club to cater for their child's ability.

Historic precedence

People with physical disabilities have been involved in sport and activities for well over 100 years. One of the earliest examples of this, in the sport of gymnastics was American Olympian George Eyser, who competed in the 1904 summer Olympic Games in St. Louis USA.

Having lost a leg due to an accident involving a train, George was fitted with a wooden prosthesis. He continued to train with his gymnastics club and went on to win 3 gold, 2 silver and 1 bronze medal in the 1904 Olympics, competing against non-disabled gymnasts from around the world. The events that George competed in included horizontal bars, parallel bars and vault [40].

George Eyser's accomplishments demonstrate the passion, resilience and determination that people with physical disabilities can have for sport.



RESULT	SPORT	EVENT
39 P.	Gymnastics	horizontal bar men
44 P.	Gymnastics	parallel bars men
152 P.	Gymnastics	combined 4 events men
33 P.	Gymnastics	pommel horse men
7.0	Gymnastics	rope climbing men
36 P.	Gymnastics	vault men

Table 2. George Eyser's 1904 Olympic Results

Physical literacy:

Physical literacy can be described as, "the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engagement in physical activities for life" [41]. The International Physical Literacy Association has been at the forefront of promoting the provision of physical literacy throughout learning environments by teachers and child care providers. The general aim of the association is to have children

provided with movement education, in the largest possible planes of movement, to enable them to have “Physical Literacy”. The association also states that physical literacy is a life long journey.

Physical literacy involves the “ability to move with competence and confidence in a wide variety of physical activities in multiple environments that benefit the development of the whole person” [42].

The International Physical Literacy association makes reference to the United Kingdom’s Statutory Framework for the Early Years Foundation Stage (2017) [43]. This framework states, “Physical development involves providing opportunities for young children to be active and interactive; and to develop their co-ordination, control, and movement. Children must also be helped to understand the importance of physical activity” [41] [43].

The importance of movement cannot be over emphasised. The health benefits have been well reported in the literature. Children with physical disabilities can all too often not receive the movement education to allow them to reach their full potential.

“We move to make sense of the world, understand and learn to value the primacy of movement in our lives, energise our lives to create a healthy mind and body and to provide the enabling conditions to support learning and appreciate and value the potential of moving and movement to enrich our lives” [41]

Gymnastics exercise provides the opportunity for children with physical disability to experience a wide variety of movement in a safe environment. A term I coined in the 90’s is, “vocabulary of movement”, I feel it is an accurate description of the range of individual elements that gymnasts learn to master and accumulate during their gymnastics career, through a wide variety planes of movement.

I feel that this term should be extended to children with physical disability as a guide to expanding their “vocabulary of movement” and enhancing their ability to reach their full potential.

This study has demonstrated that gymnastics exercise provides both physical and psychosocial benefits for children with physical disability. What is of great value is that it is a fun and safe way for the children to experience movement. It can challenge them in an appropriate way. It can allow them to experience a larger vocabulary of movement that could assist them to make sense of the world, understand and learn to value the primacy of movement in their lives, energise their lives to create a healthy mind and body and to provide the enabling conditions to support learning and appreciate and value the potential of moving and movement to enrich their lives.

Conclusion:

Gymnastics exercise can be utilised as rehabilitation for children with physical disabilities. It can provide much needed physical and psychosocial benefits to the children while providing a sense of belonging, involvement and participation in a fun way. It may also contribute to the lowering of family stress and anxiety at home. Further research is required to gather scientific measurements of gain to quantify the gains achieved following participation by children with physical disabilities in a class of gymnastics exercise.

An important consideration for parents/caregivers when choosing to enrol their child in a gymnastics class for children with physical disabilities is the suitability of the venue and the training that the coaches have received with regard to the teaching of children with physical disabilities. The coaches should have an awareness of the unique and individual needs of the children and be competent in their ability to address these needs. National governing bodies for gymnastics such as Gymnastics Ireland provide the appropriate training to coaches.

Where rehabilitation sessions are lacking for children with physical disabilities the cost of private physiotherapy led rehabilitation may be a limiting factor for some families. Gymnastics classes may be a more affordable, regular, safe, effective and fun option to consider.

Limitations of this study

The Covid 19 pandemic had a significant impact on this study due to gymnastics clubs being closed for most of 2020 due to health restrictions imposed by the Government. When restrictions were lessened it was decided by many parent/caregivers of children with physical disabilities not to bring their children to classes due to the children's health vulnerabilities.

The numbers of replies to the questionnaires were less than expected for this reason. However, even with a reduced sample size, the results were clear and left no doubt that gymnastics exercise is beneficial to children with physical disabilities and could be utilised as rehabilitation.

The surveys will remain open and continue to gather data for the foreseeable future. When health restrictions have been lifted, normality returns and the children return to their classes, the surveys will be circulated again.

Scientific measurements were not taken prior to the children starting their classes. This resulted in an accurate scale of improvement not being calculated. It was never the intention of the clubs partaking in the GymAble programme to take measurements and calculate gains as the focus of the classes was on inclusion, participation and fun.

Going forward, it would be beneficial to the scientific study of potential gains made following a programme of gymnastics exercise, to take measurements prior to a child starting a gymnastics class. Measurements could again be taken after a period of time involved in participation to assess any potential gains.

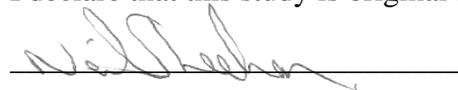
Another school of thought may argue against this. It could be argued to just let the children have fun and enjoy their sport.

Disclosures

The author discloses that as well as being a Chartered Physiotherapist, he is a member of Gymnastics Ireland and has been a coach for 38 years. He has not received financial contribution from Gymnastics Ireland nor influence with regard to this study.

Declaration:

I declare that this study is original and my own work.



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