ARTS COUNCIL ENGLAND

Drumming Down Dyspraxia

Pilot Project Report

Compiled by Wendy Andrew October 2007

Introduction and Background to the Project

Drumming Down Dyspraxia was an action research project which set out to discover if Percussion and Dalcroze Eurhythmics lessons can help Dyspraxic children.
For the project a partnership was developed between Oldham Music Service, The Royal Oldham Hospital and Oldham FDK (Fantastic Dyspraxic Kids). The project was funded by Arts Council North West with in-kind contributions from Oldham Music Service and The Royal Oldham Hospital and supported by Oldham FDK (Fantastic Dyspraxic Kids).

Project design

Dyspraxic children of the age range 7-11, who had been diagnosed by a consultant paediatrician at The Royal Oldham Hospital and under the care of the Physiotherapy Department, were identified and invited to take part.

At the weekly sessions the children were divided into two groups for the percussion lessons and the Dalcroze Eurhythmics. In addition to the lessons, the bringing together of these young people was used as an opportunity for them to offer each other mutual support.

Twenty children accepted an invitation to join the project and nineteen of these undertook physiotherapy and occupational therapy assessments.
Each child had a thirty-minute assessment, by fully qualified and experienced therapists, which took place over four weeks during April 2006. They and their parents also completed questionnaires.
When they had completed both assessments they joined the weekly Drumming Down Dyspraxia sessions.
The assessments and questionnaires were repeated after twelve months by the same therapists with the eleven children who were still attending the classes. This report is based on the assessments and questionnaires.

The Therapists' full reports are contained in the appendix

Dyspraxia Information

Dyspraxia, also known as Development Co-ordination Disorder (DCD), is a motor learning disability. This means that information needed to perform movement is often not processed or fully understood by the brain. Because of this it is often difficult for a person with Dyspraxia to interact with objects (or 'sensory messages') in an appropriate and controlled manner. This also means the planning of what to do and how to do it is affected. The Dyspraxia Foundation suggests that Dyspraxia affects around 10% of the population.

Dalcroze Eurhythmics Information

Dalcroze Eurhythmics is a music education method which aims to give the whole body an experience and understanding of music theory. The focus is on listening and actively responding through movement thereby building a muscular memory in the body and enhancing the efficiency of the nervous system. It is a method that can be applied to all abilities and all ages, from beginner to professional musician. The benefits include better co-ordination, spatial awareness, creativity, social skills (decision making, leading/following) and an improved autonomy within the person as a whole.

The method was created by a Swiss musician, Emile Jaques-Dalcroze (1865-1950), who noticed a lack of rhythmic accuracy and expression in the playing of his music students at the Geneva Conservatory. He believed that since the body plays the musical instrument then the body should be trained to be alert, co-ordinated and balanced. Effective communication is needed between the brain, the limbs, the eye and the ear so that the whole being can work effectively and with minimum effort. He devised specific exercises to achieve this autonomy in the body.

The Project

The Drumming Down Dyspraxia Pilot Project was run for 12 months with two key objectives:

1. Bring children with Dyspraxia together to improve skills in:

    - Rhythm & timing
    - Movement
    - Self -awareness
    - Social interaction
    - Co-ordination

2. Evaluate the effect of regular percussion and Dalcroze Eurhythmics sessions on the symptoms of Dyspraxia.

Percussion teachers' Comments

The severity of Dyspraxia symptoms among the children taking part in the project was varied and it was interesting to see how the co-ordination aspect of the condition was affected, if at all, by learning to drum.

The idea behind learning to play various percussion instruments was not geared towards providing music therapy through percussion lessons, and the sessions were not presented in such a fashion, but rather to allow the children to experience learning percussion instruments through different styles of music. Due to the nature of the instruments being used the issues of balance, spatial awareness and coordination were addressed so that their motor/coordination abilities were being developed to a certain degree.

Of the children that attended regularly, the majority were very quiet and inward when the project started, but I noticed that over the months all of them were expressing themselves more positively. This could be attributed to the fact that the children became more relaxed around me, but I think our improvising games/dynamic games encouraged the children to be creative. Not only did they express their ideas

through hitting a drum but also then they would explain to the group what their improvised idea was about and where it came from.

I also noticed a distinct change in the children's ability to cope with more complex co-ordination tasks. At the start of the project most of the children only used one hand on the drums. By the end all the children had developed their skills and could clap in time/keep a beat on an African drum with the music, alternate the use of the right and left hands on a drum (usually without being asked), play a rhythm with varying hand patterns, i.e. **RLRR LRLL,** or **RLLR LRRL,** and some could even keep a steady pulse on a drum kit using a combination of their feet and hands.

I would certainly say that all of the children have made progress in varying degrees towards developing their co-ordination abilities.

Joe Weaver

I believe that this project was a fantastic idea which turned out to be a great success. Coming in after around six months of the project had already passed I did not see the first intake of students from the beginning, however it was clear from my perception that over the 12 months that I was there each child made significant progress in the challenges set. I then saw a new child arrive and this enhanced my belief that the project had already benefited the initial group significantly as the new pupil had much more difficulty joining in the tasks.
In the percussion lessons we tried to work on co-ordination, such as playing certain rhythms with specific hands, whilst also trying to build up the listening skills and techniques needed to play percussion. We used a variety of instruments from full drum kit to African djembes and samba instruments.

Adrian Smith

Dalcroze Eurhythmics Teacher’s comments

My involvement in the Drumming Down Dyspraxia Project existed as one of two specialists in Dalcroze Eurhythmics to take the children’s weekly sessions. Throughout the course of this project I have sought to provide the children involved with a positive experience in music and movement, as I believe that for any learning to take effect this is a primary aim. Due to the irregularities in attendance it has been difficult to sustain learning objectives, as for any improvement in ability to occur it is vital that the learner is being consistently immersed in the experience.

I believe the children that attended the project for sustained periods of time have demonstrated significant improvements in general developments, being largely physically and socially related. Due to the varying nature of each child's needs and abilities, the programme content I followed has focussed on general rather than specific areas of movement and music true to the philosophy of the approach I specialise in, Dalcroze Eurhythmics. We have touched on many areas of learning, including coordination, response to music through movement, listening skills, self control, social skills, spatial awareness, body awareness, language awareness, pitch awareness, pulse internalisation and rhythmic awareness, memory skills, awareness of quality of movement, turn taking, following instructions, recalling instructions, core control, body strength and conditioning and balance.

The structure of the lessons on this project have taken a similar focus compared with a general music educational setting, where Dalcroze Eurhythmics is the means of learning, and these children have responded well to this teaching. Although steps in the learning process have been broken down to more realistic and achievable goals, the small numbers on the project have meant that there has been a greater sense of individual learning and attention. In future programmes I believe more significant success with development to be possible through thorough integration of the learning objectives in the Percussion and Dalcroze sessions. This way the children could receive a consistent programme through a shared philosophy. Despite this, the children, through support, encouragement, patience and repetition, have gradually improved in the Dalcroze sessions at their own rate and built a small but strong sense of community and relationships with myself and the other children.

I am pleased that I have been an integral part of this project and hope that the children have enjoyed the experience as much as I have. I would be most interested in both seeing these specific children's future developments and being involved in other projects of this nature.

Madeline Hagon

Summary of Physiotherapist's Assessment

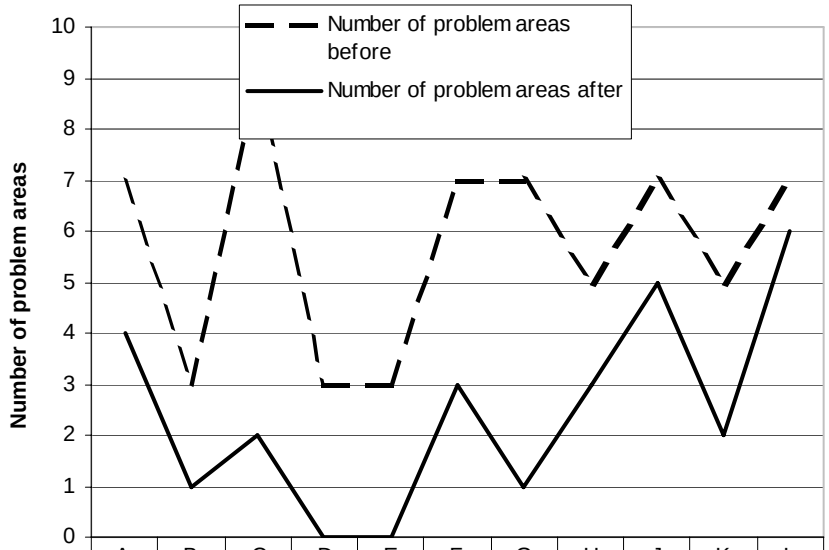
The results suggest The Drumming Down Dyspraxia project has

- Strengthened muscles around joints in order to increase stability and decrease excessive range.
- Stretched tight muscles
- Improved muscle strength and stability around shoulder/ pelvic girdles.
- Strengthened back muscles to improve active trunk extension
- Improved hand/ eye and eye/ foot coordination
- Improved bilateral and symmetrical integration
- Improved ability to cross midline
- Increased directional awareness
- Improved visual and auditory memory
- Improved motor planning
- Not altered muscle tone/ power in "Child L" with neurological presentation.
- In some cases improved outcomes with children with global delay and learning difficulties ("Child C") but in others had little effect ("Child J").

It is easy to justify how exposure to Percussion and Dalcroze Eurhythmics may have had these effects as they both involve moving into different positions, sustaining positions, using upper and lower limbs along with eyes to determine correct placing, using both sides of the body in identical or opposing patterns of movement, crossing midline, following instructions both verbal and visual and sequencing movements.

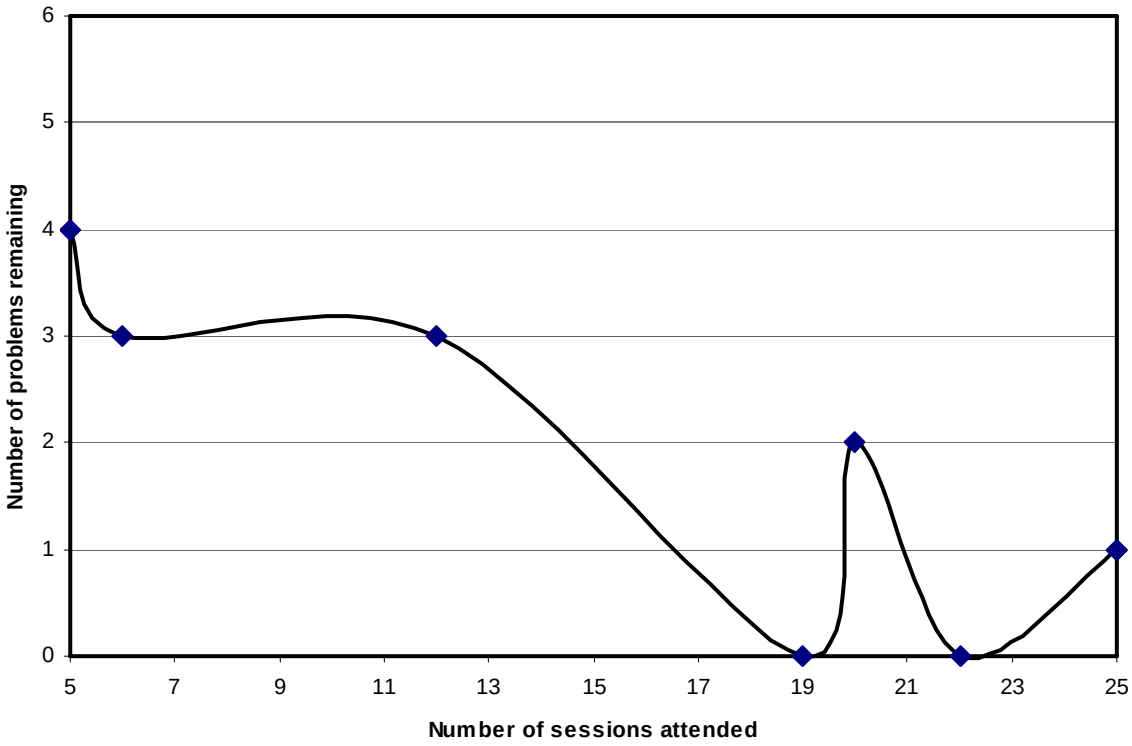
It is unlikely that these improvements would have been made without the children attending these sessions.

This is a line graph to show the number of problem areas each child presented with before and after the research period



	A	B	C	D	E	F	G	H	J	K	L
Number of problem areas before	7	3	9	3	3	7	7	5	7	5	7
Number of problem areas after	4	1	2	0	0	3	1	3	5	2	6

This is a line graph to compare the number of percussion/ Dalcroze sessions attended to the number of problem areas remaining



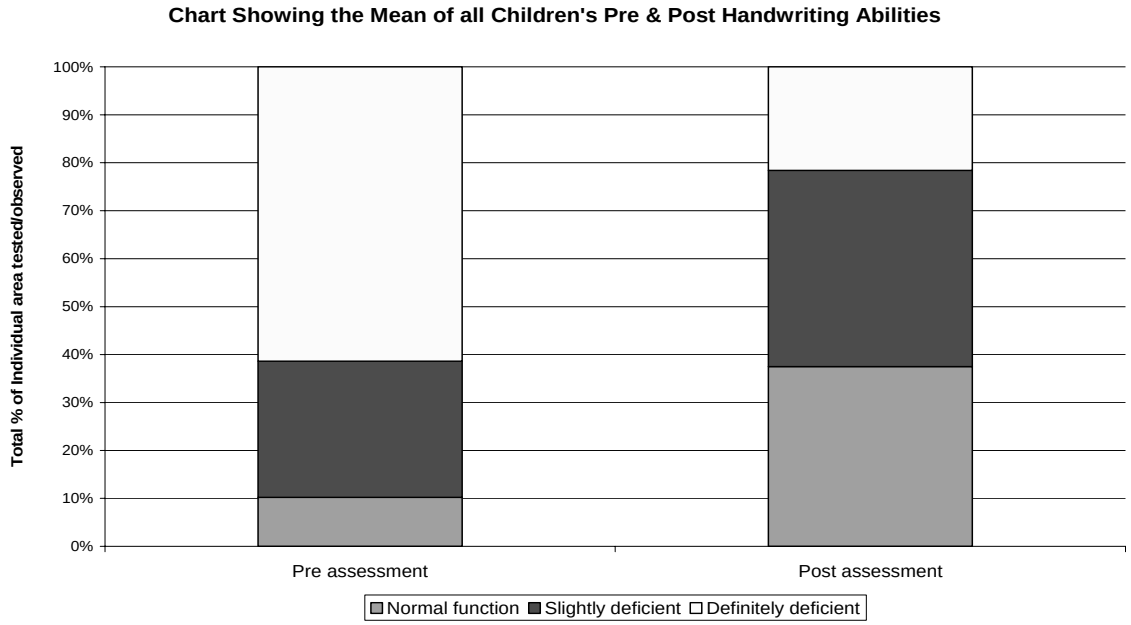
Summary of Occupational Therapist's Assessment

1. HANDWRITING SKILLS

It appears that following the Drumming Down Dyspraxia Project the children have shown significant improvements in their handwriting skills.

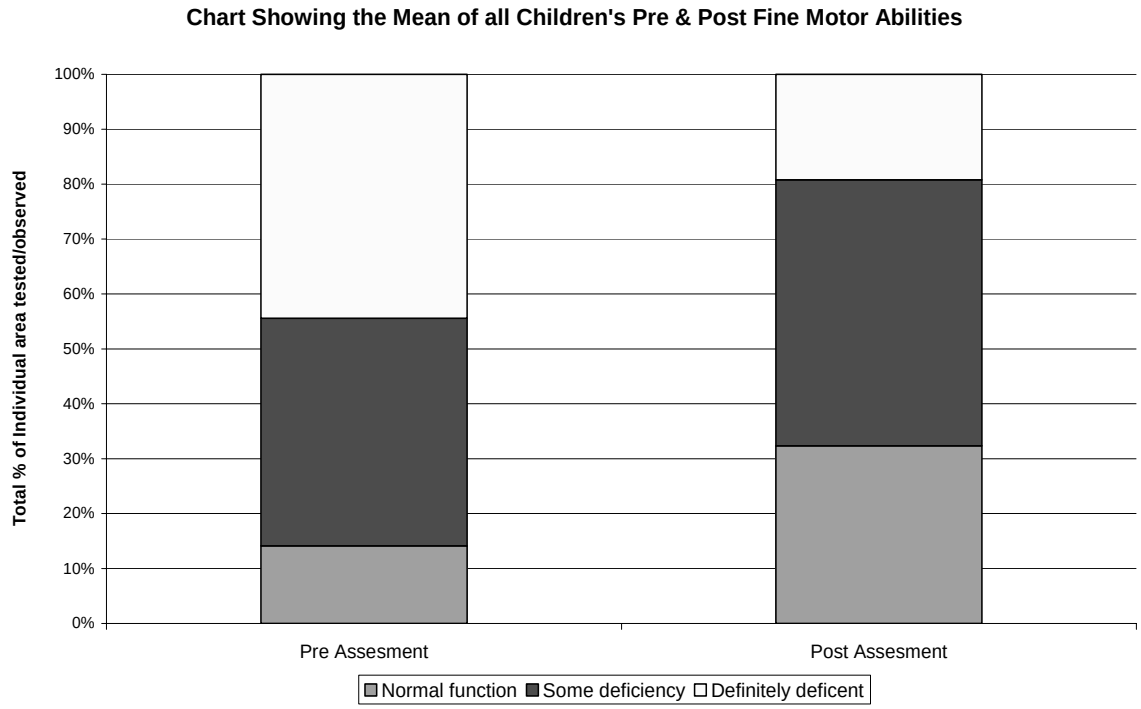
The number of children showing "normal function" in handwriting increased from 10% to 37%. Before the sessions children were observed to experience problems in 90% of the activities, but afterwards the amount of problems observed during handwriting areas dropped to 63%

Handwriting



This test is based on the Occupational Therapist's observation of several aspects of handwriting, such as pencil grip, sequencing of letters, writing speed and endurance.

2. FINE MOTOR SKILLS



This assessment is based on an Occupational Therapist's professional observations of several aspects of fine motor abilities such as eye-hand co-ordination, pincer grip and hand strength.

The results show a clear trend from definite fine motor skills deficiency towards normal function.

Prior to the project the children had a perceived "normal function" in only 14% of the fine motor skills, but this increased to 32% after the assessment. In 86% of the skills problems were experienced before the Drumming Down Dyspraxia sessions (52% of these skills showed a definite deficiency and 48% showed slight deficiency), but afterwards problems were experienced in only 68% of the skills (29% of which showed a definite deficiency and 71% a slight deficiency).

The standardised assessments carried out by Occupational Therapy do not indicate significant improvements in areas tested (Visual motor integration, visual perception and motor control of a pencil).

However the clinical observations of the Occupational Therapist, children's comments and parental reporting indicates that the participants did make some gains, particularly in the areas of:

- social skills,
- self confidence
- balance and co-ordination

Despite many parents stating that the least improved skills were self-care and sensory processing, the data results of the Occupational Therapy assessments indicated there were improvements in:

sensory processing, especially

- vestibular (movement),
- proprioceptive (receiving information form joints and muscles)
- praxis (planning movement).

On reflection back to the aims of the project of "Drumming Down Dyspraxia", these are all indicated as areas that it was hoped would be helped by the percussion and Dalcroze sessions.

Ideally it would have been better if there had been a control group for this project. It is also inconclusive as to whether the Eurhythmics or percussion sessions were more pertinent to the improvements seen. These factors could be considered if a further research project were to be undertaken.

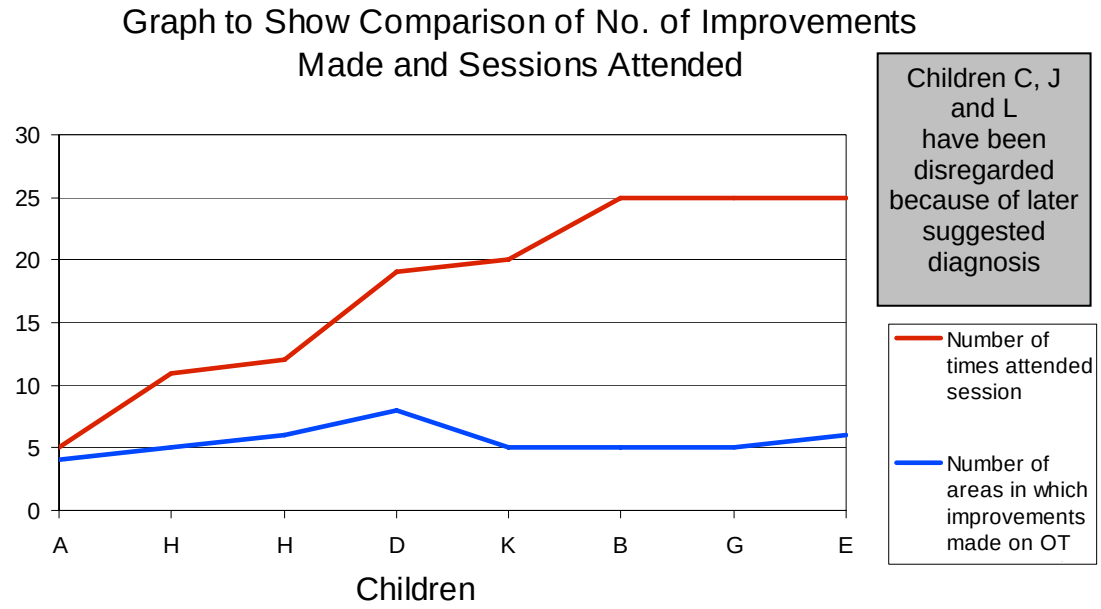
Post Assessment Summary

Linked Conditions

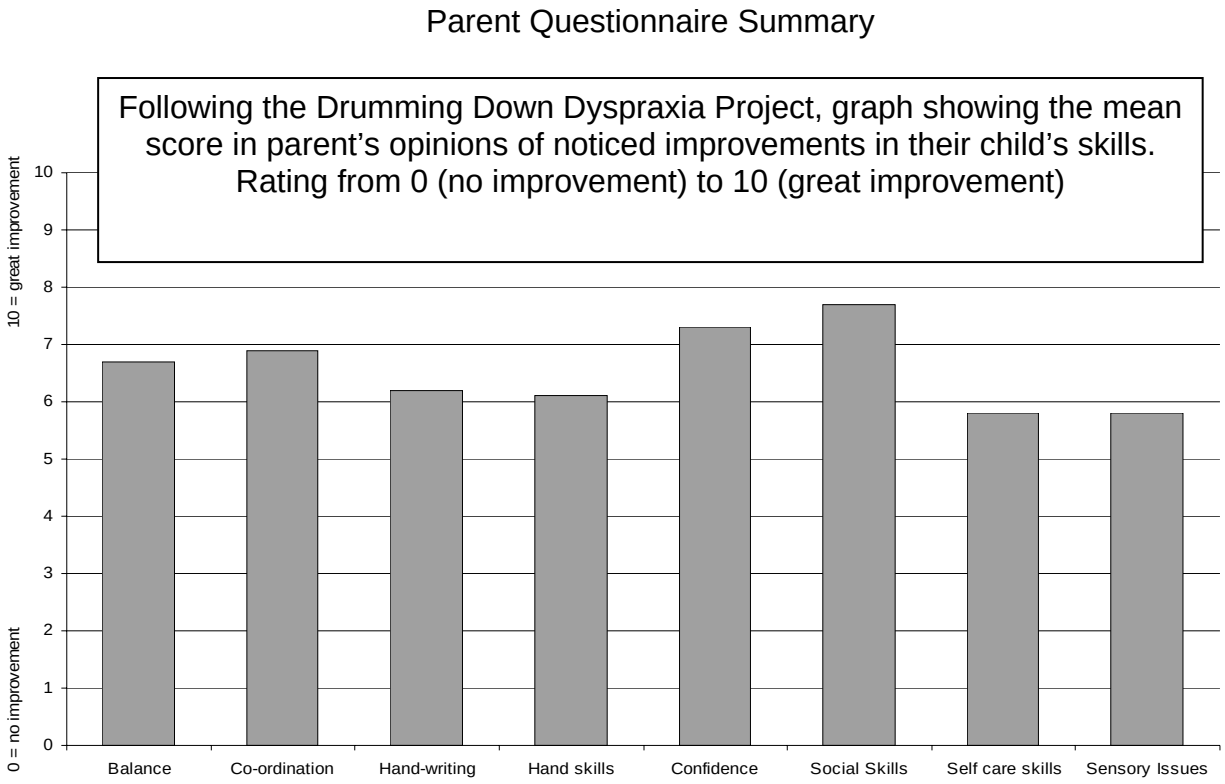
In the Physiotherapist's assessment report it is suggested that "Child C" and Child J" may have global delay / learning difficulties. The Occupational Therapist considers this to be the case as well. The Physiotherapist also noted that "Child L" presented with neurological causes for their difficulties. This knowledge may help understand why Child C decreased in ability in 5 areas of the Occupational Therapy Assessment and Child L in 3. Child J decreased in ability in one area on the Occupational Therapy assessment.

Improvements made

This graph looks at the correlation between the number of sessions attended and the number of improved areas in the children's abilities. It appears there is a general trend of continued improvement up to 19 sessions, after which the improvements were not so marked. However this information is gathered form a very small number participants.



Summary of Information from Parents



Information from parent's ratings of their child's improvements in certain skills after the sessions helped us see which were the skills most improved by all children.

The graph shown above shows social skills were the most improved skill seen in all children, closely followed by confidence. Good improvements in balance and co-ordination were also noted.

Summary of Post Project Feedback from Parents.

- General feedback comments from parents
  - “Seems to manage “special” [(?spatial)] awareness better and also day to day living”.
  - “Very glad we came on course. I feel this has helped”
  - “Thank you”
  - This course provided “New experiences, social interaction”
  - “She has really enjoyed it, her co ordination has improved.”
  - “He seems more confident to join in with other children sometimes. Willing to try things”

- Parents Comments on School Improvements
  - “Improvement in PE sessions.”
  - “Improved”
  - “She has a good report in all areas, her work is neater and better laid out.”

- Parents Comments about Music & Movement improvements
  - “Likes to make his own dances up. Hands move to beat better”
  - “Playing piano at home. Playing finger drumming”
  - “School, gym” (more involvement)
  - “She is in the school choir, but does not sing the song, she struggles to learn the words, but appears to fit in with her peers.”
  - E would “like a set of drums”
  - (Now)…“Enjoys Taekwondo, football”
  - “She will dance and move around confidently. Drums to beat of the music, although always had difficulty with rhythms of words, did not pick up nursery rhymes.”

- Handwriting Improvements

The average scoring given on the improvement scale was 6.2, which means that in parent's perception their children's handwriting has improved to some extent.

- Co-ordination Improvements

On the parent comments form, co-ordination was the third most improved skill. The average score being given was 6.2, meaning that in the parent's perception a considerable improvement had been made.

Parent's Comments about child's improvement in co-ordination:

- "She has really enjoyed it, her co-ordination has improved"
- "Likes to make his own dances up. Hands move to the beat better"
- "School, gym" (more improvement)
- "Playing piano at home Playing finger drumming".

- Self care improvements

The majority of parents felt that some improvement in their child's self-care skills had been made after the course because the mean score given was 5.2. Although, this figure shows all parents feel their children have improved, self care rated as one of the lowest two most improved skills when parents were asked.

- Social skills improvements

Overall, parents felt that social skills were the most improved skill. The mean score being given to each child being 7.7 (great improvement). The second skill that parents' felt was most improved was confidence. This seems to indicate that the project has primarily helped improved the children's social and confidence skills.

Parent's Comments about Social Skills:

- This course provided "New experiences, social interaction".
- "He seems more confident to join in with other children sometimes. Willing to try things"

- Parent's other comments on the project

  - "Unfortunately, H did not want to keep it up. At the end of a busy week in school etc, the timing was not the best. Another night may have suited us more. Thank you for all your effort though."
  - "More variety – different instruments every month or so"
  - "F was the eldest in the group which made her feel awkward. I think if there had been more her age she would have been happier."
  - "E would have liked movement harder, found it too easy"

Summary of Post Project Feedback from Children.

- "Doing the music sessions made school…." – children's answers:

"Getting better"	"Good"	"Alright"
"Happier"	"Not good"	"Like it"
"Happy"	"Fine"	

72% of children would like to continue with the DDD sessions.

- Music and Movement improvements

54% of children stated they enjoyed music sessions more after attending these sessions.

- Handwriting Improvements

9 out of 11 (82%) of the children stated they could write better after the sessions. (All parents commented on improvement in their child's handwriting.)

- Self care improvements

However, more positively, the child questionnaire showed that 72% of children felt they could do things, such as tying their shoes laces, better for themselves

after the course. 63% found things at home and school easier after the session.

- Social skills improvements

45% of children reported that taking part in these sessions positively affected how many friends they have and 36% said it made no difference.

- Mood improvements

9 children commented on the music sessions making them feel happy (e.g. “happier”, “good” “happy”). The other 2 stated they felt “OK”. This suggests that the environment the children found them in helped them have more positive feelings.

54% of the children also said they enjoyed music sessions more at school after attending Drumming Down Dyspraxia.

Conclusion

The project set out to ascertain whether exposure to Percussion and Dalcroze Eurhythmics could help Dyspraxic children.
From the assessments before and after the project it appears that the project has helped the children as both Percussion and Dalcroze Eurhythmics involve moving into different positions, sustaining positions, using upper and lower limbs along with eyes to determine correct placing, using both sides of the body in identical or opposing patterns of movement, crossing midline, following instructions both verbal and visual and sequencing movements.

It was disappointing that not all the children who participated in the Project came back for reassessment, as the cohort was already small.

There was some indication that the optimal improvement was made after approximately 19 sessions in both the Occupational Therapist and Physiotherapist’s findings.

The principles of the Dalcroze method were taken and adapted specifically for the dyspraxic children taking part in the DDD project by qualified and skilled practitioners of Dalcroze Eurhythmics. It was clear from the outset that there was an immense potential in this form of active learning for the children. In the sessions they were extremely responsive and enjoyed the freedom of expression and creativity within clear boundaries. They gained in confidence and were able to “own their bodies” in a positive way which empowered them in other areas of learning and living.

The children who attended the Drumming Down Dyspraxia sessions enjoyed both elements of the project and were keen to continue.
Unfortunately due to lack of funds this is not possible but it is hoped that at some future date this project can be extended or replicated.

Acknowledgements

I would like to acknowledge the contribution of the following people

Joe Weaver	Percussion teacher
Adrian Smith	Percussion teacher
Bethan James	Dalcroze advisor
Madeline Hagon	Dalcroze teacher
Angie Aiken	Dalcroze teacher
Sarah Hardy	Research assistant
John Wood	Research assistant
Karen Mills	Research assistant

Appendix

Physiotherapy Assessment before and after Drumming Down Dyspraxia

The assessment was performed by Sarah Day-Wilson, Senior Paediatric Physiotherapist, Pennine Acute NHS Trust before and after the Percussion and Dalcroze sessions. It was devised by a team of physiotherapists working for Pennine Acute NHS trust.
The assessment looked at the areas listed below.

1. Range - the amount of movement at each individual joint including all joints in upper (arms) and lower (legs) limbs. Excessive movement would indicate hypermobility which is associated with poor joint stability.

2. Muscle length - the length of the hamstrings and Achilles tendons compared to full range. Shortening is common following growth spurts and also where there is a lack of stability in order to increase it.

3. Tone - the tension within the muscles: normal, tight and stiff, lax and floppy. Again including upper and lower limbs. Normal muscle tone rules out neurological conditions.

4. Power - the strength of the muscles, specifically the lower limbs. Normal muscle power rules out neuro-muscular disorders.

5 - 11 are all common problem areas for children with dyspraxia.

5. Shoulder control - relates to the muscle strength and joint laxity around the shoulder girdle. It is an important pre-requisite for writing

function. It was tested in activities requiring weight bearing through straight upper limbs.

6. Active trunk extension - relates to muscle strength of the back muscles and is required for trunk control e.g. sitting and standing up straight. Together with shoulder and pelvic control this relates to balance.

7. Pelvic control - relates to the muscle strength and joint laxity around the pelvis. It is required for activities such as standing on one leg, hopping and kicking a ball.

8. Hand/ Eye coordination - is the ability of the hands and eyes to work together and is needed for activities such as writing, throwing and catching a ball.

9. Eye/ Foot coordination - is the ability of the eyes and feet to work together and is required for activities such as kicking balls and walking over rough surfaces.

10. Bilateral integration - is the ability to move both sides of the body in opposing patterns of movement e.g. Jumping sideways.

11. Spatial awareness - is the ability to judge distances and directions of themselves in relation to other objects.

12. Midline crossing - is the ability to cross a hand from one side of the body to the other and is required for activities such as writing.

13. Directional awareness - is the ability to move in different directions such as forwards, backwards, sideways and on a diagonal.

14. Symmetrical integration - is the ability to move both sides of the body in identical patterns of movement e.g. jumping and clapping.

15. Memory - relates to short-term visual and auditory memory and is required for activities such as copying from a board or dictation.

16. Motor planning - is the ability to plan the necessary movements that are required to move form one position to another with correctly ordered sequences.

The children were assessed in a room with their parents present. They gave written informed consent. Once the children had been assessed, on both occasions, their problem areas were recorded and the results were collated. The children's results were lettered A- L (omitting I) so the children remained anonymous. The physiotherapist did not know which children had attended more or less sessions of Drumming Down Dyspraxia.

Results

Assessment Pre Project

The results below will indicate whether the children studied have problems associated with dyspraxia or another diagnosis.
All the children had 3 - 9 problem areas associated with dyspraxia. However "Child L" presented with altered muscle tone/ power suggested a neurological cause for their difficulties. The physiotherapist suggested that "Child C" and "Child J" may have global delay and learning difficulties which could affect their performance/ ability to improve. 5/11 children presented with excessive joint ranges indicating hypermobility and reduced stability. 7/11 children presented with tight hamstrings/ Achilles tendons which may be because of growth spurts or compensation for lack of stability. Interestingly all the children had poor hand/ eye coordination.

Assessment Post Project

All the children presented with a reduced number of problem areas (see Chart 1). The children presented with 0-6 problem areas post project. “Child L” only improved in 1 area, whereas “Child C” improved in 7 areas. The range of number of areas improved in was 1-6 with the median, mode and mean average of 3 problem areas.

When looking at the individual problem areas there was a reduction in the number of children presenting with each problem area except muscle tone/ power (see Table 1/ Chart 2).

More problem areas were apparent prior to the Percussion/ Dalcroze (see Chart 3 and 4) Distribution was more widespread with 15 problem areas existing before and only 10 after.

Comparing the number of problem areas remaining with the number of sessions attended a negative correlation is apparent looking at the line of best fit. This is clearer if we disregard “Child L” as they presented with neurological symptoms and “Child J” as they appeared to have global delay and learning difficulties and didn’t seem to improve very much.

Results may be due to the Percussion and Dalcroze sessions but it must be acknowledged that other variables such as growth, maturation, change in education/ hobbies and therapy input may have affected presentation.

Conclusion

The results suggest that the Drumming Down Dyspraxia Project has

- Strengthened muscles around joints in order to increase stability and decrease excessive range.
- Stretched tight muscles
- Improved muscle strength and stability around shoulder/ pelvic girdles.

- Strengthened back muscles to improve active trunk extension
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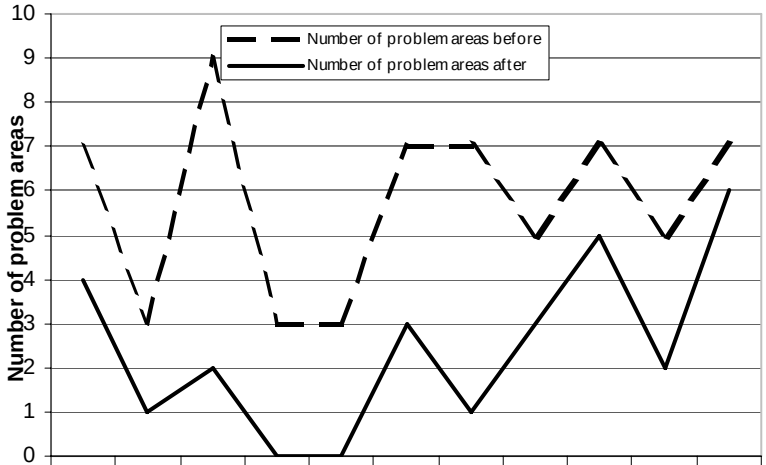
Chart 1: This is a line graph to show the number of problem areas each child presented with before and after the research period



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Number of problem areas before	7	3	9	3	3	7	7	5	7	5	7
Number of problem areas after	4	1	2	0	0	3	1	3	5	2	6

Child's ID

Chart 2: This is a bar chart to show the number of children with specific difficulties
before and after the percussion/ Dalcroze sessions

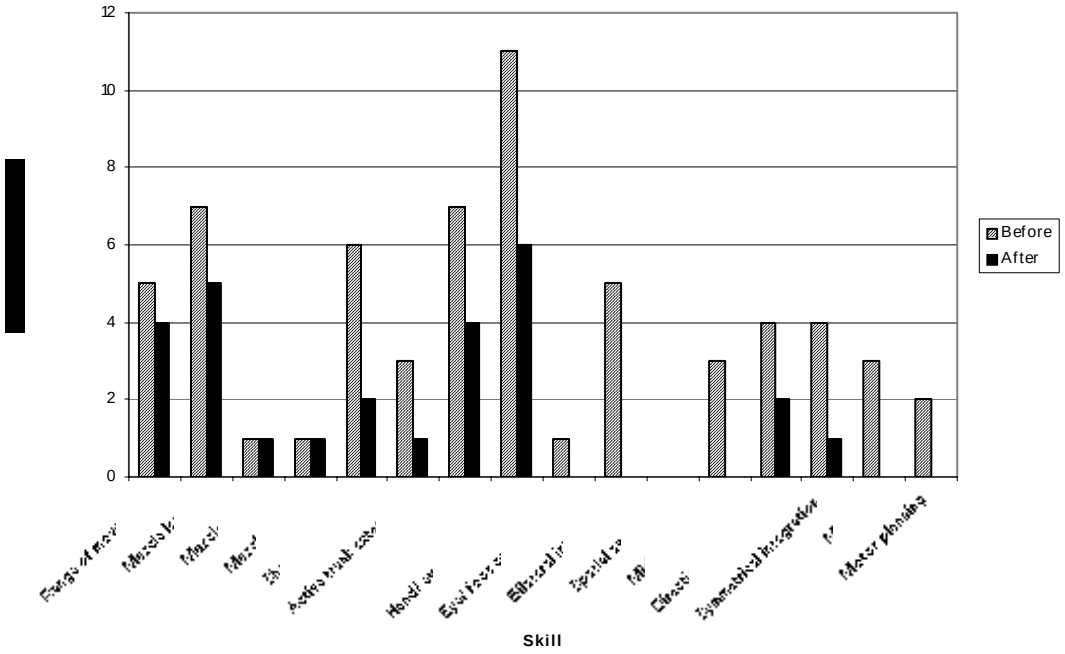


Chart 3: This is a pie chart to show the distribution of problem areas before percussion/ Dalcroze sessions

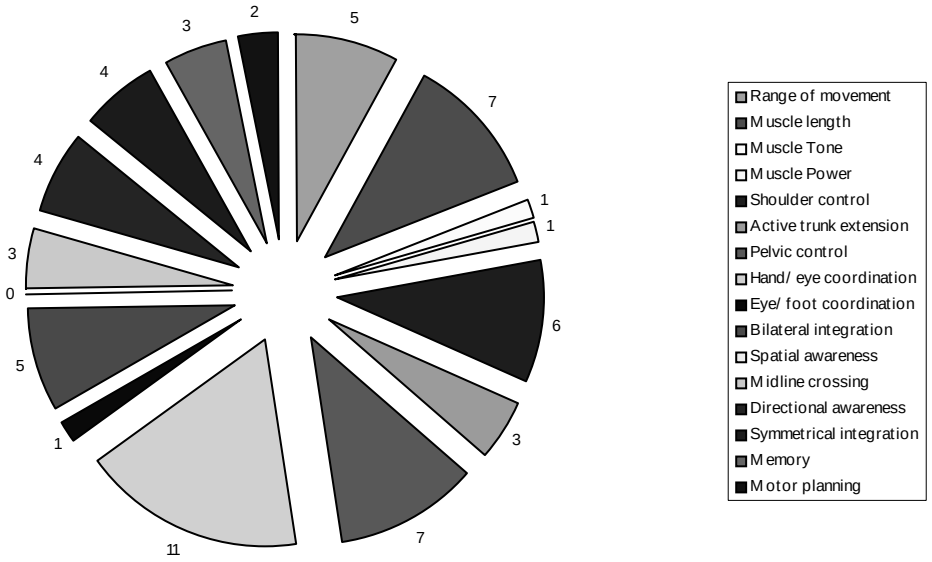


Chart 4: This is a bar chart to show the distribution of problem areas after percussion/ Dalcroze sessions

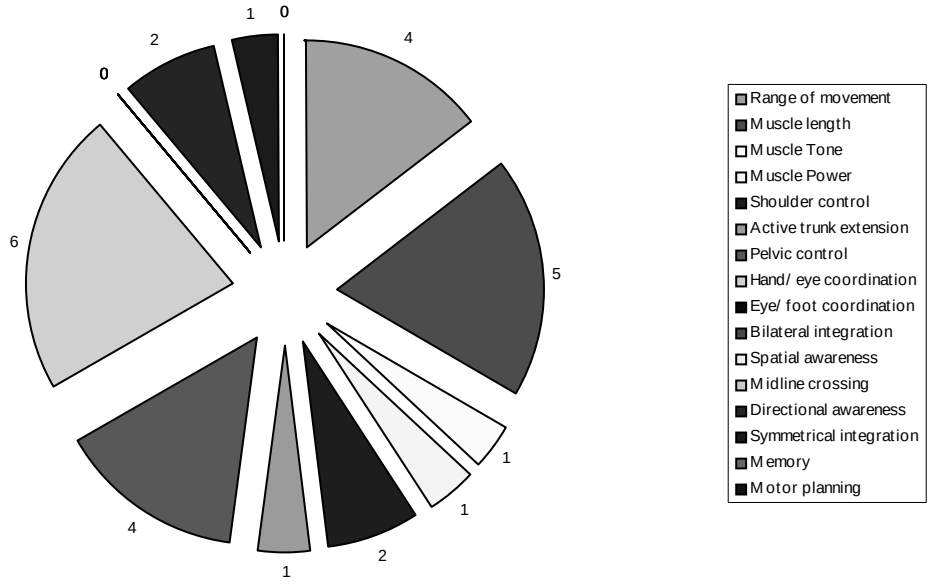
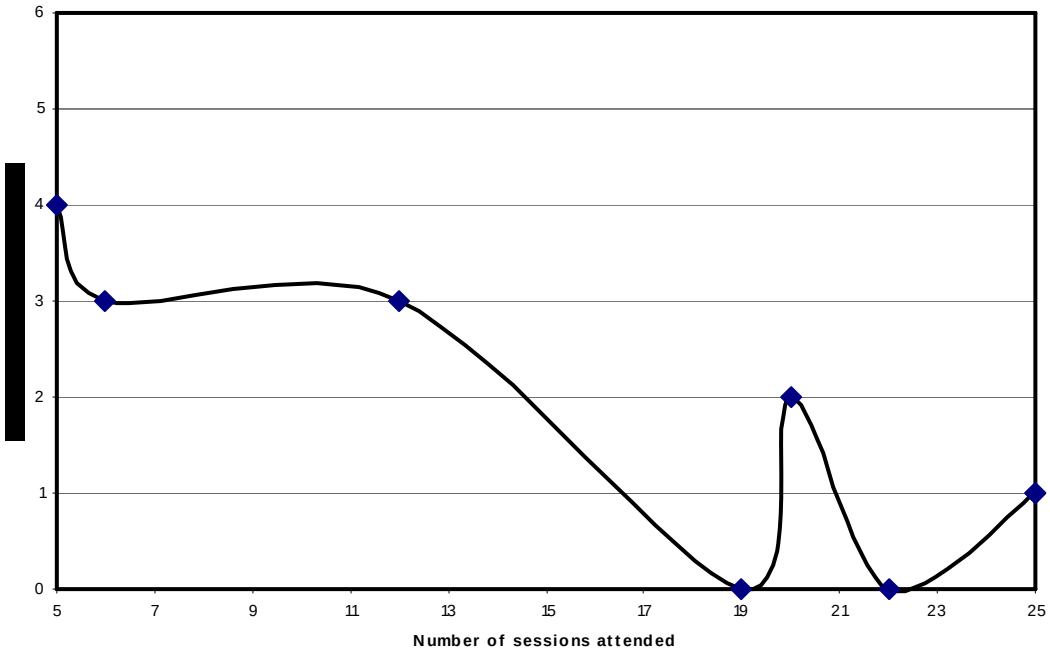


Chart 5: This is a line graph to compare the number of percussion/ Dalcroze sessions attended to the number of problem areas remaining



Occupational Therapist's report

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Dyspraxia Incidence

The Dyspraxia Foundation suggests that:

1. Dyspraxia affects c.10% of the population.
2. The lowest 2% of which are severely affected. Males are four times as likely to be affected by Dyspraxia than females.
3. No "Dyspraxic gene" has been identified, although Dyspraxia has been observed to run in families. In the majority of cases of where a child has Dyspraxia it is likely that another family member (e.g. grandparents, cousins or parents) will also experience some of the difficulties associated with Dyspraxia.

Signs or Symptoms of Dyspraxia

Dyspraxia can affect all or any of the following areas of development:

- Intellectual
- Emotional
- Physical
- Language
- Social
- Learning
- Sensory

Many of the signs or symptoms of Dyspraxia revolve around these developmental problems Not all suffers of Dyspraxia will show all the signs, but some typical signs of Dyspraxia include;

- Disliking games/apparatus
- Poor ability to stand on one leg/hop,
- Weak bat/ball skills
- Messy at eating and drinking
- Slow/poor at dressing
- Slow and hesitant at actions
- Anxious
- Easily distracted
- May be disruptive in class
- Poor/slow writing
- Unable to remember or follow instructions
- Problems copying from a blackboard

There is no cure for Dyspraxia, however with the help of professionals such as occupational therapists, physiotherapists, speech and language therapists, psychologists and specialist teachers, individuals suffering from Dyspraxia can learn to get around their problems and achieve their full potential.

Often people with Dyspraxia will also suffer from other developmental disorders such as;

- Dyslexia
- Asperger's Syndrome/Autism
- Attention Deficit Hyperactivity Disorder (ADHD).
- Suffers can also often suffer from low self-esteem, depression, emotional or behavioural difficulties

These disorders and difficulties can co-exist and overlap. In The Project one of the participants was diagnosed as being on the autistic spectrum (Child H) during the programme. Other participants displayed signs of other conditions, including generalised developmental delay.

Occupational Therapy Assessment

Assessments were performed by Tina Wood, SROT Dip COT, an independent Occupational Therapist from Stockport, Cheshire, who has been specialising in assessing and treating children with Dyspraxia for over 14 years. A selection of both standardised assessments and clinical observations were used.

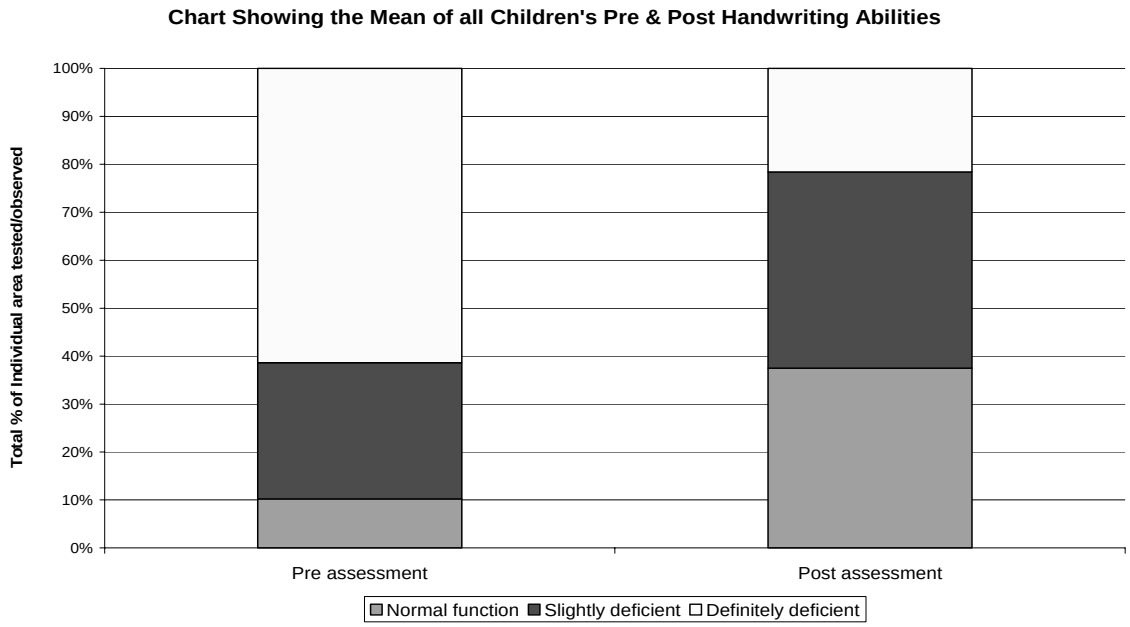
The children were assessed in a room with their parents present, who had given prior written and informed consent. Once the children had been assessed, on both occasions, their problem areas were recorded and the results were collated. The children were named A - L (omitting I) for The Project results to maintain anonymity. On retest the Occupational Therapist was not made aware of which children had attended more or less sessions of Percussion / Dalcroze Eurhythmics.

The next section shows the data from the Occupational Therapist's assessment for all the children. The material has been divided up under 4 different skill-areas:

1. **Handwriting/Graphic Skills**
    - Assessment of a sample of handwriting, using a checklist (non standardised)
    - Visual motor integration - VMI (standardised)
    - Motor co-ordination of a pencil – sub test of the VMI (standardised)
    - Visual perception (standardised) – sub test of the VMI
    - Drawing of a person (themselves) (non standardised)
2. **Fine Motor Skills** (non standardised)
3. **Sensory Processing** (non standardised)
4. **Self care** (non standardised)

1. HANDWRITING/GRAPHIC SKILLS

Handwriting



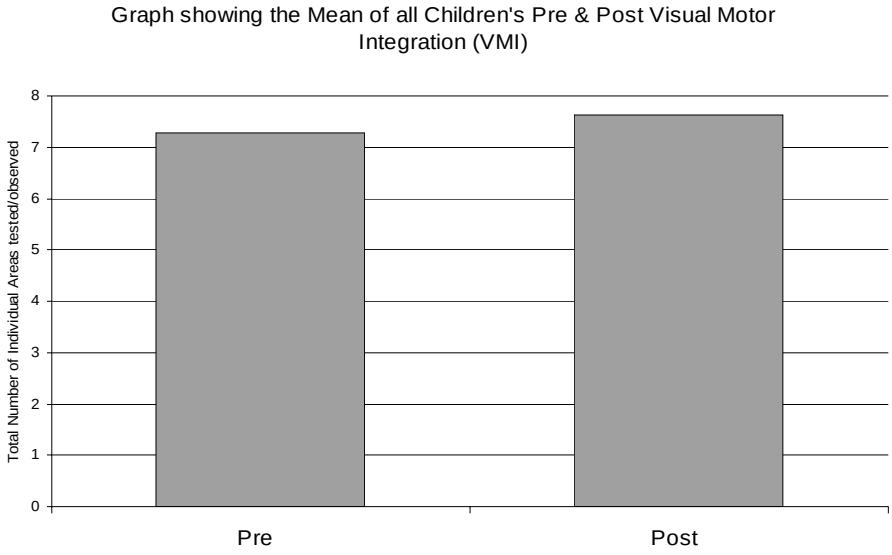
This test is based on an Occupational Therapist's observation of several aspects of handwriting, such as pencil grip, sequencing of letters, writing speed and endurance.

The number of children showing "normal function" in handwriting increased from 10% to 37%. Before the sessions children were observed to experience problems in 90% of the activities, but afterwards the amount of problems observed during handwriting areas dropped to 63%.

Conversely, the proportion of children experiencing a definite handwriting skills deficiency dropped significantly. Overall it appears that following the Drumming Down Dyspraxia Project children have shown significant improvements in their handwriting skills.

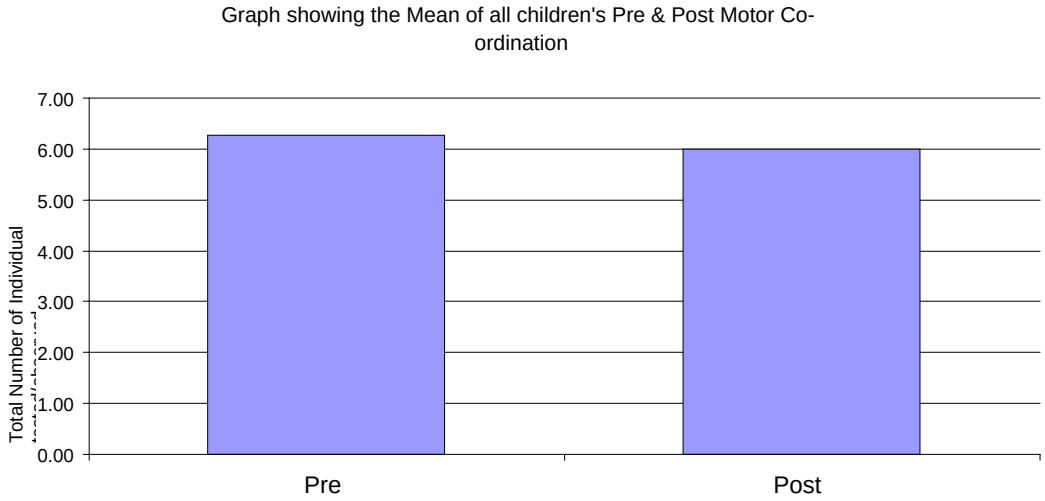
However, when considering the results from this assessment it is important to note that these results are based on professional observations not on percentile rank, therefore some maturation would be expected over the 13-month period of this project. [While comparative analysis has not been done, the Occupational Therapist believes the observed improvements handwriting skills are substantially greater than normal development would indicate]

Visual-Motor Integration (VMI)



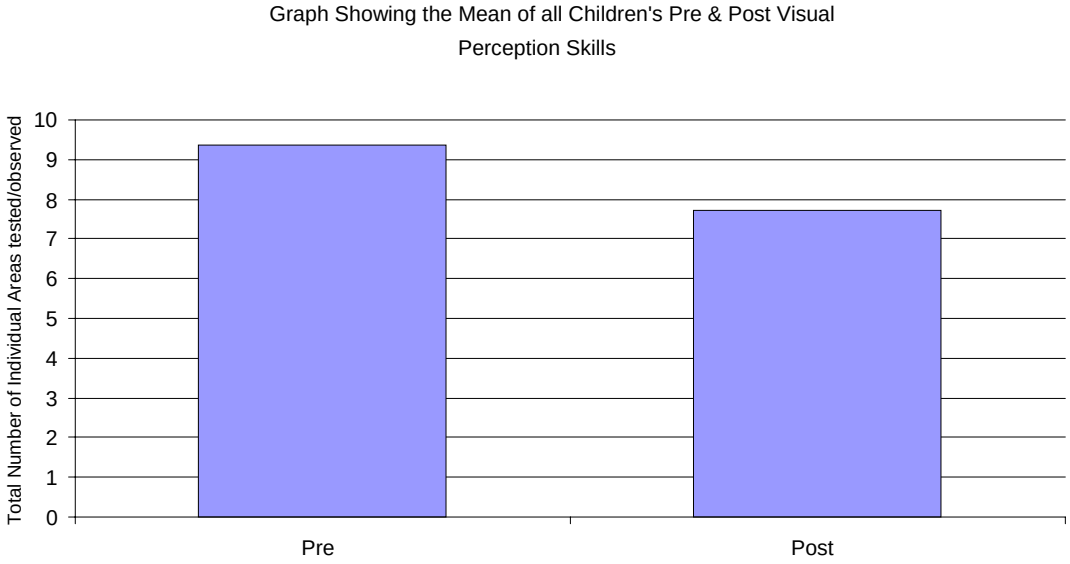
The VMI score measures each child's ability to transmit visual information into motor expression (i.e. movement). It looks at how the eyes and hands work together in copying shapes. This is needed for writing and drawing skills. While there was an increase in the mean VMI test score, this was understood to be more in line with normal development over the period.

Motor Co - ordination (VMI)



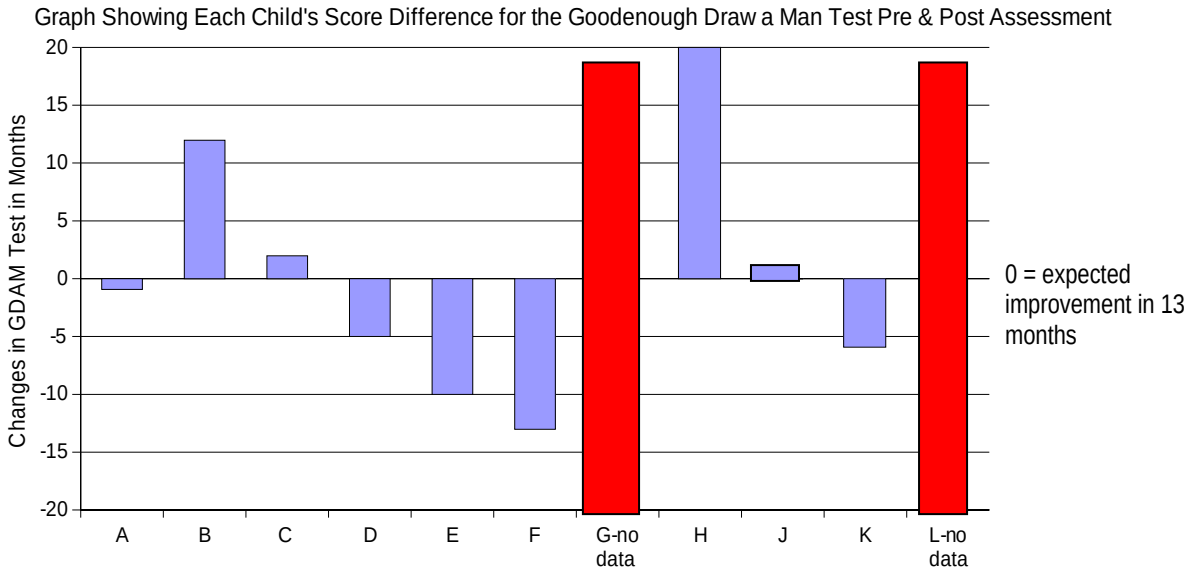
This test looks at the fine motor control when using a pencil. These results show a slight change but are not enough to draw any clear conclusions.

Visual Perception Summary



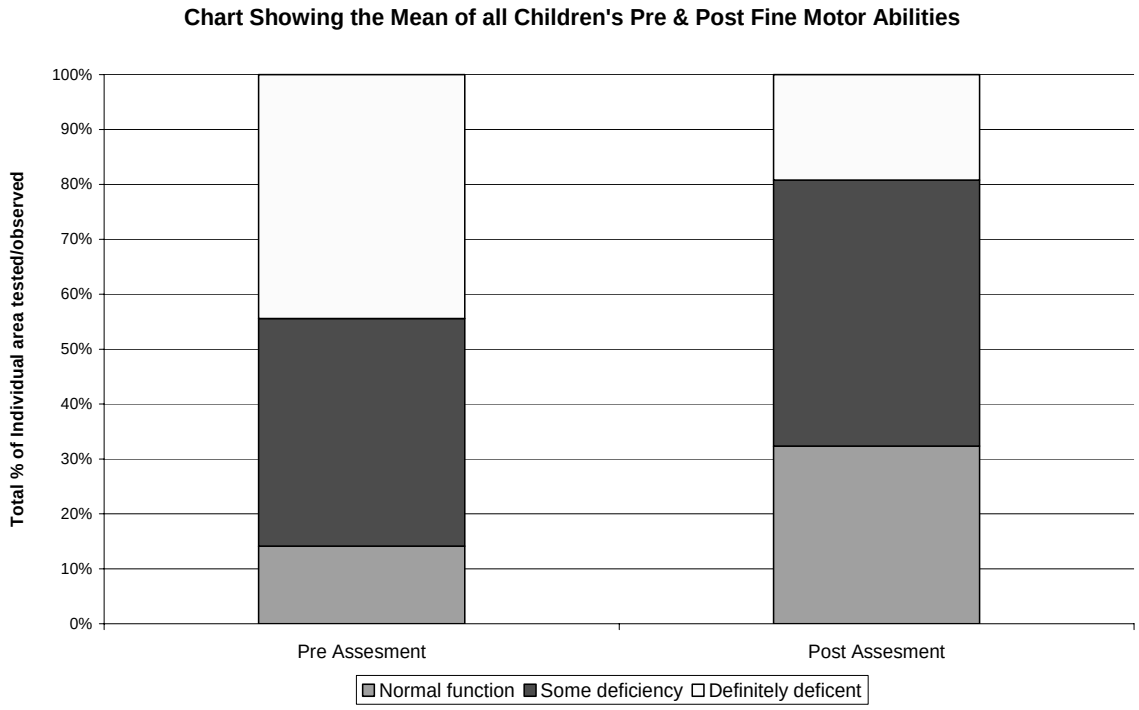
This visual perception score looks at the child's ability to receive, interpret and use information taken from the eyes and it depends on factors such as ocular motor control and visual attention. By looking at the graph we can see there appears to be no positive impact to the children on the project in improving this skill.

Goodenough Draw-A-Man test



This test looks at children's perception of his/her own body (e.g. body awareness). Over the 13 month period an improvement would expected to be made as the results are in maturation age, not a standardised percentile rank. This graph shows that some children improved and some didn't. Overall the outcome seems to be that there has been no real change in this area.

2. FINE MOTOR SKILLS

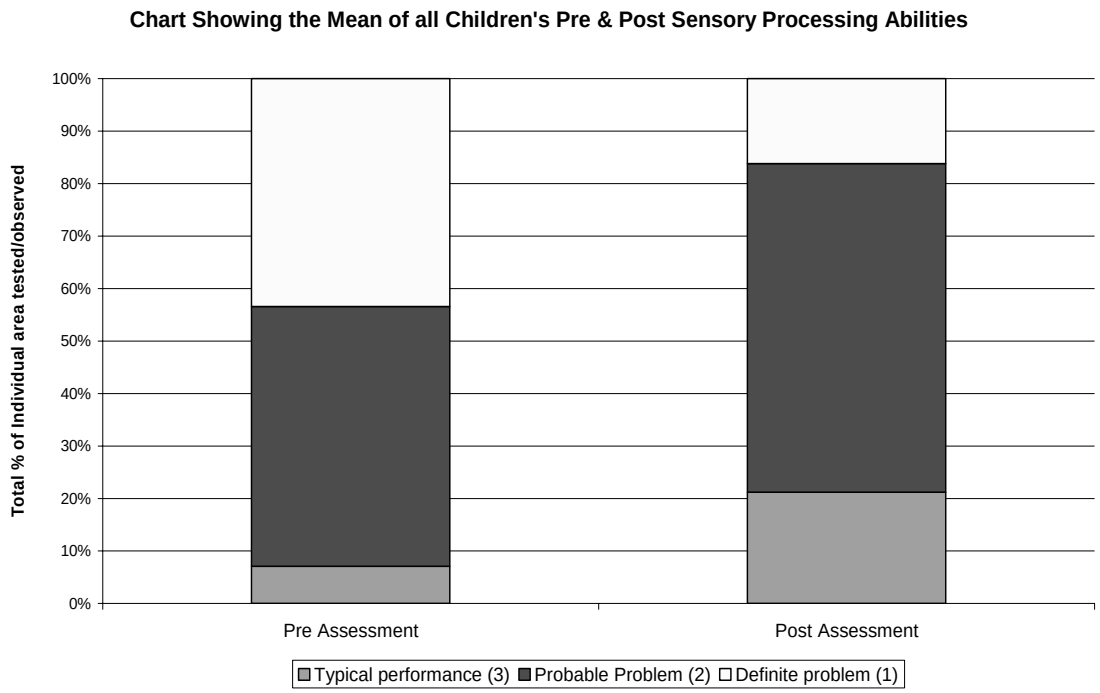


This assessment is based on an Occupational Therapist's professional observations of several aspects of fine motor abilities such as eye-hand co-ordination, pincer grip and hand strength.

The results show a clear trend from definite fine motor skills deficiency towards normal function.

Prior to the project the children had a perceived "normal function" in only 14% of the fine motor skills, but this increased to 32% after the assessment. In 86% of the skills problems were experienced before the Drumming Down Dyspraxia sessions (52% of these skills showed a definite deficiency and 48% showed slight deficiency), but afterwards problems were experienced in only 68% of the skills (29% of which showed a definite deficiency and 71% a slight deficiency).

3. SENSORY PROCESSING



Sensory processing is a neural (brain) process by which information from one's own body and the environment is sorted, organised and altered so that an adaptive response is produced to meet the demands of the circumstances. This forms the foundation for emotional development, cognitive growth and organisation of behaviour. It involves areas such as visual processing, body awareness and auditory processing (hearing).

This graph above is based upon a parent questionnaire and is therefore centred on parental perception of their child's functions of sensory processing. Before the sessions only 3 of the 11 children were reported to have typical (or normal) sensory response. Afterwards a total of 9 children appeared to show "typical function".

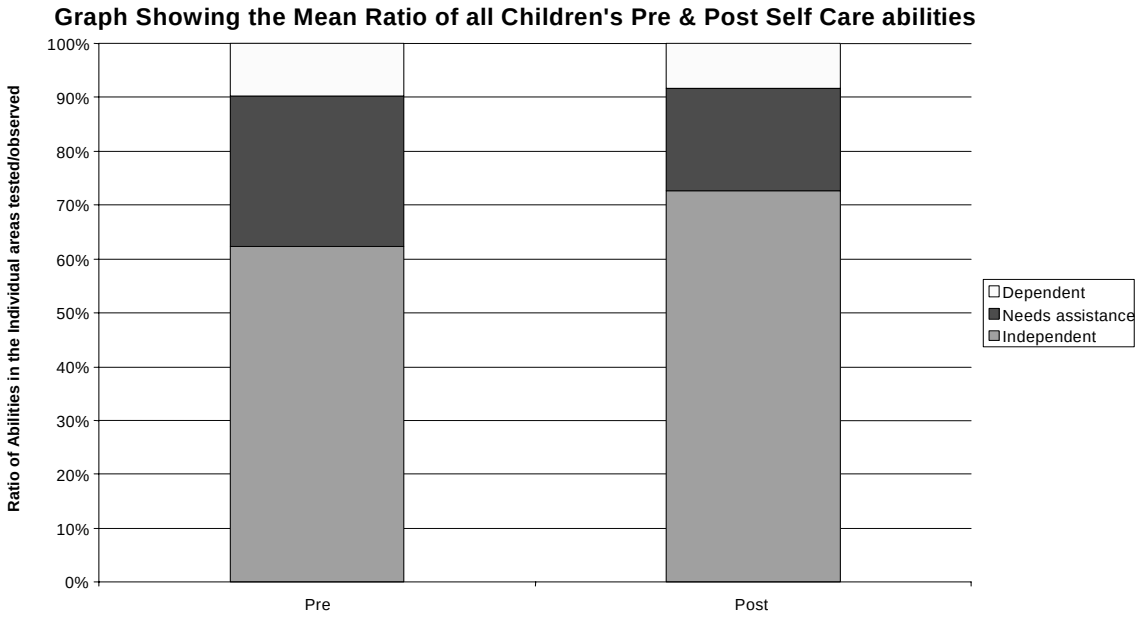
Before the sessions in 43% of responses children experienced a definite problem. Afterwards, this figure dropped to a smaller 16% of the responses.

	Auditory Processing	Visual Processing	Touch Processing	Vestibular Processing	Proprioceptive Processing	Praxis
Number of Children making improvements	4	4	4	6	6	7

When looking at the breakdown down of sensory processing areas and the number of children who have made improvements in each area it is seen that the most improved areas are:

- vestibular processing (*the sensing of movement in relation to gravity, located in the middle ear and activated by head movements)*
- proprioceptive processing (*the awareness and identification of the location, position and movement of the body in space, in relation to its parts and in relation to its environment)*
- praxis (*the ability to plan and carry out an unfamiliar activity).*

4. SELF CARE



The information for these two graphs shows the mean of each child's different levels of ability in doing 13 self-care tasks. The information is gathered from a record of the parent's perceptions of any improvements.

From this graph some general observations can be made. There is an increase in independence during self-care activities and a decrease in the amount of children needing assistance or being dependent.

Before the sessions the children were independent in 62% of the self-care activities. Afterwards this figure increased to 72% of the activities. Also, prior to the sessions 28% of children needed assistance during the activities, but afterwards only 18% did.

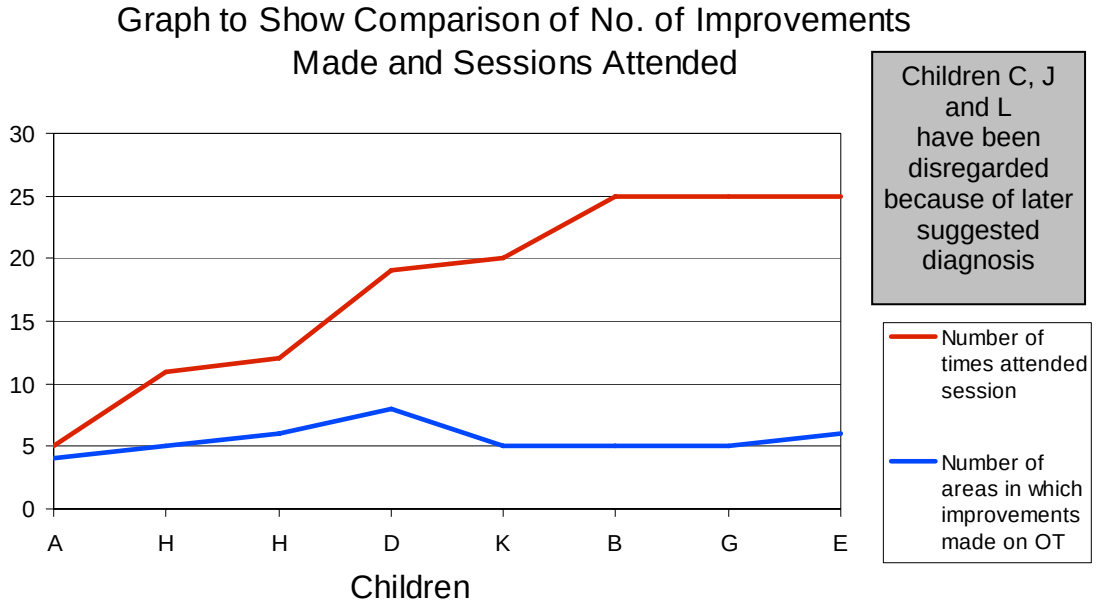
However, these results are not standardised and it would be expected that the children have matured in the 13-month period.

Post Assessment Summary

Linked Conditions

In the Physiotherapist's assessment report it is suggested that "Child C" and Child J" may have global delay / learning difficulties. The Occupational Therapist considers this to be the case as well. The Physiotherapist also noted that "Child L" presented with neurological causes for their difficulties. This knowledge may help understand why Child C decreased in ability in 5 areas of the Occupational Therapy Assessment and Child L in 3. Child J decreased in ability in one area on the Occupational Therapy assessment.

Improvements made

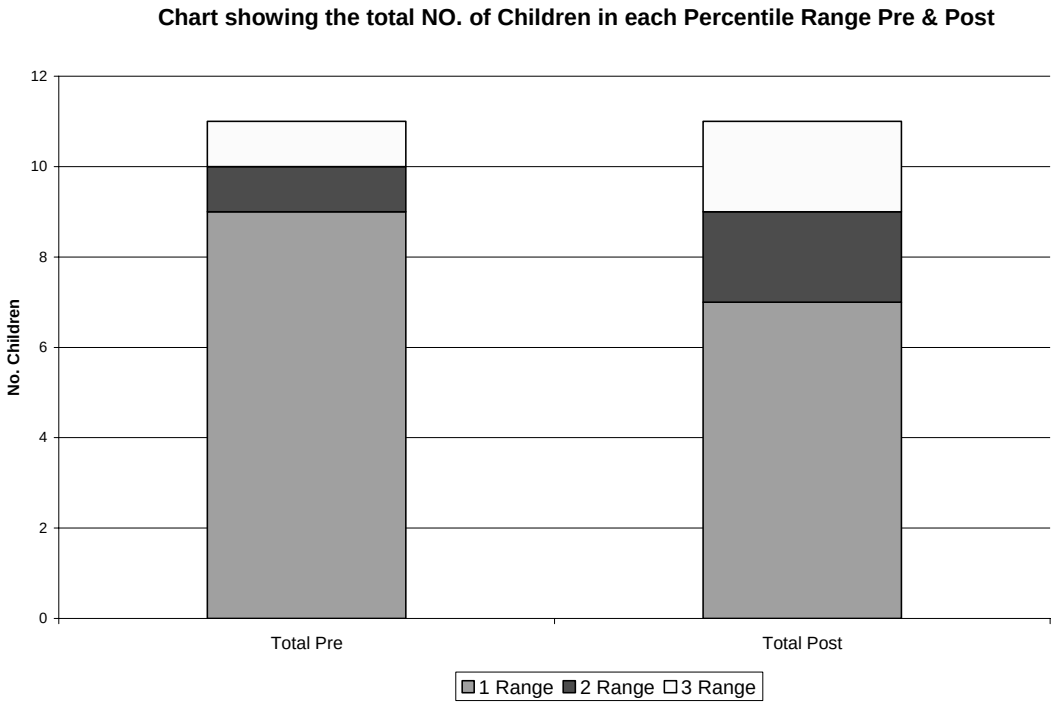


This graph looks at the correlation between the number of sessions attended and the number of improved areas in the children's abilities. It appears there is a general trend of continued improvement up to 19 sessions, after which the improvements were not so marked. However this information is gathered form a very small number participants.

Co-ordination questionnaire (DCDQ)

These graphs are compiled from a questionnaire. It is completed by parents who report on their child's development in different motor functions. They compare their own child's performance with children the same age as their own child, in 4 co-ordination areas:

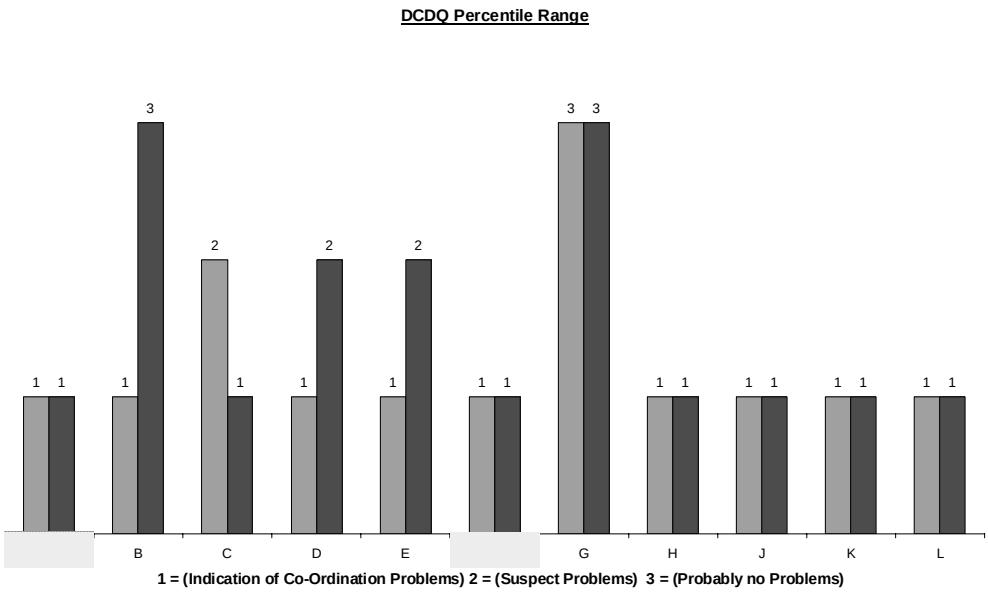
- control during movement
- fine motor/handwriting
- gross motor/planning
- general co-ordination



Ranges

1. 0-48 (0 – 10th percentile) = indication of co-ordination problems
2. 49-57 (11-25th percentile) = suspect co-ordination problems
3. 58-85 (26-100th percentile) = probably no problems

This graph shows there is an increase in the mean score showing that in the parent's perception the majority of children have improved their control and co-ordination in tasks.



Ranges

1. 0-48 (0 – 10th percentile) = indication of co-ordination problems
2. 49-57 (11-25th percentile) = suspect co-ordination problems
3. 58-85 (26-100th percentile) = probably no problems

From the questionnaire, a total score is worked out for each child's performance both pre and post assessment. Depending on their total score they are fitted into one of the ranges (see graph above).

For example, child G scored 60 (pre assessment) and 68 (post assessment). Although this score improved they are still bracketed into the same range.

The DCDQ Percentile Range graph shows that at the end of the project:

- 6 children have remained in the same bracket
- 4 have improved their co-ordination
- 1 has dropped a bracket*

**(This is child C, who has been identified by the Physiotherapist and Occupational Therapist as probably having generalised developmental delay rather than Dyspraxia).*

Occupational Therapist's Conclusion

It was disappointing that not all the children who participated in the Project came back for reassessment, as the cohort was already small.

There was some indication that the optimal improvement was made after approximately 19 sessions in both the Occupational Therapist and Physiotherapist's findings.

Also it is interesting to note that two of the children who came the most were ones who have been identified as having global developmental delay (Child C and J). Despite this they showed little improvements from having attended longer. Also as with the Physiotherapist's results Child L (who probably has neurological causes for problems) gained less than even these from attending more sessions than most others.

The standardised assessments carried out by Occupational Therapy do not indicate significant improvements in areas tested (Visual motor integration, visual perception and motor control of a pencil).

However the clinical observations of the Occupational Therapist, children's comments and parental reporting indicates that the participants did make some gains, particularly in the areas of:

- social skills,
- self confidence
- balance and co-ordination

Despite many parents stating that the least improved skills were self-care and sensory processing, the data results of the Occupational Therapy assessments indicated there were improvement in:

sensory processing, especially

- vestibular (movement),
- proprioceptive (receiving information form joints and muscles)
- praxis (planning movement).

On reflection back to the aims of the project of “Drumming Down Dyspraxia”, these are all indicated as areas that it was hoped would be helped by the percussion and Dalcroze sessions.

Ideally it would have been better if there had been a control group for this project. It is also inconclusive as to whether one session was more pertinent to the improvements seen than the other. These factors could be considered if a further research project were to be undertaken.