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SUMMARY REPORT

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1. Introduction

This report presents a summary of the findings of a small pilot study of an American programme called the Learning Breakthrough Programme (LBP) (Belgau, 1982), which is currently being implemented in Northern Ireland (NI). This programme may be described as a neurodevelopmental intervention that helps children and adults with learning difficulties including ADHD, dyslexia and autism spectrum disorders.

2. Background

Approximately five per cent of all children worldwide fulfil the diagnostic criteria for Attention Deficit Hyperactivity Disorder (ADHD) (Lichtenstein et al., 2012). ADHD is a common chronic condition typically affecting more boys than girls, with prevalence rates in the UK estimated at 3.6% and 0.9% respectively in children aged 5 to 15 years (Holden et al., 2013). Most of these children are treated using pharmacological methods (Lichtenstein, 2012). It was previously believed that ADHD was a disorder that children eventually grow out of, but more recently, studies suggest that approximately 30-60 per cent of children continue to display significant symptoms of the disorder into adulthood (Weiss, 1993). Substantial impairments in academic performance and social functioning are often associated with ADHD and over 65% of sufferers frequently have one or more comorbid disorders such as dyslexia, autistic spectrum disorders, developmental coordination disorder and conduct and oppositional defiant disorders (Harpin, 2005). All of these disorders are of considerable clinical importance and cause a considerable emotional burden to both children and parents alike (Bishop, 2007).

Belgau (1982) described his LBP as “a multi-sensory brain training program designed to strengthen very basic brain processes and enable high level learning skills to flourish”. He indicates that that the programme is very easy to use and is suitable for anyone aged six or older. The Dore Programme (2000), known originally as Dyslexia Dyspraxia Attention Treatment (DDAT), is an adapted version of the LBP, which appears to target children over the age of 7 with learning difficulties including in particular, dyslexia (Reynolds and Nicholson, 2007). However, this programme has not been used in the last number of years.

The LBP consists of a daily routine of balance and co-ordination exercises for 15 minutes, twice daily for a period of one year. The programme utilises specially designed equipment such as a balance ball, visual motor control stick, pendulum ball and beanbags, amongst other items. Typically, the programme is purchased online with a DVD and an instruction manual. To our knowledge, the programme has not yet been evaluated despite anecdotal evidence to suggest that it may be effective.

The LBP has been delivered in NI since 2010 through a company called Learning Support Services Northern Ireland (LSSNI). Clients can purchase the programme (complete with the equipment) directly from the director (Susan Steele). This includes all the materials as well as an initial assessment and several client reviews at 3,6,9 and 12 month intervals, all of which are carried out by Susan Steele, with telephone support also provided. LSSNI is currently the only provider of the LBP that provides this support feature in conjunction with the programme materials. Recently, this programme has also begun to be delivered in the Republic of Ireland on a small-scale basis (by an associate of LSSNI).

3. Study Aims and Objectives

The principal aim of this study was to undertake analysis of a small data set to assess/explore the perceived effectiveness of the LBP in a sample of primary school children (n=49), aged between 4-12 years, who completed the programme during the period September 2012 to September 2014 (inclusive). There was no contact with children, parents or any other stakeholders in the completion of the study.

4. Method

The sample

The anonymised data set (n=49) was provided by LSSNI and consisted of completed cases only (i.e. those who completed the programme) across a range of presenting issues including ADHD, Dyslexia and Autism Spectrum Disorder, amongst others. A purposive sample of children across the required age range and comprising both boys and girls was selected for inclusion in the pilot study. The data included 49 assessor-completed questionnaires which were completed at baseline (pre-intervention) and 6-months later.

Measures/Evaluation Form

The pre-post data were collected using an 80-item questionnaire specially devised by LSSNI to track and monitor cases and called the *Learning Breakthrough Evaluation Assessment Questionnaire (LBEAQ)* (See Appendix A). Typically, assessments take place at baseline, 3,6, 9 and 12 -month intervals respectively. However, only the baseline-6month scores were used for purposes of this analysis.

LSSNI completed the questionnaire with appropriate scores being assigned to each of the 80 items ranging from 0 to 4,with 4 indicating the highest level of severity and 0 indicating that the symptom was no longer present and/or was never present.

Data analysis

Prior to the analysis, the researcher met with the LSSNI representative. The data set was checked manually for errors and outliers and all inconsistencies and/or missing data were followed up and interrogated thoroughly. This involved ongoing liaison with the LSSNI representative. The (subjective) scores were standardised for the baseline and post-intervention assessments, and then entered onto SPSS (version 22) for analysis. For analysis purposes, the 80 presenting symptoms contained in the Learning Breakthrough Evaluation Assessment Questionnaire were recoded into diagnostic categories, based on guidance that the researcher obtained from the LSSNI representative. In total, 9 diagnostic categories were created. These were used for analysis purposes only; they were not formal diagnostic labels that the participants had received. These are referred to henceforth as sub-scales for purposes of this analysis.

A paired sample t-test was carried out to explore differences between the total baseline and post intervention scores; a series of Wilcoxon Signed Rank Tests was used to explore the possible effect of the LBP intervention on each of the 9 sub-scales. The results are presented below.

5. Summary of key findings:

(1) Demographics

- The sample comprised 75% (36/49) males and the mean age of children in the sample was 8.78years (SD= 2.22, range 4-13 years). Almost 29% were aged 7 years or under; 49% were aged between 8-10 years (See Figure 1).

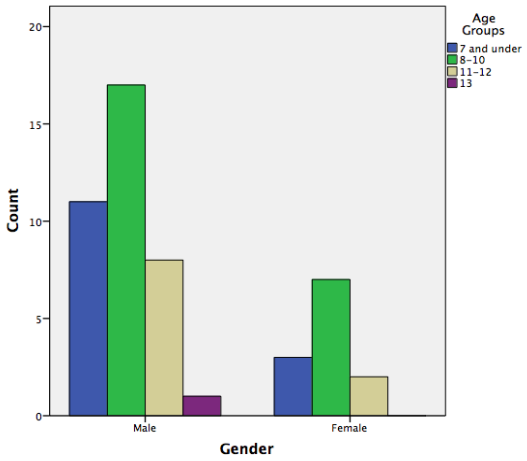

Figure 1. **Age and gender at initial assessment**

(2). Clients' Primary presenting issues

- In total, 9 categories (sub-scales) of clients' major presenting issues were identified (See Table 1), although it must be noted that there was considerable overlap across categories. In addition, most of the 9 categories contained a number of related sub-groups (See Appendix B).

Table 1: Categories of presenting issues

	Primary Presenting Issue: Sub-scales	**Possible number of associated items (LBEAQ)**
1.	Attention Deficit disorder (ADD)	11
2.	Attention deficit/hyperactivity disorder (ADHD)	13
3.	Autism	14
4.	All (multiple categories)	5
5.	Dyslexia	21
6.	Dyspraxia	6
7.	Spatial Awareness	1
8.	Fine Motor Skills	5
9.	Sensory Processing	1

(3) Overall Baseline and Post-Intervention (6-month) scores

- A paired-samples t-test showed that there was a statistically significant and moderate decrease in the 'Total score' measure from baseline (M=185.95,SD=35.14) to 6-month post intervention (M=65.92,SD=34.16), t (48)=23.99,p<. 005 (two-tailed); 95% confidence interval 109.98-130.09; moderate effect size (.9)) (Figure 2). The baseline and post-intervention scores for each individual child in the sample is provided in Appendix C. The mean number of months for post-intervention follow up was 7.13(range 5-11,SD=1.38).

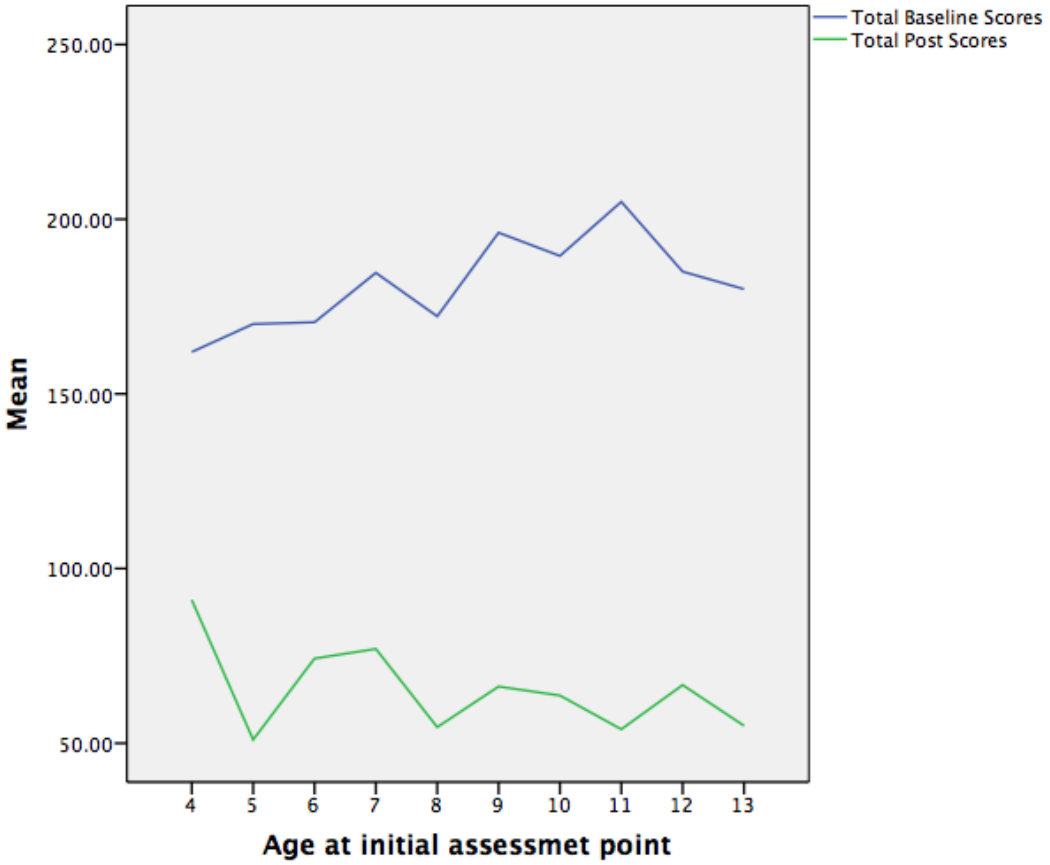

Figure 2 Mean baseline and post-intervention scores by participant age

(4) Sub-scale analysis-Wilcoxon Signed Rank Tests

The series of Wilcoxon Signed Rank Tests also showed statistically significant decreases (improvements) in pre-post scores on each of the 9 sub-scales. The results are summarised below in Table 2.

Table 2: Summary of pre-post test analysis

Sub-scale Name	Z	p	Effect	Medium Rank (Pre and Post)
1.Autism	-6.094	0.000	.62	27,8
2.ADD	-6.094	0.000	.61	36,11
3.ADHD	-6.095	0.000	.62	28,9
4.ALL Symptoms	-5.192	0.000	.60	8,2
5.Dyslexia	-5.652	0.000	.57	10,3
6.Dyspraxia	-5.652	0.000	.57	10,3
7.Spatial Awareness	-5.326	0.000	.53	4,0
8.Fine Motor	-5.781	0.000	.58	12,3
9.Sensory Processing	-3.942	0.000	.42	2,0

6. Conclusion

This pilot study is the first of its kind to assess the LBP. The work was conducted in the hope that it would provide an initial basis on which to design and implement a large-scale evaluation into the future in order to properly assess the effectiveness of the programme.

Despite the small size of the study, the findings provide us with an interesting snapshot of how this American programme has been translated to a different geographical context – in this case, Northern Ireland. All of the clients were shown to have responded positively to the intervention as reflected in the statistically significant improvements in both the overall pre-post score and on each of the 9 sub-scale categories.

These preliminary findings tentatively suggest that there may be merit in delivering this programme to children with a range of symptoms and particularly those with ADHD, ADD, autism spectrum disorders and dyspraxia. However, this study had several limitations which should be kept in mind when interpreting the findings. Firstly, the sample size was small. Secondly, the questionnaire was completed by the person who was delivering the service rather than an independent researcher or other observer and, in addition, no independent observation or qualitative methods were used to supplement and amplify the questionnaire-based data. Thirdly, the questionnaire is a non-standardised measure that has no tested psychometric properties. Fourthly, no information was available on any formal diagnoses that clients may have received, their precise symptoms or whether or not they were taking medication for their condition. Finally, a control group was not utilised in this pilot study – thus, each child acted as his/her own control.

Nonetheless, to the best of our knowledge, this programme has no known evidence to date. Whilst a small number of studies have been carried out on the aforementioned Dore programme, the findings thus far, have been inconclusive (Reynolds and Nicholson, 2007) and the programme has not been used in recent years. Future research is urgently needed to properly evaluate the LBP programme in terms of its overall effectiveness including the mechanisms underpinning its success/failure with specific client groups, as well as its overall cost-effectiveness. Such an evaluation could incorporate one or more robust multi-method strategies including: a randomised controlled trial (RCT) to assess outcomes

over time; a process evaluation to assess barriers and facilitators to implementation as well as stakeholder views and experiences; and an economic appraisal to assess value for money.

7. References

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Appendix A

Learning Breakthrough Evaluation Assessment Questionnaire

Parents' details:

Severity of difficulty: 4 = Most Difficult – 0 = No difficulty				
Name	**D.O.B**	**Initial assessment date CATEGORY[1]**		
Little concept of time (out in 10 minutes)		ADD		
Rows when getting ready for school		ADD		
Forgetful shop/PE gear/lunches		ADD		
Difficulty organising homework		ADD/Dyslexia		
Loses pencils/rubbers/books for tasks		ADD		
Difficulty reciting days of week/months/ABC's		DYS		
Spells phonetically		DYS		
Struggle to retain simple/complex spellings		DYS		
Writes minimum amount necessary		DYS		
Has difficulty studying for tests		DYS		
Has difficulty recognising mistakes		DYS		
Has an attitude of 'it will do' due to tiredness		DYS/ADD		
Has difficulty copying from board		DYS		
Slow reading speed (monotone)		DYS		
Has difficulty reading out loud		DYS		
Yawn or rub eyes when reading		DYS		
Inserts words/guesses words from picture		DYS		
Tracks with finger/guide		DYS		
Text merges/moves/white page brighter		DYS		
Letter/number reversal		DYS		
Difficulty structuring ideas onto paper		DYS/ADD		
Incorrect use of grammar (caps – full stops)		DYS		
Writes very slowly or very fast		DYS		
Difficulty writing in a straight line		DYS		
Squeezes words in to the end of the line		DYS		
Is writing messy? (Lack of spacing/Diff sizes)		DYS		
Stutters or slurred speech		Verbal Dyspraxia		
Difficulty learning times tables		ADD/Dyscalculia		
Struggle with quick fire maths		ADD/Dyscalculia		
Often doesn't get class-work finished		ADD/DYS/Autism		
Difficulty waiting turn (in a queue)		ADHD		
Interrupts or intrudes on others		ADHD		
Poor posture (Low muscle tone) (Tired core)		All of the above		
Fidgets with hands or feet		ADD/ADHD		
Moves around a lot when seated		ADD/ADHD		
Easily Distracted		ADD/ADHD		
Is 'on the go' or acts as if 'driven by a motor'		ADHD		
Flits from one game to another		ADHD		

Talks excessively	ADHD		
Runs about or climbs excessively.	ADHD		
Can't play quietly	ADHD		
Leaves seat in classroom/visits toilet a lot	ADHD		
Difficulty throwing and/or catching	Dyspraxia – All		
Difficulty riding a bike	Dyspraxia – All		
Awkward when running	Dyspraxia – All		
Has a tendency to knock glasses over	Spatial awareness – All		
Difficulty playing in team sports	Dyspraxia – All		
Reluctant to join in physical activities	Dyspraxia/Auditory proc		
Awkward pen grip (Fingers are straight)	Fine motor – Dyslexia		
Struggles to tie shoe laces	Fine Motor		
Struggles with buttons	Fine Motor		
Difficulty using cutlery	Fine Motor		
Struggles with drawing/colouring-in	Fine Motor		
Difficulty getting to sleep	ADHD – All		
Wakes in the night	ADHD – All		
Wakes very early 3am 6am	ADHD – All		
Difficulty getting up	ADHD – All		
Fussy eater	Sensory processing – All		
Becomes frustrated easily/Anxiety	All		
Shows aggressive behaviour/'Meltdowns'	Autism/ADHD		
Inappropriate speech/No filter	Autism		
Difficulty expressing emotions	Autism		
Is very shy	All		
Very dependent on specific routines	Autism		
Takes comments very literally	Autism		
Difficulty holding eye contact	Autism – All		
Fixations	Autism		
Seems not to listen when spokento directly	Autism – Bubble		
Low confidence	All		
Difficulty making friends	Autism/ADHD		
Difficulty keeping friendships	Autism/ADHD		
High sensitivity to touch/sound/deep impact	Autism – All		
Prefers to play alone	Autism		
Lacks imagination in play	Autism		
Knows what to say but can't get words out	All		
No consequences of actions	ADHD/Autism		
Lack of empathy	Autism/ADHD		
Is focus weak? (Therapist to check this)			

1. Some symptoms can be experienced across a range of symptom categories so these are marked as 'ALL'.

Appendix B

Symptom classification categories and their associated sub-groups

1.Attention Deficit Disorder (ADD)
(1) ADD
(2) ADD/Dyslexia
(3) ADD/Dyscalculia
(4) ADD/Dyslexia/Autism
(5) ADD/ADHD

2.Attention Deficit/Hyperactivity Disorder (ADHD)
ADHD
ADHD/All Symptoms

3.Autism
Autism
Autism-Bubble
Autism/ADHD

4. All (multiple categories)

5.Dyslexia
Dyslexia
Dyslexia/ADD

6.Dyspraxia
Dyspraxia-All
Verbal Dyspraxia

7.Spatial Awareness

8.Fine Motor

9.Sensory Processing

Appendix C

Baseline and Six-month post intervention scores for each child