

# Trust Recolo to provide expert, high quality and effective community neuropsychological rehabilitation to children, young people and their families.

Recolo is a UK wide practice of Chartered Clinical Child Psychologists, Paediatric Neuropsychologists, Educational Psychologists, and adult mental health & trauma specialists offering community-based neuropsychological rehabilitation for children and young people up to the age of 25 years, plus support to their families following brain injury.

## WE ARE RECOLO

Recolo was started in 2007 and has been growing ever since.

Recolo UK Ltd was set up by three clinical psychologists (Reed, Byard & Fine) committed to provide expert, high quality and professional neuropsychological rehabilitation for children with acquired brain injury and their families.

We have over 30 clinicians throughout the UK, all with key areas of expertise and knowledge, and all specialising in working with children and young people. All our clinicians receive regular supervision.

## THE RECOLO METHOD

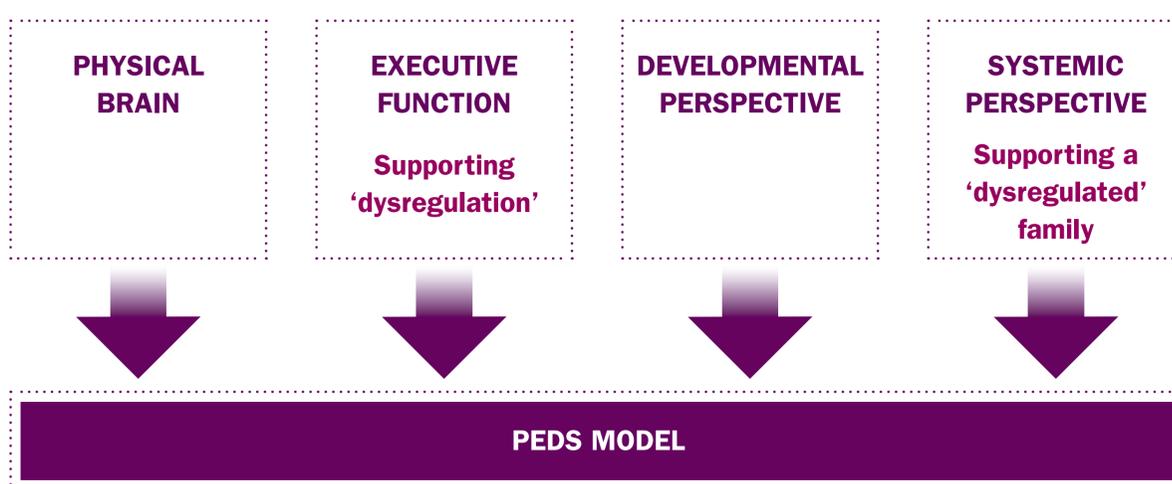
- ✦ We promote health of physical brain through diet, exercise (including motor and sensory activity) and rest.
- ✦ We structure activities and routines, and use assistive technology to compensate for weak executive functioning.
- ✦ We take a developmental perspective in rehabilitation.
- ✦ We work systemically with whole family, school and wider support network.
- ✦ We know that family functioning is associated with child functioning/outcome. Brain injury often leads to 'Dysregulation' in the young person with ABI and family/wider systems. Therefore, supporting 'regulation' in family and wider system is as important as individual rehabilitation with child.

## WE ARE EXPERTS

- Antecedent behaviour management
- Systemic therapy for families
- Neuropsychological assessment
- Cognitive remediation (e.g. interventions to support the development of (or to compensate for) weak memory, attention, executive functioning)
- Educational Psychology support and school liaison
- Trauma work for children and adults
- CBT for children and adults
- Consultation and support to rehabilitation and allied therapy teams
- Specialist teaching, training and supervision to the NHS and private sector
- Paediatric Psychology support of children with chronic physical & medical conditions.

## WE ARE INNOVATIVE

We believe in integrating neuroscience development and innovation with neuropsychology. New interventions within the neuroscience frame include (re)training 'rhythmicity' and (re)training 'timing' in the brain.



## HOW WE WORK IN THE MEDICO-LEGAL CLAIM PROCESS

- Our knowledgeable operations team provides the business support required in order to give your client the best possible service and outcomes.
- Professional administration and liaison throughout the case duration. Strong working relationships with our referrers are vital.
- All referrals are carefully considered to ensure the best skilled clinician, in the right location, is matched to the right case. Regular supervision is given to all clinicians.
- Efficient, cost effective and measurable progress.
- We provide specifically tailored and bespoke packages for the individual needs of the child, family and team so that the best outcomes are achieved.
- Session pricing is provided on a case by case basis following a complete assessment of needs and purpose.
- We are familiar at working with medico-legal, commercial and public sector budget requirements and fully understand the need for cost efficiency and transparency.



## CONCLUSION

We use neuropsychology to understand the impact of a child's brain injury on their everyday lives and to promote the development of emotional, social, behavioural and cognitive functioning and overall quality of life.

We use these theories to work individually with the child or young person, with parents, families, schools and teachers, case managers, allied therapists and MDT team, Connexions, CAMHS, employers, providing support and advice around cognitive rehabilitation and behavioural management.

We understand that the emotional impact on the family is significant as they adjust to their new role of care for their child.

We support the family in its new role of care, providing psychological support for families as they adjust to the brain injury and what it means for their lives. Children respond better to people they trust, in places where they feel safe.

# Parenting following early traumatic brain injury.

Traumatic Brain Injury (TBI) in childhood is a reasonably common cause of neuropsychological disability. Rates range between 1-3 per 1000 per year for children and young people. Growing evidence suggests that early occurring TBI in childhood is associated with poorer long-term cognitive and psychosocial outcomes than injuries sustained in later childhood, over a broad range of domains. The family system can bear risk of disruption following early TBI. An euro rehabilitation model which focuses on the child's neuropsychological development within the family and social system provides a greater chance of positive outcome.

## INTRODUCTION

This case study describes a neuro rehabilitation program focused on developing behavioural regulation for a girl aged 6 with a TBI. At aged 2½ years the girl sustained a contusion of the left frontal lobe with a growing skull fracture which was repaired four months later. Neurologically she was considered to be stable but she experienced behavioural and emotional difficulties on a daily basis.

### METHOD

An individual program was developed to manage behavioural problems for the child, develop independence, enhance emotional regulation and support family and school. Detailed formulation, psycho-education, behavioural approaches and positive behavioural supports were employed.

### RESULTS AND DISCUSSION

Results showed an increase in positive parenting and a decrease in the behavioural difficulties over time. The case has implications for understanding how to help children with TBI develop self regulation by working within a systemic context.



## TBI AND FAMILY SYSTEM

The family system can be at risk of disruption following early TBI. Studies highlight increased family strain, depression, psychological distress, burden, anxiety, social isolation and loss of income (Ganetal., 2006).

Often the main negative effects are experienced by the primary care giver. Pre-injury family function (measured by economic status, mental health vulnerabilities, level of adaptive function) alongside the severity of the injury, is considered to be a predictive factor for outcome (Taylor2002).

Results suggest that regardless of the severity of the injury, families who reported higher levels of stress pre-injury, a perceived burden associated with the injury and disengaged/denial coping styles, reported greater stress than families who did not.

Disruption to the family system can affect development of self regulation.

### TBI DEVELOPMENT

The ability to self regulate behaviour and emotions develops slowly over time, with experience and socialisation.

Early development of self regulation occurs through parent child interaction. Children learn through operant conditioning that some of their behaviour is rewarding and some results in withdrawal of reward or punishment. Using behavioural contingencies, parents modify children's behaviour.

The ability to learn about consequences is reduced significantly by frontal lobe injury (Rolls 2000, Schlund 2002).

As children develop, they learn to use internal strategies to manage their own behaviour.

The following case study (on the right) uses understanding of the ways psychological, neurological and systemic factors interact in the development of self regulation, in order to guide an intervention with a 6 year old girl with TBI.

## DISCUSSION AND CONCLUSIONS

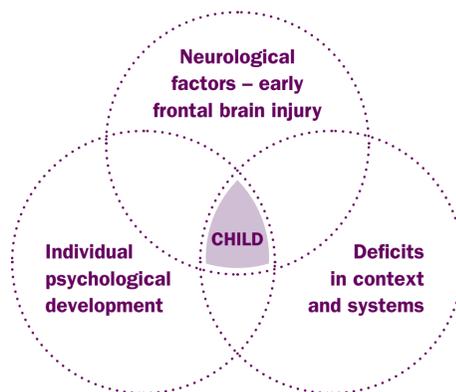
Measurement of outcome showed a reduction on visual analogue scale ratings of the affect of behavioural difficulties on family function. However these reductions were not seen on standardised questionnaires such as the SDQ and PEDSCL.

There are a paucity of measures specifically tailored to measuring the behavioural, emotional and neurocognitive symptoms following TBI. Perhaps measuring the effects of behaviour on the family is a useful way to consider outcome.

Out come is always related to resources required to create the change. It is difficult to assess how cost-effective the intervention was. It is expensive to provide home based rehabilitation. The few studies that have evaluated the impact and cost-effectiveness of community-based rehabilitative interventions report mixed findings (Ponsford, 2005).

Ylvisaker and colleagues have emphasised the importance of context-sensitive rehabilitation when working with children who have TBI (Feeney & Ylvisaker, 2006). Progress acquired within the context to which the knowledge and skills are applied, is more effective than acquisition outside of the routines of the child and family's daily life.

## DEVELOPING SELF-REGULATION FOLLOWING TBI



“Emotional regulation consists of extrinsic and intrinsic processes responsible for monitoring, evaluating and modifying emotional reactions, especially their intensive and temporal features to accomplish one's goals”  
Thompson, 1994

## DEVELOPING SELF REGULATION: NEUROLOGICAL FACTORS

The development of self regulation is seen within the context of neurological development. Self regulation is associated with a collection of brain areas including the brain stem, hypothalamus, limbic system and frontal lobes of the cerebral cortex. Development of this brain system progresses in a hierarchical way with ventral areas, such as brain stem, developing before dorsal areas, such as the Dorsolateral Pre Frontal Cortex (Todd and Lewis 2008). This developmental progression can be affected by TBI.

Children start life as stimulus-bound creatures reacting in the moment to pleasant and unpleasant events. The brain stem and mid brain develop early in childhood.

Development progresses with the Ventral Pre-Frontal Cortex (VPFC). Social understanding and reward-based regulatory behaviours mediated by the VPFC are thought to be shaped by early interactions between infants and caregivers (Schore 1997). Positive interactions are rewarded and create expectancies of rewards, mediated by VPFC. Impulsive behaviours result in loss of reward and children therefore learn to regulate those behaviours.

Later on, the Dorsal Pre-Frontal Cortex (DPFC) develops. Typically development occurs between ages 3-5 but continues through adolescence as myelination continues. Children start to be able to delay gratification, show effortful control of impulsive behaviour and become capable of using higher order rule systems for decision making.

## CASE STUDY: BACKGROUND

Joy was born at full-term following an uneventful pregnancy. Developmental milestones were achieved within expected limits.

Joy sustained a severe head-injury at two years, four months of age. She was involved in a road traffic accident in which a car crashed into her pram. An initial CT brain scan revealed that she had sustained a contusion of the left frontal lobe. A growing skull fracture was repaired 4 months later. In the weeks following surgery, Joy developed a wound infection requiring a long course of antibiotics, in addition to plastic surgery.

A baseline neuropsychological assessment revealed performance within the Average range of intellectual functioning (Wechsler Preschool and Primary Scale of Intelligence-III; PIQ=100, VIQ=102). Attentional abilities were noted to be a concern at home. Temper tantrums, labile mood and impulsivity were reported.

At the time of treatment, Joy lived at home with her mother and older sister, Karen (12). Joy's mother, Ms Hobbs had recently qualified as a nurse, and specialised in Adult Neurorehabilitation. In the support network were Joy's maternal grandparents. Ms Hobbs had a single sister who lived locally. Ms Hobbs had not had contact with Joy's father since Joy was four months of age.

Ms Hobbs reported isolation and felt she was misunderstood by other people. She described a small network of friends.

## INTERVENTION

Antecedent, Behaviour and Consequence (ABC) charts of the angry outbursts were kept over the first six weeks to identify the precise locations, times and antecedents to Joy's outbursts. Alongside this, reward charts were established for simple behaviours.

Psycho education processes based on developmental psychology, neuropsychological literature and cognitive behavioural therapy were used throughout.

Joy's social cognition (awareness of others' behaviour and her own response in relation to their thoughts and feelings) was weak. Strategies such as 'social stories' (Gray and White, 2006) were used to raise social awareness and to promote understanding of social situations. Role play and "cheatsheets" to guide behavioural responses were used before specific events.

Promoting parental self-regulation was essential. Careful monitoring of diaries and detailed discussion revealed that Ms Hobbs had tended to get angry and exacerbate the situation. On other occasions she would collude or agree to demands but not in a predictable or consistent manner.

Emphasising the importance of continuity and consistency in parenting was particularly fruitful. Developing alternative strategies and distracter activities for managing outbursts was effective in minimising these behaviours.

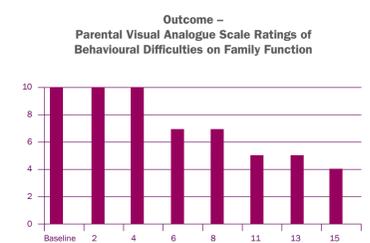
Outcome – Pediatric Quality of Life Scales (PEDSCL)

Subscales	Scores*					
	Child		Parent		Teacher	
	2008	2009	2008	2009	2008	2009
Physical Functioning	100	75	56	69	100	100
Emotional Functioning	40	40	15	65	100	100
Social Functioning	25	40	40	40	100	75
School Functioning	40	40	65	65	100	100

\*Higher scores indicate more positive outcome.

Outcome – Strengths and Difficulties Questionnaire Ratings across Treatment

Scale	Parent		Teacher	
	May 2008	June 2009	May 2008	June 2009
Overall stress	19*	24*	1	8
Emotional symptoms	4	5	0	1
Behaviour problems	6*	5*	0	2
Hyperactivity	4	4	1	4
Peer problems	5*	5*	0	1
Pro-social behaviour	6*	5*	10	8
Impact	High	High	Low	Low



Treatment was carried out in the client's home over an extended period, which enabled the development of positive family/professional relations and context sensitive rehabilitation. These relations would not have been available, had the intervention been carried out in a clinical context.

For many children with early TBI, there is an interplay between risk factors. There is neurological impairment that in turn affects psychological development. In addition, the family are often affected by the trauma of the accident and disruption to development. The brain injured child may therefore grow in an environment which struggles to support the development of self-regulation.

Intervention requires working systemically through parenting and helping parents with their own self regulation, to encouraging the parent to contain and regulate the child.

One way of viewing this is to see the parent as the provider of executive control to the infant or child with brain damage. In order for this to happen, the parent needs to feel regulated themselves i.e. to act in a calm, thoughtful, containing manner.

The task of the therapist is often to provide self regulation for the parent (system) which in turn enables the right conditions for the child to develop self regulation.

As the child develops the ability to self regulate, the focus turns to developing internal strategies. This would include improving working memory through training and providing child Cognitive Behavioural Therapy (CBT).

# CogMed: Improving working memory and attention. Preliminary results from a clinical case series.

Authors: Dr Sophie Gosling, Laura Sturdy, Laura McHugh,  
Dr Howard Fine, Dr Katie Byard and Dr Jonathan Reed,  
Recolo UK Ltd.

## INTRODUCTION

### What is CogMed?

CogMed is an online, evidence-based clinician supported program that aims to improve Working Memory. See [www.cogmed.com](http://www.cogmed.com)

### What is working memory?

Working memory is the ability to hold and manipulate information in mind to work out problems in the short-term (Baddeley and Hitch, 1974). It is closely linked

to attention and is often weaker in children who have ADHD or who have an acquired or traumatic brain injury. Mental arithmetic, remembering sequences or lists, working out word problems are examples of mental tasks that use working memory. Studies have shown that having difficulties with working memory is linked to poorer school attainment (Alloway and Gathercole, 2006). Therefore, improving working memory can help improve academic achievement.

### What happens to working memory after a brain injury?

There is variation between individuals, however, working memory is often one of the areas that can be affected.

### Is there already evidence that Cogmed works?

There are a number of published studies that support the effectiveness of this intervention with both adults and children whose working memory has been affected by a range of conditions (e.g. cancer, stroke, ABI, ADHD). See the Cogmed website for more details.

## OUR STUDY

### Aim

To examine quantitative and qualitative data from a case study series using the computerised CogMed RM program.

### Methods

Children were referred to the Recolo UK Ltd CogMed RM program. Thirty-one children were referred and 29 children completed the five week CogMed RM training. Their ages ranged between 6 to 25 years (mean age=9 years). In addition to working memory difficulties, the children also had problems with schoolwork, learning, concentration, attention and impulse control. A small number in the group (n=3) had a brain injury.

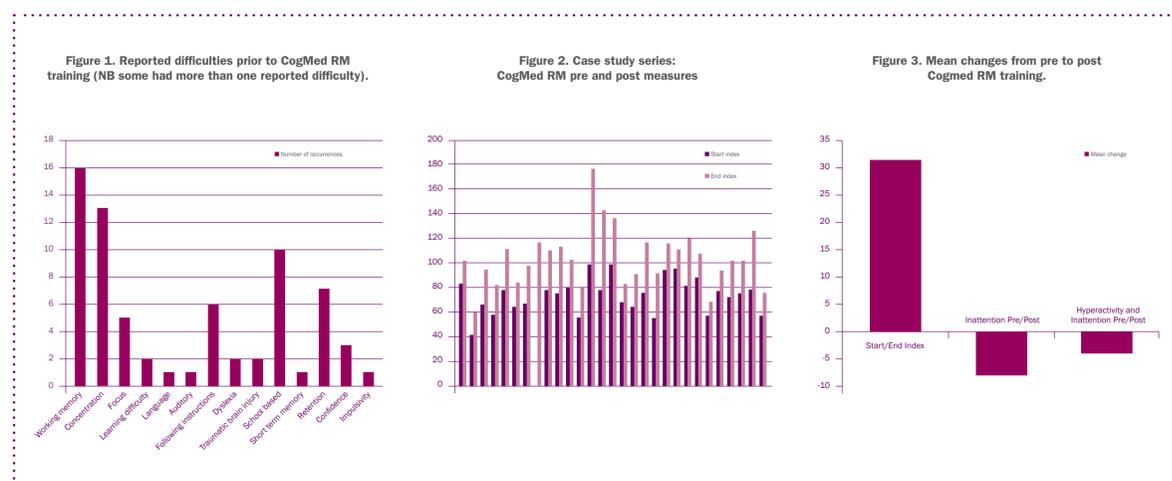
Working memory was assessed before and after the training using the CogMed index. Inattention (n=19) and/or hyperactivity (n=17) was also measured before and after training. Qualitative comments from parents, teachers and the young person were also examined.

### Results

Measures of working memory performance before and after the training showed that the average gain was 30 points. All the children who received and completed the training showed improved scores.

Inattention and hyperactivity scores also improved for the majority of children. Inattention scores improved by an average of seven points and hyperactivity scores improved by an average of five points.

Qualitative feedback was also obtained from parents and teachers to assess perceptions of generalisation of the training to everyday life and academic skills. Feedback was given for 72% of the children (n=21). Three children struggled to complete the training and although their index scores improved, parents and teachers did not notice improvements in everyday life. One child completed the training unsupervised and this positively skewed his results.



### Comments and quotes

**Before training:** Significant difficulties completing activities of daily living and following instructions.

**After training:** Significant improvements in her working memory in everyday life. The improvements were most apparent around concentration and retention of information. 'She can effectively follow through with tasks and follow longer a sequence of instructions.' (TBI, woman in early 20s)

**Before training:** Difficulties with reading, spelling and school work. Comments from parents after the training: 'He has improved 'brilliantly'... progressed significantly since completing the programme and that this improvement was also noted by his class teacher. He has shown more confidence around both reading and spelling since completing CogMed.' (6 year old boy)

**Before training:** Learning difficulties, working memory and difficulties around retaining information and following instructions.

**After training:** Definite overall improvement. His memory had improved and that he was better able to remember and recall information. His capacity to retain and remember information, ability to concentrate and processing speed had also improved. (9 year old boy)

### Key points

- CogMed RM was positively received by the majority of children and parents. Scores improved for all of the children who completed the training.
- Research is needed to examine the whether the gains made are maintained by following up children six to twelve months after completion.
- Children who have working memory difficulties as a result of an ABI could benefit from CogMed RM training.

### Acknowledgements

Thank-you to all of the children and their families who took part. The team: *Laura McHugh*: CogMed trainer with Recolo, compiled the data. *Dr Howard Fine*: Recolo UK Ltd Director and supervisor of CogMed training. *Laura Sturdy*: MSc student at Lancaster University prepared and analysed the data. *Dr Sophie Gosling*: poster preparation. *Dr Katie Byard* and *Dr Jonathan Reed*: Recolo UK Ltd Directors.

# The Recolo difference: A case study.

## David's story.

At age 14 years David suffered severe TBI in RTA

### MEET DAVID

David returned home after 6 months in hospital (including 3 months in coma):

- Poor reintegration into school
- Frequent aggressive outbursts
- Significant cognitive changes – weak memory, attention and executive functioning. Limited insight
- High fatigue levels
- Flat mood
- Friendships diminished – ‘bored’ and ‘lonely’.

### REHABILITATION PLAN

- Individual support to improve mental health
- A plan to improve David's aggressive behaviour
- A plan to improve David's mood, social functioning and daily routine
- Systemic intervention at a family level:
  - Shared narrative of events
  - Education with regards to brain injury
  - Enhance coping, problem-solving and communication in family.

### CHANGES OVER TIME

#### For David

- Behaviour improved (currently no significant behavioural outbursts)
- Returned to school. Recently completed BTEC
- Timetable of weekly activities – ‘not bored anymore’
- Experiencing less fatigue
- David's overall quality of life (PEDsQL) improved.

### CHANGES OVER TIME

#### For Family

- Reduced depression, anxiety and PTSD (on standardised mood measures)
- Parents have returned to work
- The family are able to talk together about the accident
- According to mother, there is less ‘separateness’ in the family
- Adjustment / adaptation – more realistic expectations of son; acceptance of rehab programme.

“...although it is hard to listen to things you don't want to accept and face realities... it is helping me to understand and adapt to my feelings with advice”

### DAVID'S FAMILY

#### Trauma

Family members witnessed the accident (younger brother, father, mother)

Descriptions of the family included:

- ‘No one talked’
- Everyone was living ‘separate lives’ in the same house
- ‘Unbearable’ sadness and grief

- Mother severe depression and anxiety
- Social isolation
- No tolerance for David's behaviour – snappy, reactive, angry
- Post-Traumatic Stress symptoms in mother, father and brother
- High levels of psychological distress, stress and burden.

### INTERVENTION 1

#### For David

- Introduction of support worker input (training given).
- Structured weekly timetable of activities and therapy to manage fatigue, increase social participation and improve overall quality of life
- Educating Educators about the impact of David's neuropsychological functioning on learning and behaviour at school / college
- Introduction of mobile phone / laptop to compensate for weak memory / attention / planning / organisation skills
- Changes to home / school environment to minimise triggers to challenging behaviour. Consistent responding by others to manage behaviour.

### INTERVENTION 2

#### For Family

- Individual psychological support to family members to reduce depression, anxiety and PTSD
- Joint family sessions:
  - Hearing each other's story
  - Education about brain injury (answering questions)
  - Conversations about loss, changes, different futures
  - Identified patterns of coping, family resources and resiliencies; applied to current ‘problems’
- Communication with wider team – review, goal-setting meetings.

