The Importance of Trauma-Informed Approaches in Education – The Impact of Implementing a Brain-Based Approach to Supporting Learners Across a Scottish Local Authority

Childhood adversity and trauma are not only highly complex and deep-rooted issues covering many disciplines including politics, social justice, economics, education, health, and social care, they are also highly emotive and prone to causing debate and divide amongst professionals. This divide has been evident in Scotland in recent years as two "sides" have appeared in what has become a battle of words and rhetoric over the perceived merits and flaws of attempts to share the knowledge around the impact of childhood adversity on long-term child development and functioning to a wider audience (see for example Barrett (2018) and the reply from Zeedyk (2018).

It is beyond the scope of this article to discuss these issues in more detail, however we feel it is important to note these discussions have taken place as they have contributed, together with recent policy initiatives from the Scottish Government (notably the Scottish Attainment Challenge (SAC) and Pupil Equity Fund (PEF)) to both greater awareness of the impact of childhood adversity across the lifespan, and a greater pool of resources for schools to use in pursuit of this goal.

While we wholeheartedly support the ambition of these funding streams, we have been concerned as a result at the rapid appearance of a large number of packages, approaches and interventions that are labelled as both "trauma-informed" *and* "evidence-based". Too often, exploration of the basis on which these claims are made demonstrates "evidence" is a loosely constructed term, often focused on "likeability" of an approach (or, in some cases, that of individual trainers) and without concrete, outcome data that demonstrates an improvement in functioning over time.

As a Service working in an area of significant socio-economic deprivation, childhood trauma and adversity are part of our daily landscape. We often work with families who are experiencing the effects of complex, intergenerational trauma. We frequently work with parents who were themselves clients of our Service as children. Increasingly, as with other areas and services, the complexity of the cases we deal with has significantly grown and we now see greater numbers of children affected not only by childhood adversity and trauma, but also by complex, neurodevelopmental conditions.

We would argue the experiences we provide for our children in educational establishments are vital in helping to develop healing relationships with safe, secure, well-regulated adults in tolerable amounts and at regular intervals throughout their week. This, combined with patterned, repetitive, rhythmic sensorimotor experiences is what the Neurosequential Model tells us will affect real and lasting change in the life of a child. There will always be a place for specialist, therapeutic support for some children, but these resources are finite, increasingly stretched, and often not able to provide the frequency of intervention which children require. Therefore, empowering schools with the

knowledge and skills to adapt their environments and practices to be trauma skilled is where, we believe, the true potential lies in helping overcome the insidious impact of childhood adversity and trauma.

Context and Background to Study

Clackmannanshire is Scotland's smallest mainland local authority, located roughly mid-way between Edinburgh and Glasgow, and nestled between the Ochil hills and the River Forth, with a local population that is currently just under 52,000. It is, however, an area of significant socio-economic disadvantage as a result of decades of post-industrial decline, unemployment and intergenerational poverty. It regularly records figures higher than the national average on a range of indicators such as the number of deaths by suicide (21.7 per 100,000 population, versus the Scottish average of 13.3 per 100,000); the number of households classed as income deprived (14.4% compared to the Scottish average of 12.2%) and 16.9% of the local population live within the 15% most deprived areas in Scotland (Clackmannanshire and Stirling Health and Social Care Partnership, n.d.).

Taken together, all these factors have contributed to a local population who have experienced repeated, multiple traumas across many generations – a fact that was highlighted in a local study undertaken by Clackmannanshire's Educational Psychology Service (EPS) in 2003 (O'Connor and Russell, 2003) which showed 98% of the sampled Primary Four population had experienced one or more traumatic incidents across their life span.

We have therefore argued for some time that trauma-informed approaches are crucial in supporting the needs of our learners, not only for the development of their resilience, coping skills and mental health and wellbeing, but also to enable our children to be taught in environments that are sensitive to the needs of those who have experienced trauma.

For many years this work has grown and developed as we endeavoured to share knowledge with educators and empower them to make adaptations for individuals or small groups of pupils and work therapeutically with those youngsters displaying the most severe post-traumatic symptoms within the classroom (using Eye-Movement Desensitisation and Reprocessing, or EMDR). While this work was necessary, and often carried with it good successes for the individuals concerned, there was always a sense of a lack of integration to these processes. For example, work to develop attachment-based practices in particular classrooms was seen as separate to the therapeutic work with individual pupils, and neither of these were particularly concerned with improving the academic performance of the pupils affected.

Understanding more about the Neurosequential Model taught us in order to develop interventions that are capable of addressing the issues created by repeated exposure to adverse experiences, we had to move towards a model of integrated interventions supported by trauma-skilled educators capable of providing regular amounts of patterned, repetitive, rhythmic sensorimotor experiences within an emotionally safe relationship with a regulated, known

adult – developing the idea of Hughes' (personal communication, October 31, 2017) that every interaction is therapeutic and Perry's (2013; 2020) idea that the dose of intervention needs to mimic the dose of stress which has led to the difficulties within the classroom. Doing so would, we believed, allow us to meet the needs of our learners more effectively.

When Clackmannanshire became a Scottish Attainment Challenge (SAC) authority in 2016 (one of nine local authorities across Scotland with the highest rates of socio-economic disadvantage and consequently a significant poverty-related attainment gap) there was a chance for us to move towards this type of model – an opportunity to develop a holistic, universal approach to closing the poverty-related attainment gap by combining a range of theories into a cohesive, practical application for the classroom. We describe the practice we want schools to develop as being "BALTIC" – Brain-Based, Attachment-Led, Trauma-Informed Communities. The table below summarises the main theories upon which this new "Readiness for Learning (R4L)" approach was based.

Acronym	**Theory**	**Rationale**
Brain-based	Neurosequential Model in Education (Bruce Perry) Interpersonal Neurobiology (Dan Siegel)	Knowledge of basic core principles of brain development and neuroarchitecture helps educators to better understand and meet learners needs.
Attachment-**L**ed	Attachment Theory (John Bowlby & Mary Ainsworth) Nurturing Approaches (Marjorie Boxall)	Experience of early relationships influences patterns of behaviour in later life that are expressed in the classroom. Social and emotional development requires specific support to develop in school for some pupils.
Trauma-**I**nformed	Eye-Movement Desensitisation and Reprocessing (Francine Shapiro) Dyadic Developmental Practice (Dan Hughes)	Memories of traumatic experiences can become problematic and lead to symptoms of Post-Traumatic Stress Disorder being a barrier to learning. Pupils who have experienced developmental trauma require all interventions to be therapeutic in nature through the use of PACE (Playful, Accepting, Curious and Empathetic)-ful practice.

Community	Ecological Systems Theory (Urie Bronfenbrenner)	Children do not grow and develop in a vacuum – wider factors within their families and communities, as well as local and national policies all interact together to form the community in which the child is developing.

Table 1: Theories underlying the Readiness for Learning (R4L) approach

These theories were predominantly ones which we had previously been familiar with to greater or lesser extents – for example, the majority of our team are trained to deliver EMDR as a therapeutic intervention – and which we had used to guide our everyday practice and work with schools. Our work as EPs, we believe, is very much guided by the need to take core psychological concepts and to make them relevant, meaningful, and practical to our stakeholders – namely families and schools. We had previously found that, while the theories mentioned in Table One were all useful and helpful in understanding classroom behaviours, using terminology such as attachment/nurture/trauma was less helpful due to some of the associations our stakeholders have with the terms. It was therefore important to us as we moved forward in our journey to becoming truly trauma informed that we develop a model which removed some of these associations and stigmas, that was asset-based, and which put the emphasis back on to learning.

These "BALTIC" theories have been distilled into five core areas of practice that we support schools to develop which constitute what we see as an R4L environment – see Figure Two below. These core areas are expanded into a set of quality indicators under each heading which school staff can use to evaluate their practice and environment against – this work forms a core part of the ongoing coaching and mentoring provided by the EPS when supporting a school to develop their R4L practice.

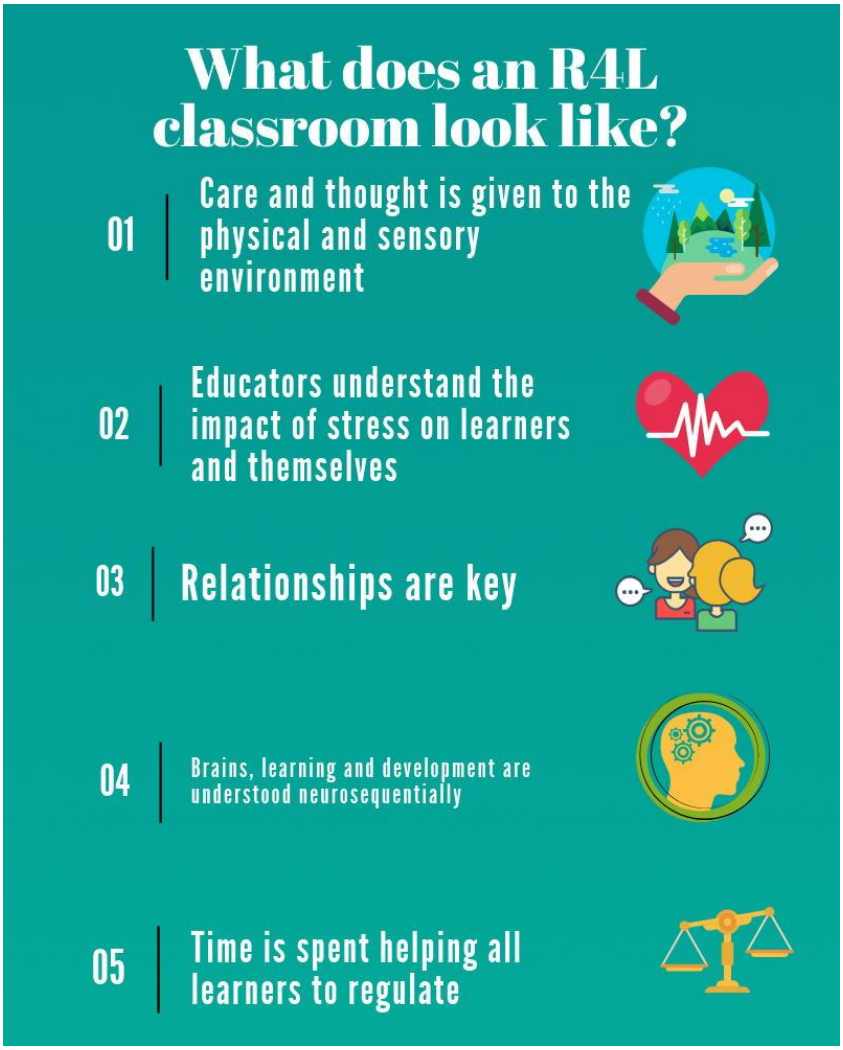

Figure 1: "What does an R4L classroom look like" infographic

SAC funding allowed us the opportunity to devote a significant amount of Service time to developing the approach and to implement it systemically and strategically across the authority. This also included the opportunity for all members of the EPS team, as well as some key members of school staff, to train to trainer level in the Neurosequential Model in Education (NME) approach developed by Dr Bruce Perry.

Although Dr Perry's work was familiar to us as a team, training to this level has allowed us to grow and develop our thinking using a "Neurosequential lens" – thinking that goes far beyond simply applying the model within a classroom setting. The universal nature of brain development has allowed us to use the model as a "jumping off point" to explore how we apply the core concepts within it not only to a wider group of pupils than those who have experienced childhood adversity and trauma, but also for example to organisational change within our own team as educational psychologists, teacher mental health and wellbeing, and crucially, how we can better deliver our services in ways that are more tied to the values of excellence, equity and efficiency.

This study documents our work to establish an evidence base regarding the efficacy of the R4L approach within our local context. Although there are many published articles regarding the Neurosequential Model more widely (see Perry (2020) for a brief history of the NM with selected articles), combining it with approaches such as nurture into the R4L approach had not been studied previously.

We will therefore document our work with a small cohort of Primary One pupils (4/5 years old) across the academic session of 2017/18. This was a universal intervention offered to every pupil in the class. The class was chosen as a result of the particularly high level of developmental need that was present within the cohort, which had led to discussions with the Head Teacher about how to make their Primary One experience significantly different from what the school had offered before. We will also share longitudinal data for these pupils up to and including the March of their Primary Three year to demonstrate the impact over time of the approach.

Method

As part of an authority-wide programme of implementation, a small group of pupils were selected to be part of a more detailed, small-scale study investigating the impact the R4L approach might have on their executive function skill development. The group of pupils were selected based on a number of factors. These included:

- The school had recently been trained in the NME and had a strong track record in classroom practice that was guided by attachment and nurture so were in a good position to begin their implementation of the R4L approach.
- The school is in a high area of socio-economic deprivation and consequently has a pupil population who are significantly affected by the poverty-related attainment gap.
- Even within this context, there were significant concerns about the developmental and executive function skills of this particular group of pupils, so it was recognised by the Head Teacher that their Primary One experience was going to need to be significantly different to what they had offered before.

A period of consultation and re-design was undertaken across the summer term in May/June 2017, working collaboratively with the staff in school to explore new ways of meeting the needs of this group of pupils. This consultation was continued throughout the academic session of 2017-18, allowing the intervention to change and adapt to the developing needs of the pupils across the year. Initially however, the main changes that were instigated included:

- Removal of all behaviourist-based methods of classroom management, including positive reinforcement such as stickers. They were replaced with relationship-based approaches to supporting children within the classroom. The rationale for this was their developmental stage indicated they were unable to undertake consequential thinking, so these

methods were unlikely to be successful. In addition, we wanted to focus on developing high quality relationships between teacher and pupil, which behaviourist interventions were less able to support.

- Classroom re-designed to allow for more room to play. This re-design included considering the sensory profile of the room – examples included using softer lighting, changing the smell of the classroom using reed diffusers, and providing "dark dens" and "cosy corners" with lots of soft furnishings. These changes were instigated to match the developmental stages of the pupils, with reduced demands in terms of, for example, sitting at a traditional desk. In addition, somatosensory regulation is a key component of the NME, so considering the sensory profile of the room allowed us to build in some of this regulation "by design".
- Strong focus on play-based learning (including teaching pupils how to play) in both indoor and outdoor spaces and scaffolding of core skills (e.g., symbolic representation). Again, this change was largely driven by the developmental stage of the pupils as they generally lacked the underlying skills which would have allowed them to come straight in to a "formal" P1 environment.
- Traditional literacy and numeracy activities (e.g., phonics) were not undertaken until well into the second term, allowing for time to be spent building relationships and developing the underlying developmental skills noted above that are necessary pre-cursors for success in learning. The rationale here was again allowing class teachers to meet the pupils where they were in their development and give them "permission" to spend time on explicitly teaching these core developmental skills first.

In addition, the educators working with the pupils received a high level of coaching and mentoring support from both the link EP for the school and the R4L Lead EP throughout the academic session. This support was crucial in supporting their problem solving, reflection and emotional regulation throughout the year. The frequency and duration (or "dose and space" as Perry would describe it) of this support changed and adapted across the year as the educators became more confident in the approach and began to perceive positive benefits from the work they were undertaking – support was typically provided at least weekly (sometimes more frequently) in the initial stages, dropping to around monthly by the end of the academic session. In addition to the support of the EPS, the school's head teacher was also able to provide ongoing support and advice about how to translate theory into practice.

A comparison group (effectively a wait-list control as the original intention was this group would have their Primary Two experience modified. Due to a number of operational reasons within the school this did not happen. We have continued to track their performance as a comparison over time.) were selected from a nearby school who received no intervention during their Primary One year. This group of children came from an area comparatively less affected by socio-economic disadvantage but were otherwise broadly comparable in terms of age, gender etc. However, as can be seen from our predictions below, we expected that R4L pupils would have lower scores on standardised measures due to the increased levels of disadvantage for them as a group. A limitation of

this study is the fact that this group were recruited to the project later so some of the data on this group was collected at slightly different times.

We commissioned the School of Psychology and Neuroscience at the University of St Andrews to work alongside us to gather independent data regarding the impact of the project that supplemented the data we were already gathering "in house" – the results from our initial, internal data using the NME Mini Map assessment (collected in May/June 2017 prior to pupils joining Primary One, and again in June 2018 at the end of their first year) can be found in our article in the Division of Educational & Child Psychology journal (Taylor & Barrett, 2018).

Data was gathered by the researchers from the University of St Andrews in November 2017 and again in June 2018 (initial data collection later than planned due to unforeseen operational delays) using the following performance measures.

Test	**Measures**	**Method of Data Collection**
Behaviour Rating Index of Executive Function, Second Edition (BRIEF2)	Executive function skills across four domains – Behaviour Regulation Index (BRI), Emotional Regulation Index (ERI), Cognitive Regulation Index (CRI) and Global Executive Component (GEC)	Teacher report
Heads Toes Knees Shoulders (HTKS)	Inhibition Control	Direct instruction and observation by researcher
Bracken School Readiness Assessment, Third Edition (BSRA)	Basic skills assessment e.g., shape, colour etc.	Direct instruction and observation by researcher
British Picture Vocabulary Scale, Third Edition (BPVS)	Receptive vocabulary	Direct instruction and observation by researcher

Table 2: Performance measures used with Primary One cohort

This was further complemented by the routine data gathered by the school regarding academic performance, including PIPS (Performance Indicators in Primary Schools) and SNSA (Scottish National Standardised Assessment) data, and Teacher Professional Judgements (TPJs). The overall approach to data triangulation can be seen in Figure 2.

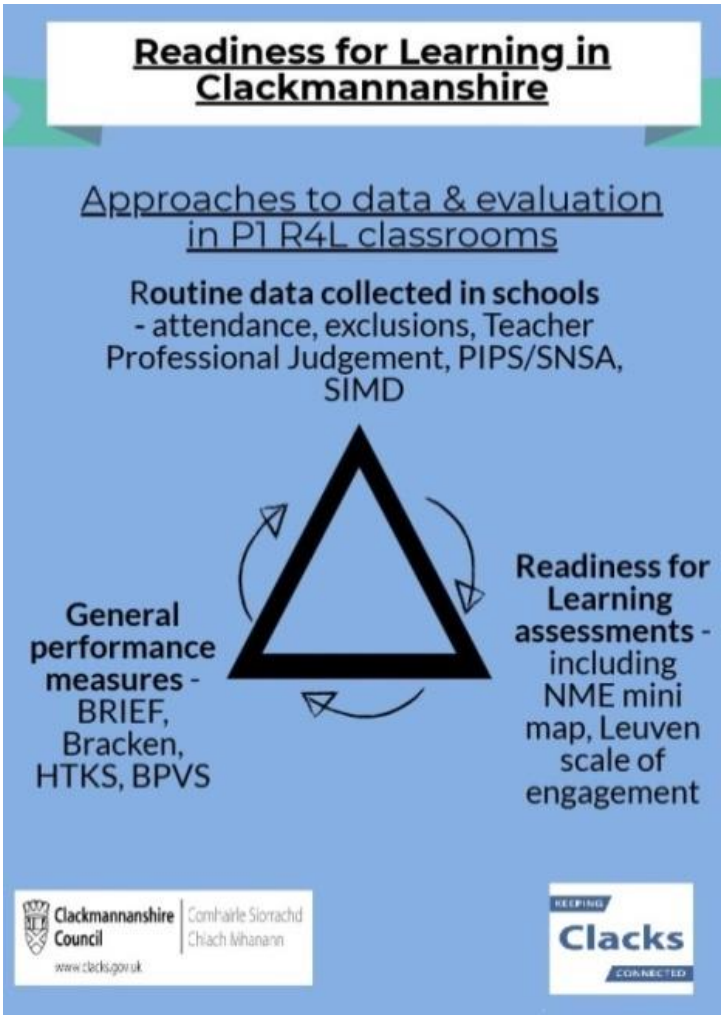

Figure 2: Approaches to Data in R4L Class

In addition to the quantitative data, qualitative data was gathered using a semi-structured interview with one of the class teachers and four of the Primary One children in the intervention class in early June 2018. The full interview with them can be viewed at: https://www.youtube.com/watch?v=Zzju8ASGFOs&list=PLR2XudKRtg-US_m1Ow9L_plTzT2r_qqjy.

We made a number of predictions regarding what the impact of the R4L intervention would be. Namely:

1. At pre-test there would be significant differences between the scores of the R4L and non-R4L class on the standardised performance measures i.e., the standardised scores for the R4L class would be above/below the norms of the non-R4L class.
2. Pupils in the R4L class would show greater improvements in their executive function capabilities across the session compared to the non-R4L class, as measured via the BRIEF2. We predicted the non-R4L scores on the BRIEF2 would remain stable.

3. Given the sequential nature of brain development, the majority of the improvements made by the R4L class would be seen initially within the BRI and ERI, with CRI scores being the last to show improvements.
4. The predicted improvements in executive function capabilities for the R4L class would not result in increased academic performance within the first year but improvements would be seen by the end of Primary Two.
5. Scores for the non-R4L class were predicted to at least remain stable on all measures or improve slightly as a result of normal developmental maturation.

The pupils in the R4L class have continued to be supported by the approach throughout their Primary Two year and for the first seven months of Primary Three (up to the point of COVID-19 related school closures) when a switch to home learning was required. We will however present the school-based evidence we have up to the point of the school closures.

Results

Data from 34 pupils (20 in the R4L class, 14 from the non-R4L class) was included in the analysis and is summarised here from Gardner et al (2018a) and Gardner et al (2018b). When the initial performance data for each group was compared to the statistical norms at the start of the year, the R4L group were found to have scores significantly worse than the norm on all standardised measures (see Table 3).

		Descriptive Statistics		**One-Sample t-test**
	Group	**Mean**	**SE**	**Significantly different to norms**
BSRA	*Intervention*	83.64	2.62	Significantly below
	Non-R4L	95.64	3.93	Not significant
BRIEF (note: scores on this assessment should be low)	*Intervention*	64.41	2.91	Significantly above
	Non-R4L	45.79	1.64	Not significant
BPVS	*Intervention*	91.18	2.01	Significantly below
	Non-R4L	98.36	1.76	Not significant
HTKS	*R4L*	10.68	2.36	N/A

	Non-R4L	15.64	3.29	N/A

Table 3: Standardised performance measure scores for R4L and non-R4L group at Time One

When scores were analysed at the end of the Primary One year, it was found that:

Bracken School Readiness Assessment

There was no significant difference in performance between time 1 and time 2, for either group on the BSRA ($F(1,31) = 0.33$, $p=0.57$, partial eta-squared = 0.011). There was a significant difference in performance between the groups ($F(1,31) = 4.80$, $p=0.036$, partial eta-squared = 0.13), with the R4L group scoring an average of 9.82 points below the non-R4L group. The non-R4L group average approximately 0.5 standard deviations below the expected mean, and the R4L group average just over 1 standard deviation below the expected mean performance, with respect to the published norms.

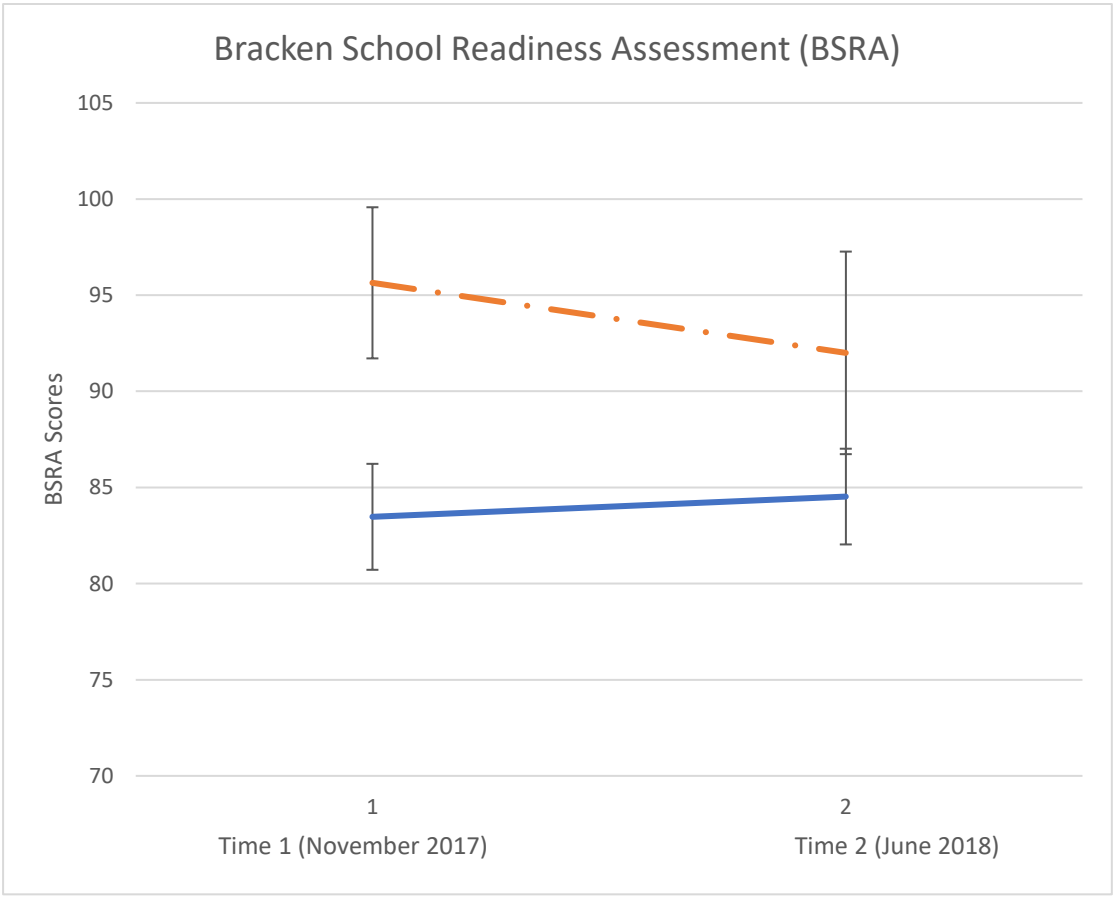

Figure 3: Bracken School Readiness Assessment Mean Scores with standard error bars at Time 1 and Time 2 for R4L and Non-R4L groups.

Behaviour Rating Index of Executive Function

A mixed-design two-way analysis of variance was conducted on the Global Executive Component (GEC) which indicated there was an interaction between BRIEF-2 scores and the type of intervention (R4L vs non-R4L) $F(1,31) = 32.9$, $p<0.001$, partial eta-squared = 0.51. Simple main effects analysis, with Bonferroni adjustment, showed that the R4L group scores significantly decreased at time 2 (in this assessment a lower score is preferable), $F(1,31) = 46.1$, $p <.001$, partial eta-squared = 0.60, whereas the non-4RL group scores did not significantly change over time, $F(1,31) = 2.98$, $p = 0.095$, partial eta-squared = 0.088. There was a significant difference in performance between the groups, $F(1,31) = 7.55$, $p = 0.010$, partial eta-squared = 0.20.

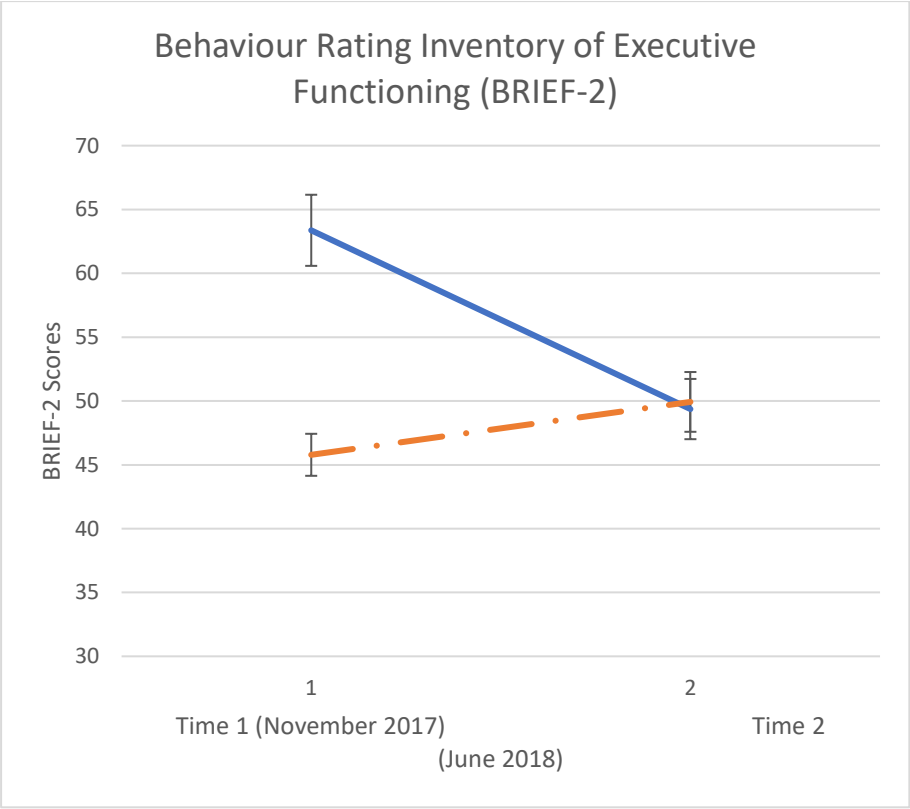

Figure 4: Behaviour Rating Inventory of Executive Functioning Mean Scores with standard error bars at Time 1 and Time 2 for R4L and Non-R4L groups.

When BRIEF2 scores were considered by sub-scale to identify in which area the changes in GEC scores came from, we found the following:

Behaviour Regulation Index (BRI)

A mixed-design two-way analysis of variance was conducted which indicated there was an interaction between BRI score and the type of intervention (R4L and non-R4L) $F(1,31) = 14.34$, $p < .001$, partial eta-squared = .316. Simple main effects analysis, with Bonferroni adjustment, showed that the R4L group scores significantly decreased at time 2 $F(1,31) = 24.7$, $p < .001$, partial eta-squared = 0.44, whereas the non-R4L group scores did not significantly change with time $F(1,31) = 0.52$, $p = 0.48$, partial eta-squared = 0.017.

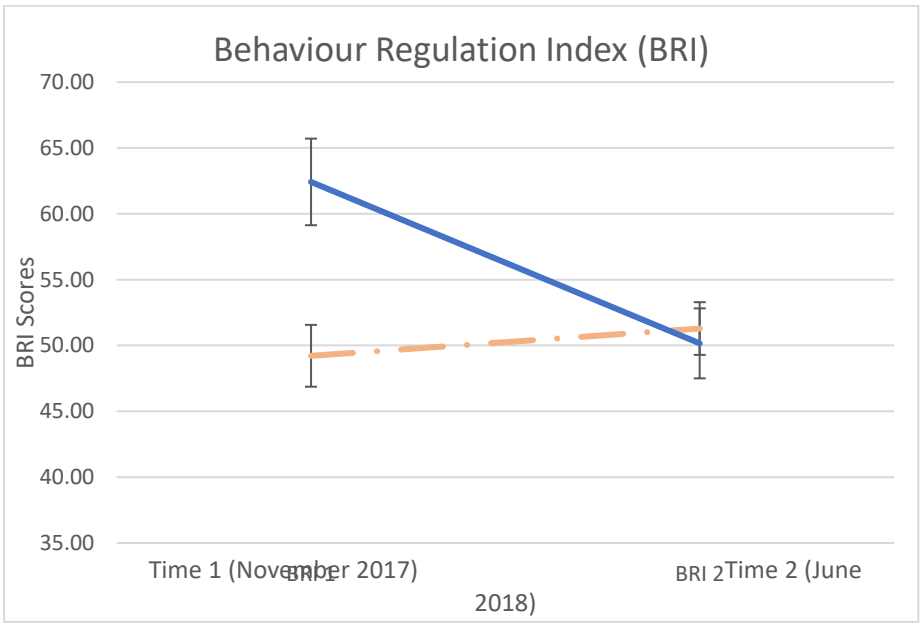

Figure 5: Behaviour Regulation Index Mean Scores with standard error bars at Time 1 and Time 2 for R4L and Non-R4L groups.

Emotional Regulation Index

A mixed-design two-way analysis of variance was conducted which indicated there was an interaction between ERI score and the type of intervention (R4L and non-R4L) $F_{(1,31)} = 21.6$, $p < .001$, partial eta-squared = 0.41. Simple main effects analysis, with Bonferroni adjustment, showed the R4L group scores significantly decreased at time 2 $F_{(1,31)} = 21.2$, $p < .001$, partial eta-squared = 0.41, whereas the non-R4L group scores significantly increased at time 2 $F_{(1,31)} = 4.72$, $p = 0.038$, partial eta-squared = 0.13.

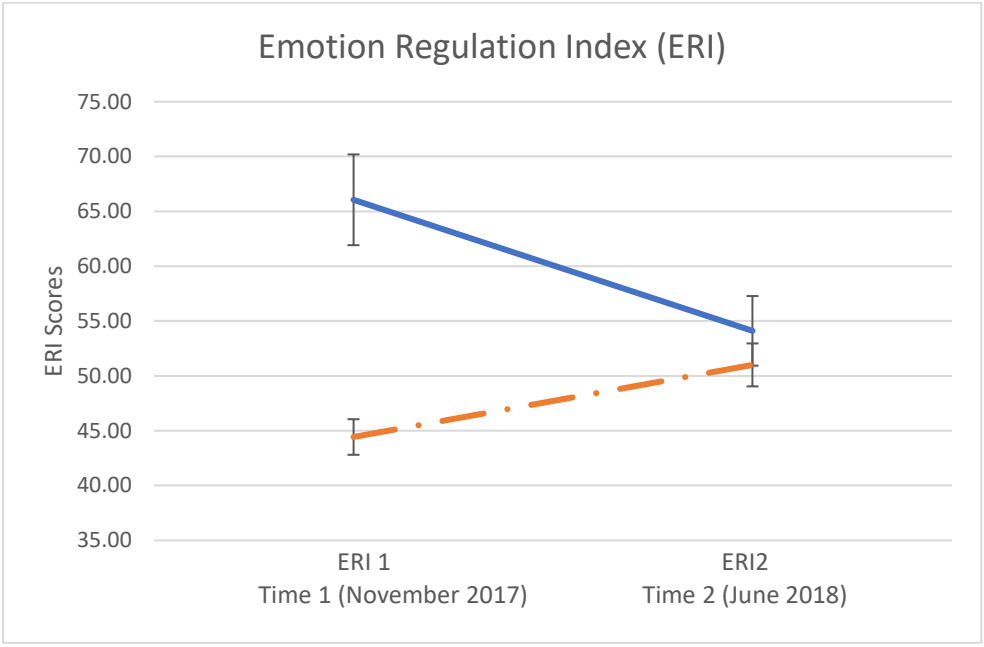

Figure 6: Emotion Regulation Index Mean Scores with standard error bars at Time 1 and Time 2 for R4L and Non-R4L groups.

Cognitive Regulation Index

A mixed-design two-way analysis of variance was conducted which indicated there was an interaction between CRI score and the type of intervention (R4L and non-R4L) $F_{(1,31)} = 12.4$, $p = 0.001$, partial eta-squared = 0.29. Simple main effects analysis, with Bonferroni adjustment, showed the R4L group scores significantly decreased at time 2 $F_{(1,31)} = 15.1$, $p < 0.001$, partial eta-squared = 0.34, whereas the non-R4L group scores did not significantly change with time $F_{(1,31)} = 1.54$, $p = 0.22$, partial eta-squared = 0.047.

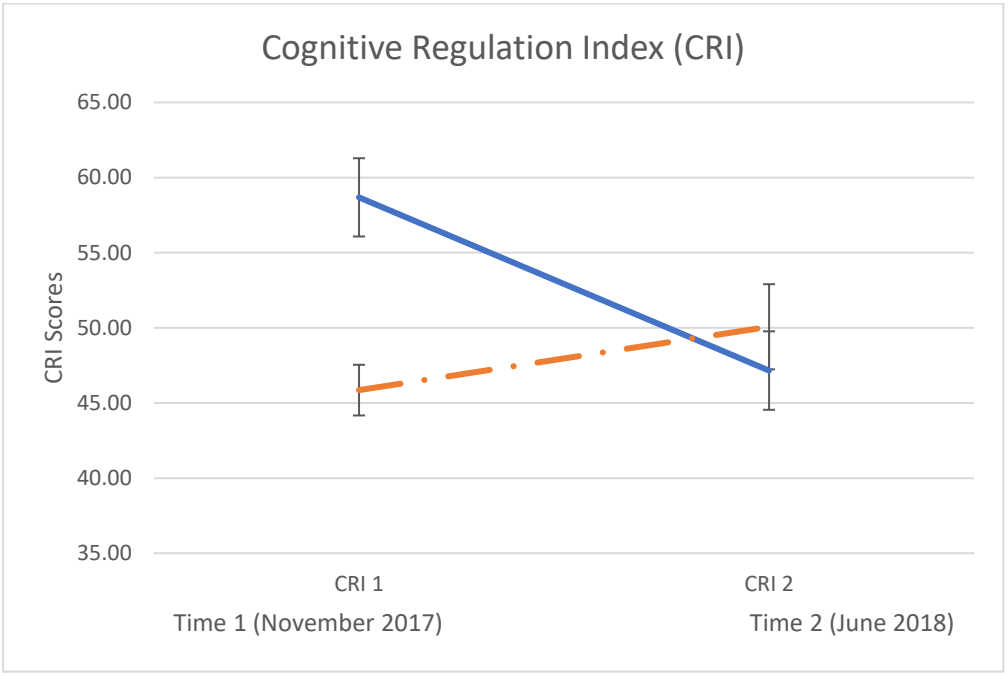

Figure 7: Cognitive Regulation Index Mean Scores with standard error bars at Time 1 and Time 2 for R4L and Non-R4L groups.

British Picture Vocabulary Scale

A mixed-design two-way analysis of variance was conducted which indicated there was an interaction between BPVS scores and the type of intervention (R4L vs non-R4L) $F_{(1,31)} = 4.25$, $p = 0.048$, partial eta-squared = 0.12. Simple main effects analysis, with Bonferroni adjustment, showed the non-R4L group scores significantly decreased at time 2 $F_{(1,31)} = 8.28$, $p = 0.012$, partial eta-squared = 0.21, whereas R4L group scores did not significantly change $F_{(1,31)} = 0.035$, $p = 0.85$, partial eta-squared = 0.001.

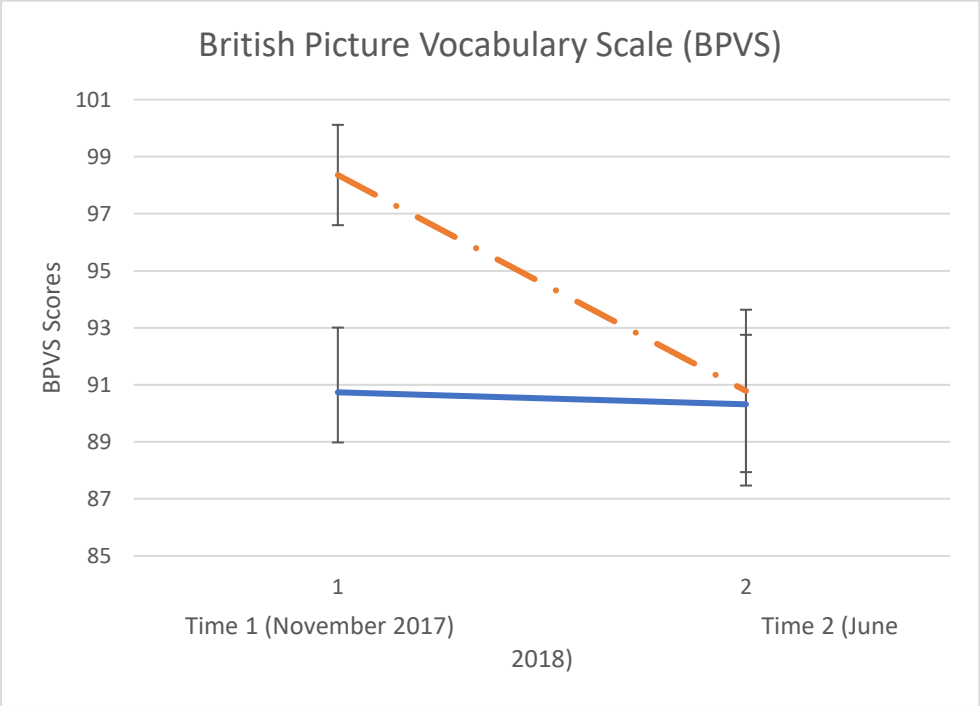

Figure 8: British Picture Vocabulary Scale Mean Scores with standard error bars at Time 1 and Time 2 for R4L and Non-R4L groups.

Heads Toes Knees Shoulders

A mixed-design two-way analysis of variance was conducted which indicated there was no interaction between time taken in HTKS and the type of intervention (R4L vs non-R4L) $F_{(1,31)} = 1.35$, $p = 0.26$, partial eta-squared = 0.042. However, there was a significant difference in performance between time 1 and time 2, $F_{(1,31)} = 34.36$, $p < 0.001$, partial eta-squared = 0.526, with the performance at time 1 being lower (M = 13.795, SE = 2.078) than at time 2 (M = 25.541, SE = 1.973). There was no significant difference in performance between the groups $F_{(1,31)} = 2.92$, $p = 0.097$, partial eta-squared = 0.086.

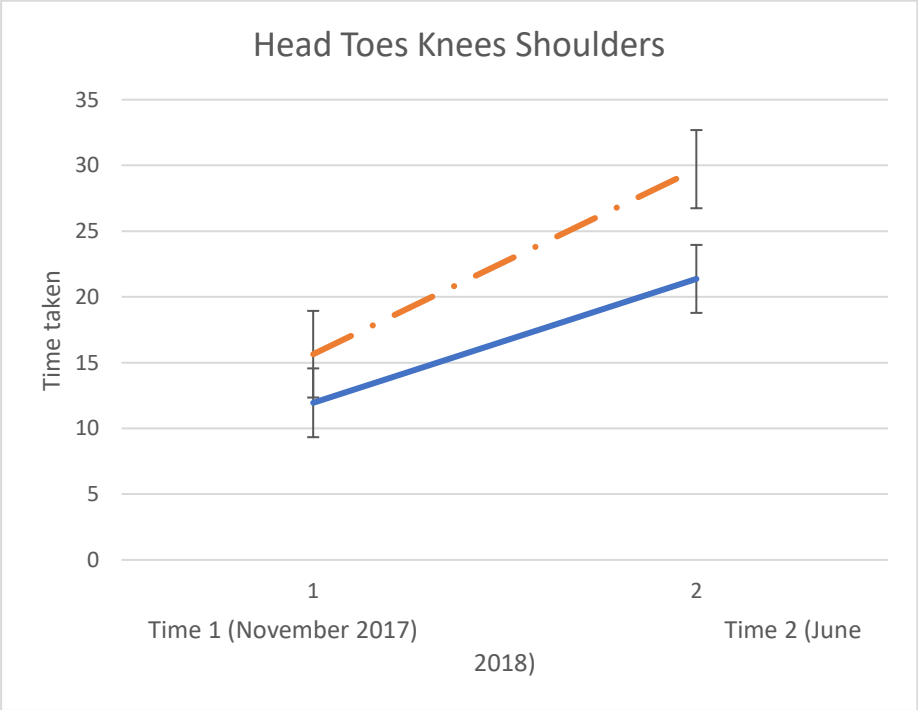

Figure 9: Head Toes Knees Shoulders Mean Scores with standard error bars at Time 1 and Time 2 for R4L and Non-R4L groups.

Changes in academic performance levels over time have been harder to measure consistently because standardised academic performance is only measured in Scotland in P1 and then not again until P4 (under the new Scottish National Standardised Assessment programme – this group of pupils were the first year to complete these, but not until the end of their P1 year, so PIPS were also used at the start and end of the year. Only PIPS data is presented here). What can be seen in Table 4 however, is that although the R4L class continued to be making less than expected progress by the end of P1, so were the non-R4L class who we had predicted would continue to out-perform the R4L class at this point.

	Very Below	Below	Average	Above	Very Above
R4L - Reading	19	44	34	0	3
Non-R4L - Reading	55	35	10	0	0
R4L - Maths	16	37	44	0	3
Non-R4L - Maths	29	29	35	7	0

Table 4 – Percentage of pupils in each PIPS "value added" category at the end of P1

Longitudinal Data

When the NME Mini Map assessment was re-run at the end of Primary Two (see Taylor & Barrett, 2018, for original findings during Primary One year), it was found that gains in Executive Functions Score (EFS) had been maintained, or in some cases, improved further (see Table Four). (Note: this information was not collected for the comparison group)

	Friedman		Wilcoxon					
			Time 1&2		*Effect Size*	Time 2&3		*Effect Size*
Reading	p=0.01252	p<0.05	Z = -2.0005	p = 0.02275	0.42	Z = -2.8877	p = 0.00193	0.60
Maths		N/S		N/A			N/A	
Reactivity	p=0.0034	p<0.05	Z = -3.0182	p = 0.00126	0.42	Z = -2.6126	p = 0.00453	0.54
Communication	p=0.0006	p<0.05		N/S	0.56	Z = -3.823	p = 0.00379	0.80
Relational	p=0.4614	p<0.05	Z = -2.6694	p = 0.00379	0.59	Z = -2.3534	p = 0.00939	0.49
Affect Regulation	p=0.1173	p<0.05	Z = -2.844	p = 0.00226	0.50	Z = -2.4853	p = 0.00639	0.52
Threat Response		N/S	Z = -2.3953	p = 0.0082	0.49		N/S	
Coordination		N/S		N/S			N/A	
Fine Motor		N/S		N/A			N/A	
Attention	p=0.149	p<0.05	Z = -2.0005	p = 0.02275	0.42	Z = -2.8877	p = 0.00193	0.60

Table 5: Analysis of NME Mini Map scores over time

By March of Primary Three the percentage of children identified with Additional Support Needs in the R4L class was 18%, and 37% in the non-R4L class. This difference is significant ($p<0.05$).

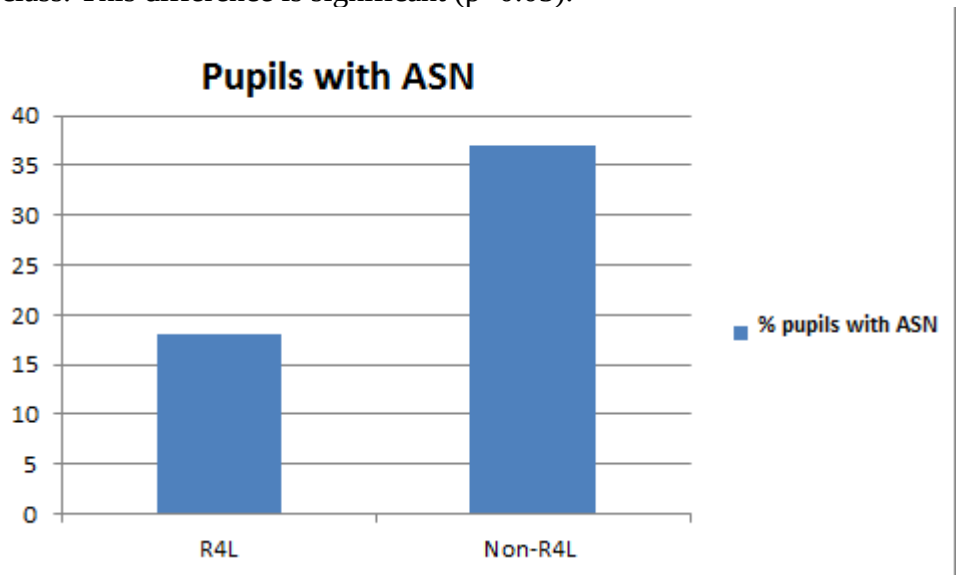

Figure 10: Percentage of pupils identified with Additional Support Needs (ASN) in R4L vs Non-R4L class

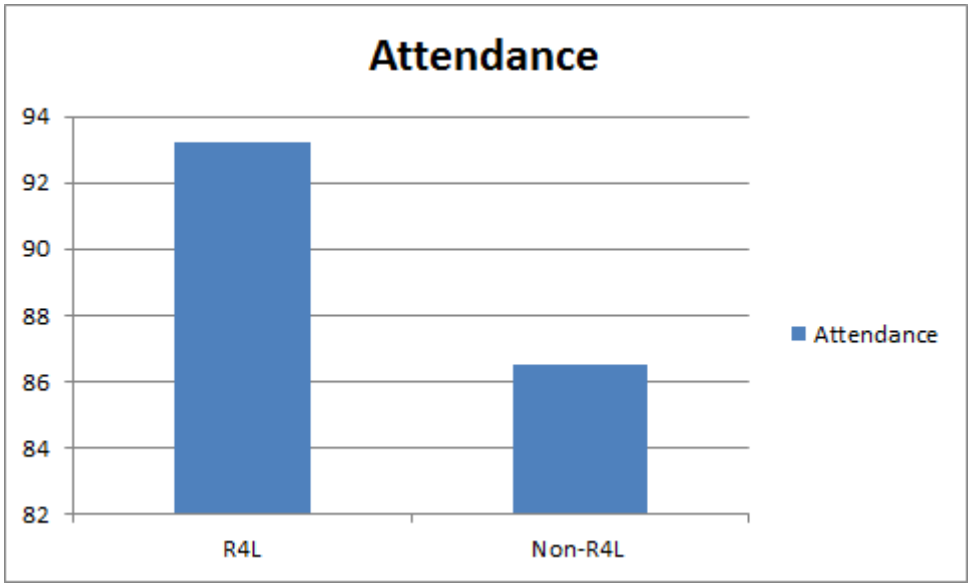

Figure 11: Attendance for R4L vs Non-R4L class

R4L class attendance is 93.2%, non-R4L comparator is 86.5% ($p<0.01$).

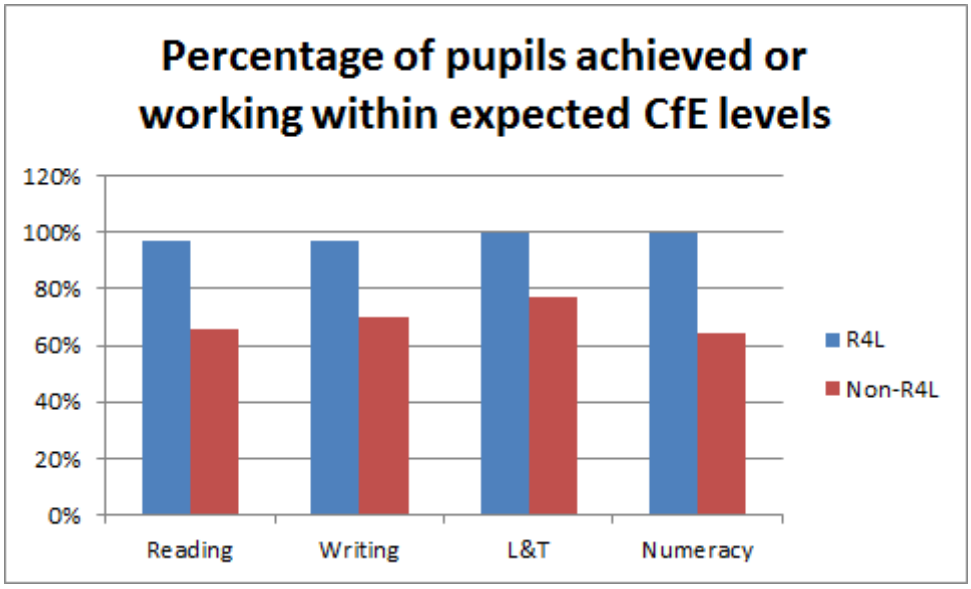

Figure 12: Percentage of pupils working within the correct Curriculum for Excellence levels in R4L vs non-R4L class

R4L class are significantly more likely to have achieved or be working within the correct CfE levels. Reading – $p<0.01$. Writing – $p< 0.05$. Listening & Talking – $p<0.05$. Numeracy – $p<0.05$.

Although not reported here, further interventions across the authority have shown similar statistically significant improvements in a range of measures including BRIEF scores, NME Mini Map EFS, attendance, exclusions etc.

Discussion

This study sought to explore the impact of the R4L approach on a pilot group of 4/5 year olds during their Primary One year. A number of predictions were made in advance of the study, based on the NM theory. These are presented below, together with the summarised data in italics for each prediction.

1. At pre-test there would be significant differences between the scores of the R4L and non-R4L class on the standardised performance measures i.e., the standardised scores for the R4L class would be above/below the norms of the non-R4L class. *The R4L class scores were significantly lower than the published norms on all of the standardised performance measures. In contrast, the comparison group scored within normal limits on all measures.*
2. Pupils in the R4L class would show greater improvements in their executive function capabilities across the session compared to the non-R4L class, as measured via the BRIEF2. We predicted the non-R4L scores on the BRIEF2 would remain stable. *The R4L class showed significant improvements in their BRIEF2 scores. The non-R4L class showed no significant change in their scores on this measure. However, their scores were within normal limits at the start of the study but did show a slight increase (scores should be as low as possible on this assessment) over the course of the year.*
3. Given the sequential nature of brain development, the majority of these improvements would be seen initially within the BRI and ERI, with CRI scores being the last to show improvements. *This prediction was only partially upheld – as all three of the subscales showed significant improvements in the R4L class. However, when we consider the BSRA we did not see the same level of positive gains for the R4L group (we considered the BSRA to be one that taps into cognitive skills so would therefore be later to show improvements). We hypothesise these are scores we would have seen greater change on had we re-assessed using this assessment into their Primary Two year. Again, the non-R4L class showed no significant change in their scores on any of the sub-scales, although their scores did increase slightly (i.e., get worse) on all scales.*
4. The predicted improvements in executive function capabilities would not result in increased academic performance within the first year but improvements would be seen by the end of Primary Two. *Pupils in the R4L class continued to be performing less well than expected at the end of P1, but by the end of P2 there were significantly more pupils working within the appropriate Curriculum for Excellence levels in the R4L class than the non-R4L class.*
5. Scores for the non-R4L class were predicted to at least remain stable on all measures or improve slightly as a result of normal developmental maturation. *Although this prediction was partially upheld (there were no significant changes in scores for this group over the duration of the study), we were interested to note that their appeared to be a worsening trend in the scores for this group. While this trend was not enough to either reach significance, or to move their group norms out of the acceptable range for each assessment, it does illustrate what became a*

more concerning picture for these pupils. As mentioned previously, operational reasons within the school meant the proposed implementation of R4L with them in Primary Two did not happen. We have continued to see a worsening picture for these pupils on both the standardised performance measures and measures of academic attainment, as well as "softer" variables such as attendance and the number of pupils on Staged Intervention (an indication that higher numbers are requiring additional support within this group).

Due to the COVID-19 school closures, we have not been able to gather BRIEF or NME Mini Map scores for these pupils at the end of their P3 year as had been planned.

However, we plan to continue monitoring the progress of these two groups of pupils until at least the end of the Primary Four (P4) year for two main reasons. Firstly, P4 tends traditionally to be a time when we can see academic performance begin to drop off in some subjects and it will be interesting to explore whether or not this is something which happens for the R4L class. Secondly, P4 is the next point in the school career where we will receive standardised academic assessment data, so it will again be interesting to put this information into their story and explore what else we can learn from the journey these particular pupils are taking through their school career.

A core concern of teaching staff when we have introduced the R4L approach more widely across the authority is that spending time regulating pupils and focusing on these skills detracts from core "learning" time that will have a negative impact on academic performance. *These results strongly suggest that when time is spent focusing on core underlying developmental and executive function skills, academic performance is not only maintained, but can improve significantly.* Additionally, if the development and maintenance of these skills is not supported within the education environment, our data indicates academic progress can in fact be slowed.

The application of the R4L approach as a universal intervention has significantly reduced the number of pupils identified as having additional support for learning needs as well as the number of pupils who require social and emotional supports outwith the classroom. What this means is, from being a group of pupils who were originally predicted to have a level of need that would significantly impact on school resources in terms of the amount of adult time required to support them, the level of intervention required for the class as a whole has dropped significantly over the course of their Primary career thus far.

Although it is beyond the scope of this paper to discuss in detail, the further results we have from other R4L classrooms established around the authority, we can report we have further evidence of similar statistically significant improvements in executive function capabilities (as measured by both NME Mini Map and BRIEF2 scores) for other age ranges and groups of pupils. Although one of the key points of the R4L intervention is that schools can adapt and develop it to suit their own contexts, there are universal strands to the

intervention that must be maintained for us to consider it having enough fidelity to be considered a "true" R4L intervention (see Figure 1 in Introduction). When this fidelity is maintained, we are beginning to see evidence that similar outcomes to those reported in this study can be achieved.

A key component of achieving these results and in implementing the R4L approach has been ongoing coaching and mentoring of the classroom staff to encourage them to think in different ways about behaviours, how to manage them and how to present academic content to pupils. Although this work has taken place in a very focused way with the staff involved with the R4L class, this is a programme of work that is a core work stream within the wider R4L project. As previously stated, we are now in a position where every educator within Clackmannanshire has been trained in the NME, and just under 50% have completed further supplementary training through online e-learning modules covering the additional contributing theories.

This work has been crucial in setting R4L interventions within a context of an education service which has an understanding of childhood adversity and trauma at its core. While we continue to endeavour to close the poverty-related attainment gap, this is always balanced with an understanding that for academic process to be achieved and maintained, positive mental health and wellbeing needs to come front and centre. The R4L work has, therefore, both benefited from, and contributed to, the leadership direction from Education Service Management within the authority. This in turn has supported schools to make decisions and design interventions based on the health and wellbeing needs of pupils first and foremost. The majority of schools report this has "given them permission" to make this their focus, as opposed to prioritising academic progress to the exclusion of everything else. This is especially the case when schools often report their professional judgement is many pupils do not have the pre-requisite skills for this to be successful.

Limitations

In addition to the challenge of continuing to monitor this group of pupils during the pandemic, there were a number of limitations which pre-existed in this study. Firstly, our comparison group – when we initially identified the R4L class to work with, it had not been intended to carry out such focused, standardised testing with them. This meant the comparison group were recruited in to the study at a later date than was perhaps ideal. Consideration was briefly given to splitting the identified pupils from the R4L group (actually two classes of pupils) into intervention and non-intervention groups, but this was not possible due to both practical and ethical considerations – i.e., it would not have been possible to have one class receive the intervention and another to act as a control due to the physical proximity of the two spaces they occupied within the school. Ethically, we also felt that this could not be justified given the very high level of need that had been identified within both classes.

While some of these issues are ones that could be avoided in future, it is also important to remember it was never our intention to conduct a piece of "gold standard" academic research – any work that we do as Educational

Psychologists has to put the needs of our pupils, teachers, and schools first and foremost. This means there are times when "real world" considerations have to take precedence in guiding and shaping the direction of research and evaluation work. That being said, we feel confident that by taking a triangulated approach to data gathering, we have enough sources of evidence which are all contributing complimentary strands to our data story.

A second limitation is the replicability of the R4L intervention both within other schools in Clackmannanshire and more widely. We would attribute a core part of the success of this study to the individual responses from the educators working with the pupils to the coaching and mentoring they received. In addition, this work did not exist within a vacuum, it took place within an organisation that was stable enough for educators to feel safe to take risks in adapting their practice and which had a strong foundation of practice infused with attachment and nurture principles on which to build. We know from working with other schools in implementing this approach, that some or all of these factors are not always in place, and this has led us further into work with schools to explore and support their organisational readiness to take on the implementation of the approach.

Conclusion

This now leads us to some wider reflections on the use of trauma-informed approaches within education. Historically, we have worked to establish large-scale implementation of trauma-informed approaches, such as the psycho-education programme for grief and loss, Seasons for Growth. Although these have generally achieved their goals, for example, in terms of number of staff trained, we have previously not been able to affect a culture shift within the authority whereby there is an embedded understanding of the psychological implications of childhood adversity and trauma.

While we are still not there (yet) with R4L, we are far closer than we have ever been due to the combined factors of increased focus for the EPS thanks to SAC funding, the increased national attention these issues have received in recent years, and an integration of the goals of R4L within the wider strategic plan for the Education Service within Clackmannanshire. This is a privileged and exciting space to occupy at this time, and although the impact of COVID-19 will be devastating for many children and families - especially those living in deprivation - we are also in a strong position as an authority to be able to respond to these challenges in a proactive, evidenced-based way to support longer term resilience and transformation post-COVID-19.

We have been clear from the start of this paper that we believe trauma-informed approaches are both necessary and have the capacity to be transformative in the lives of children and young people. However, there are some points we would like to raise to further clarify our position.

Firstly, interventions that are truly "trauma-informed" not only describe the impact and potential outcomes that can arise from a childhood affected by adversity and trauma, but they are able to describe in detail what steps need to

be taken in order to address some of the issues. In our opinion, it is not enough to simply inform people what the impacts of childhood adversity and trauma potentially are – knowledge awareness on its own is not enough to help practitioners adapt their practice. However, this does not mean we feel general awareness raising is not also an important feature of developing communities that can recognise and support these issues.

Secondly, we have experienced first-hand the benefits of working within a culture which understands, supports and gives priority to the impact of childhood adversity and trauma in terms of what this does to the stress response system. This has led into wider discussions about the stress levels of individual organisations, such as schools, and helped us find new ways to offer support and guidance when this has been required. This in turn has helped to shape and guide our model of service delivery as Educational Psychologists that makes us better able to respond equitably to the needs expressed within our authority. In addition, we hope to incorporate the Neurosequential Model into the development of whole-system approaches to meeting the needs of children and young people within the wider Education Service and with other partners.

Finally, we have received a number of approaches from other authorities and organisations seeking to "buy in" the R4L approach as a way of improving outcomes within their own context. While it is heartening to know others see value in our work and can identify the benefits of such an approach, these advances are ones which for a variety of reasons we have not progressed. Some of these reasons relate to capacity and procedural issues, but more importantly we believe the unique social demographic of each different local authority is such that "buying in" any approach (not just specifically R4L) requires careful thought and consideration to be given to how the intervention fits not only with the local demographic, but also pre-existing structures, and organisational culture. This is where, we believe, Educational Psychology as a profession can play a crucial role in supporting the development of such approaches, given our background, training and experience in child development together with organisational psychology, research and evaluation and change management.

As we look to the future of R4L within Clackmannanshire, we plan to extend our knowledge base further through training in the Neurosequential Model, this time through the Neurosequential Model in Therapeutics (NMT). This will enable us to undertake far more detailed assessment and targeted intervention with the young people we work with who have been most significantly affected by childhood adversity and trauma. This work will allow us to work more collaboratively with our colleagues across Child Care Services in Social Work, particularly in relation to those children at risk of being removed from the care of their parent(s).

The experience of COVID-19, while daunting to consider in terms of the potential long-term impact on our population, has also offered up opportunities to engage with our parents and carers in new ways, such as the development of an online mental health and wellbeing hub which applies the principles of R4L to caring relationships and developing materials to share the core principles of NME with our pupil population from 5-18 years.

To conclude, childhood adversity and trauma can have long-term, far-reaching implications for child development that can impact on every facet of a child's life, including education. As such, there is a need for good quality, evidence-based approaches within the classroom which seek not only to manage the behaviours that are expressed, but to intervene in ways that are positive and focused on building resilience in children and capacity in educators. When these approaches are applied consistently, sensitively and persistently, we have demonstrated they have the potential to effect real and lasting change. Our over-riding hope, however, is that, in time, significant progress will be made in reducing the incidence of childhood adversity through large-scale social and political change that addresses the fundamental inequalities which are still inherent in our global communities today.

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