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Original citation:
Holliman, A.J. , Hurry, Jane and Bodman, Sue (2014) Children's reading profiles on exiting the Reading Recovery programme: do they predict sustained progress?. Journal of research in reading, volume (In press) DOI 10.1111/1467-9817.12041

http://dx.doi.org/10.1111/1467-9817.12041

Publisher
Blackwell Publishing Ltd

Journal of Research in Reading UKLA The United Kingdom Literacy Association

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Journal:	*Journal of Research in Reading*
Manuscript ID:	JRIR-2013-11-0097.R2
Manuscript Type:	Original Article
Keywords:	Reading Recovery, Early literacy, Intervention, Longitudinal, Assessment

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Abstract

The aim of this study was to identify reading profiles which predict the literacy progress of Reading Recovery graduates. Reading Recovery is an intensive remediation for children after the first year of school. Children were assessed at exit from the programme, and at three-, six-, and twelve-month follow-up points. Text Reading Level made unique contributions to word reading, spelling, and writing at all time points and was consistently the best predictor of word reading. Phonological processing also made unique contributions to word reading and spelling. Reading comprehension was found to be the best predictor of National Curriculum sublevels for reading and writing, twelve-months later. These findings indicate that levelled texts, as employed in Reading Recovery, provide a good indication of progress in word reading, spelling, and writing after the programme has been discontinued, but also present a case for assessing other reading skills (e.g., phonological processing and reading comprehension) in order to help predict sustained progress in literacy.

Keywords: *Reading Recovery; Early Intervention; Reading Profiles.*

Children's reading profiles on exiting the Reading Recovery programme: Do they predict sustained progress?

Reading Recovery is an early literacy intervention programme designed for five- to six-year-old children who demonstrate risk of literacy failure after one year in full-time education (Clay, 2009). An extensive literature (e.g., Hurry & Sylva, 2007; Pinnell, Lyons, DeFord, Bryk, & Seltzer, 1994) has shown that children whose Reading Recovery programmes were successfully discontinued maintain their gains in literacy in the short-term in the year of implementation (although see Chapman, Tunmer, & Prochnow, 2001). Positive programme effects have also been reported in the years following the intervention (e.g., Holliman & Hurry, 2013; Schmitt & Gregory, 2005). However, there is evidence that for some children receiving Reading Recovery these gains are not maintained once back, unsupported, in the classroom (Chapman et al., 2001); this is particularly evident over longer periods of time (e.g., Hurry & Sylva, 2007; Wasik & Slavin, 1993).

Information on the 'retention' of gains resulting from an early intervention is of paramount importance (Schwartz, Hobsbaum, Briggs, & Scull, 2009) yet, surprisingly, only a handful of studies have sought to explain 'why' Recovery children may fail, or continue to maintain their gains in literacy once their Reading Recovery programme has been discontinued. One approach, adopted here, is to explore whether any aspects of their reading profiles (beyond those captured by standard Reading Recovery assessments) can help explain sustained progress in literacy; for example, Iversen and Tunmer (1993) found that children's reading progress following Reading Recovery was strongly influenced by their 'phonological processing skills' at discontinuation of the programme. Research has also shown that reading comprehension difficulties can lead to slower rates of vocabulary growth

(Cain & Oakhill, 2011) and less literacy engagement which may negatively impact upon later literacy development (the so-called 'Matthew effect', Stanovich, 1986). In the present paper, we examine the independent contributions of the standard Reading Recovery assessments (the Observation Survey and Text Reading Level) and two newly introduced assessments – of phonological processing and reading comprehension – to see whether this 'broadened analysis' of children's reading profiles on exit from the programme can help predict the trajectory of sustained progress in literacy.

The Reading Recovery intervention programme

Developed by Dame Marie Clay in the 1970s, the programme involves daily, thirty minute lessons with a trained Reading Recovery teacher, typically for a period of between 12 and 20 weeks. Lessons include several activities: re-reading two or three familiar books; specific letter and word work, including grapho-phonemic connections and phonic knowledge; composing and writing a sentence or two; and reading a newly introduced book. Embedded work with letters and words is also incorporated throughout the lesson. Adopting a Vygotskyan approach to instruction, daily lessons are tailored to the child and build on what the child knows and needs to learn; thus, learning is situated and scaffolded in the child's zone of proximal development (Vygotsky, 1978).

The intervention sets out to close the attainment gap between children at risk of literacy difficulties (in Reading Recovery) and their classroom peers. When children reach literacy levels appropriate for chronological age and in line with their classroom peers, the teaching programme is ceased, or 'discontinued' in order to identify further children. The vast majority of children who receive Reading Recovery make accelerated progress (84.1%) and can be successfully returned to class with

average attainment levels for their age (European Centre for Reading Recovery, 2013). Those who do not make accelerated progress are 'referred'; that is, identified as potentially requiring further ongoing assessment.

An Observation Survey of Early Literacy Achievement (Clay, 2013), referred to here as the Observation Survey, is used to identify lowest attaining pupils for Reading Recovery and provide detailed information at exit from Reading Recovery, for both 'discontinued' and 'referred' programmes, to assess readiness for the programme to finish. The six core tasks have both formative and summative purposes: (i) the 'Letter Identification' task for both lower- and upper-case forms allows the teacher to gather information about the child's letter knowledge, visual discrimination, degree of automaticity, and auditory and visual confusions; (ii) the 'Word Reading' task assesses how many words on a list of high-frequency words the child can identify and also creates a context for observing decoding fluency and recognition of some words at sight as a 'known' lexicon; (iii) the 'Concepts about Print' task allows the teacher to observe how the child uses the rules of the alphabetic code (e.g., 'Show me where to start reading.' What's wrong with the writing on this page?') alongside the language needed to access classroom instruction in letter and word learning (e.g., 'Show me a capital letter.' Show me the first word'); (iv) the 'Writing Vocabulary' assessment is designed to reveal the extent to which the child is learning how to build a lexicon of known words; the child is prompted with words that are likely to be within a young literacy learner's repertoire when he/she is unable to think of any to write; (v) the 'Hearing and Recording Sounds in Words' task is a standardized context for assessing knowledge of phoneme-grapheme correspondences and of how spoken language is recorded; (vi) a 'Running Record' of text reading provides both a qualitative and quantitative analysis. The qualitative analysis guides

teachers to assess the child's use of a range of information sources, directionality and one to one matching, phrasing and the degree to which they initiate and use strategic activity to process text. This analysis is summarised in narrative form, at the beginning and end of a child's Reading Recovery lesson series as supportive activity at text, word and letter levels, and unhelpful activity at text word and letter levels. The quantitative analysis scores accurate word reading to find an accuracy level of 90-95% along an established gradient of challenge and is summarised as an instructional text reading level (Clay, 2013). Text Reading Level is an important measure at exit from Reading Recovery since it relates individual text level performance to the literacy attainment norms for the specific class/cohort. Decisions to end a child's programme through discontinuing or referral also include a full page qualitative analysis.

The contribution of the Observation Survey and Text Reading Level to progress in literacy

The intervention's designer, Dame Marie Clay, considered the most cost effective way of reducing the level of risk to long term gains is to reach average attainment levels. This is because those at greatest risk of not receiving class teaching appropriate to their needs are those that are the greatest distance from the mean level of attainment (Clay, 2001). Taking children's attainment to average levels is therefore intended to safeguard future progress.

Performance on the Observation Survey and the Text Reading Level are used to assess the effectiveness of Reading Recovery, pupil by pupil and as a predictive measure of continued progress. Average and above scores, in parallel with analysis of literacy processing (as evidenced on running records) are used to support the judgement that a given pupil has literacy skills of sufficient flexibility and durability

as to suggest that they can continue to progress in line with their classroom peers. Given that many of the Observation Survey tasks have low ceilings (i.e., Letter Identification, Hearing and Recording Sounds in Words), Text Reading Level and the analysis of text reading behaviours is considered particularly important since a running record of text reading is designed to capture how effectively the learner can access a complex range of information and work on that information (Clay, 2013). It identifies an appropriate level for instruction and, if that level is close to or above the class average, the likelihood is that the learner can benefit from the literacy environment of the classroom. Some researchers (e.g., Center, Wheldall, Freeman, Outhred, & McNaught, 1995; Elbaum, Vaughn, Hughes, & Moody, 2000) have argued that basing discontinuation decisions on text reading levels is unreliable and may not identify specific difficulties for at-risk readers. However, studies have demonstrated that pupils who attained average levels of achievement when their Reading Recovery programme was discontinued continue to progress within the average attainment band for literacy long after the intervention has ceased (e.g., Rowe, 1995; Schwartz, 2005). Indeed, a recent study (Jesson & Limbrick, 2014) found significant associations between Text Reading Level scores at exit from the programme and subsequent reading performance as measured by standardised tests; only students who were discontinued from the programme on a higher Text Reading Level (21-23) obtained stanine levels above 5.

Clay provides some evidence for predictive validity using a longitudinal study of the 83 children that remained at the same school for two years after they were 6 years old. Scores of two standardised word reading assessments (Schonell R1 and Fieldhouse Reading test) at seven and eight years were correlated with literacy behaviours observed on the Observation Survey at six years (reported in Clay, 2013,

p. 167). Correlations ranged from .69 (Concepts about Print) to .90 (Clay Word Test). At seven, the range was .69 (Text Level) to .83 (Letter Identification and Clay Word Test). This data suggests that performance on the Observation Survey does indeed suggest future literacy attainment, up to eight years at least. In the US, evidence submitted to the National Centre for Response to Intervention (NCRTI) drew on a random sample of 9,760 to provide information on the technical standards achieved by the Observation Survey. As a result, the Observation Survey is one of only three reading assessments that fall into the NCRTI's highest technical rating. With regard to predictive validity, when Observation Survey scores were correlated with Slosson scores, all coefficients were above the .70 required by NCRTI (D'Agostino, 2012). Thus, there is good reason to suspect that performance on the standard Reading Recovery assessments – the Observation Survey and Text Reading Level – would be predictive of later progress in literacy.

Whilst the Observation Survey and Text Reading Level offer sound assessment, they do not provide a standardised assessment of phonological awareness or reading comprehension.

The contribution of phonological processing to progress in literacy

One of the most consistent and widely accepted findings over the past few decades is that deficits in phonological processing may give rise to reading difficulties (e.g., Cain, 2010). Children with reading difficulties often have accompanying phonological processing deficits (e.g., Juel, 1998) and phonological processing skills are often superior in precocious readers (e.g., Stainthorp & Hughes, 2004). In a meta analysis from 70 published studies, Bus and van IJzendoorn (1999) found that phonological awareness training improved children's phonological processing skills (as expected) and also their reading skills (to a lesser extent). The effect of

phonological awareness on reading was described as medium to strong, and while phonological awareness was not considered the single, strongest predictor, it was considered a 'substantial' predictor of reading and a "causal factor" in the process of learning to read (Bus & van IJzendoorn, 1999, p. 411).

Research has shown that phonological processing skills are predictive of later literacy development. For example, Ehri, Nunes, Willows, Schuster, Yaghoub-Zadeh, and Shanahan (2001) conducted a quantitative meta-analysis to investigate the relationship between phonemic awareness instruction (one aspect of phonological awareness) and reading ability. The analysis comprised 52 published studies, which included 96 cases. Phoneme awareness instruction was found to enhance phoneme awareness (as expected), word reading, spelling, and reading comprehension. It generally helped the later reading ability of typical developers and at-risk samples, children of different ages (preschoolers, kindergarten, first graders), and children of different socio economic status (SES). In another study, Bryant, Maclean, Bradley, and Crossland (1990) conducted a two-year longitudinal study with 65 children from the age of 4 years 7 months and monitored the progress in phonological awareness, reading, and spelling. It was found that rhyme awareness (another aspect of phonological awareness) was able to predict significant, unique variance in reading even after controlling for individual differences in phoneme awareness. Bryant and colleagues concluded that sensitivity to rhyme promotes phonemic awareness and in turn, literacy, and that sensitivity to rhyme can influence literacy development independently of its connection with phonemic awareness.

Few would dispute the strong associations between phonological processing and early literacy; however, it is noteworthy that the coverage of phonological processing skills (or lack thereof) has been identified as something "Reading

Recovery has not done well" (Reynolds & Wheldall, 2007, p. 213). Some researchers (e.g., Greaney, 2011; Tunmer & Chapman, 2003) claim that Reading Recovery is a 'whole language' approach, which does not provide opportunities for the explicit phonological and phonics teaching that struggling readers require. It has further been argued that the programme is less effective for children with phonological processing difficulties (Center et al., 1995; Spector & Moore, 2004) and that the effectiveness of Reading Recovery could be improved 'considerably' by incorporating more phonological processing skills into the programme (Hatcher, Hulme, & Ellis, 1994; Iversen & Tunmer, 1993).

It should be noted that this description of the programme's theoretical base is refuted by Reading Recovery professionals, citing the long-standing promotion of fast visual processing of words in print that can be traced through Clay's work. It is not entirely accurate to say that Reading Recovery is based solely on meaning, since "Reading Recovery has been methodically designed to establish and secure that whole complex of lower-order skills on which reading so integrally depends" (Adams, 1990, p. 421). Nevertheless, some maintain that Reading Recovery does not adequately assess, or remediate difficulties in, phonological processing, which some regard as the 'key' component of early reading especially in terms of predicting sustained progress in literacy (Chapman et al., 2001). For this reason, this construct was included in the present study.

The contribution of comprehension to progress in literacy

The pivotal role of comprehension is captured in the Simple View of Reading, which proposes that reading comprehension is the product of listening comprehension and decoding (Gough and Tunmer, 1986). Indeed the Reading Recovery programme foregrounds the importance of meaning in children's reading, consistent with its roots

and reflected in its use of authentic texts. However, the Reading Recovery summative assessments do not explicitly assess reading comprehension in a standardised way. The Text Reading Level assessment, whilst using meaningful texts, on a summative level principally addresses word reading accuracy, although the child's ability to substitute words that make sense is an important part of the record's analysis. Early difficulties with comprehension, both oral and reading comprehension, have been found to predict later reading comprehension difficulties (Catts, Adlof, & Weismer, 2006; Catts, Hogan, & Fey, 2003; Elwér, Keenan, Olson, Byrne, & Samuelsson, 2013), tracking children from kindergarten up to teens. It has also been argued that reading comprehension difficulties may lead to slower rates of vocabulary growth (Cain & Oakhill, 2011) and less literacy engagement. Vocabulary growth also leads to improved reading comprehension in what is likely to be a reciprocal relationship, (Clarke, Snowling, Truelove, & Hulme, 2010). It would therefore seem important to include some measure of reading comprehension in any follow-up study, because of the central importance of the skill, the fact that it is seen as independent of decoding, and is predictive of subsequent reading performance.

Summary

It is well known that the longer the period of time following intervention, the greater the number of variables influencing lack of sustainability (Frater & Staniland, 1994). Indeed, a great number of factors may affect a child's continuing performance in literacy following Reading Recovery such as subsequent literacy teaching experience and the quality of the classroom environment (Wahlberg & Reynolds, 1997). In the present study, we focus on children's reading profiles at exit from the programme and investigate whether any aspects of their reading profiles can predict sustained progress in literacy at four time points. To gain further insight into their

reading profile, in addition to the standard Reading Recovery assessments, children were assessed for their phonological processing and reading comprehension – these additional skills are acknowledged as being of importance (see Clay, 2013) and have been shown to predict subsequent progress in literacy, but are not formally measured in a standardised way in the core assessments of the Reading Recovery programme.

This study addressed two major research questions:

1. What is the bivariate relationship between the standard Reading Recovery assessments (the Observation Survey and text reading level), phonological processing, reading comprehension, and the reading, spelling, and writing tasks at exit from the programme and at three-, six-, and twelve-month follow-up points, where available?
2. Can any of the variables measured at exit from the programme (Observation Survey, Text Reading Level, phonological processing, and reading comprehension) make a unique contribution (beyond the influences of the other predictors) to reading, spelling, and writing at three-, six-, and twelve-month follow-up points, where available?

Methodology

Participants

All participants in this study (N = 114) were recruited from a series of primary or combined schools in the UK or Ireland and were about to have their Reading Recovery programmes successfully discontinued. This sample of Reading Recovery children at exit from the programme comprised of 69 males and 45 females aged between five- and seven-years-old (mean age = 6 years and 6 months; standard deviation = 0 years and 4 months). At first follow-up three-months later, there were reading assessment data on 103 children (attrition rate = 10%) and spelling

assessment data on 57 children (attrition rate 50%). At second follow-up six-months later, there were reading assessment data on 85 children (attrition rate = 25%) and spelling assessment data on 40 children (attrition rate = 64%). At third follow-up twelve-months later, there were reading and writing assessment data on 65 children (attrition rate = 43%). This third follow-up used end of Key Stage 1 National Curriculum levels, which were only available for UK schools.

To investigate whether there were any differences between traced and untraced children at different follow-up points, we compared their reading profiles at exit from the programme. On the whole traced and untraced children were similar, but at first follow-up three-months later, the untraced children scored significantly higher on the Single Word Spelling Test (Sacre & Masterson, 2000), $t(110) = 2.080$, $p = .04$, and on the Concepts about Print task from the Observation Survey (Clay, 2002), $t(109) = 2.196$, $p = .03$ at exit from the programme. At second follow-up six-months later, the traced children scored significantly higher on the Text Reading Level assessment (Clay, 2013), $t(109) = -2.061$, $p = .042$ at exit from the programme. Lastly, at third follow-up twelve-months later, the untraced children scored significantly higher on the Writing Vocabulary task from the Observation Survey, $t(109) = 2.025$, $p = .045$ at exit from the programme.

Measures

All criterion measures in this study were chosen on the basis that they have been standardised for the UK population and are commonly used in the education and literacy field. Moreover, none of the criterion measures were directly related to the content of the programme; this is a common criticism of research on the effectiveness of Reading Recovery (see Hiebert, Colt, Catto, & Gury, 1992).

At exit from the programme, Reading Recovery teachers administered the standard Reading Recovery assessments: the Observation Survey and Text Reading Level, and the British Ability Scales (BAS) II Word Reading subtest (Elliot, Smith, & McUlloch, 1996), along with a battery of tests that would provide an assessment of their phonological awareness, using the Alliteration Test, the Non-Word Reading Test, and the Rhyme Test from the Phonological Assessment Battery, PhAB (Frederickson, Frith, & Reason, 1997), reading comprehension, using the York Assessment of Reading Comprehension, YARC (Snowling et al., 2009), and spelling, using the Single Word Spelling Test. These assessments were presented in a fixed order following any recommendations in accompanying test manuals over one or two sessions to minimise the length of testing period. All of the assessments in this study have been widely used in the UK.

At first and second follow-up (three- and six-months later respectively), the children who previously took part were re-contacted and the same Reading Recovery teachers administered the BAS II Word Reading subtest and the Single Word Spelling Test. At third follow-up (twelve-months later), we used National Curriculum levels (compulsory in England) for reading and writing. The levels (ranging from below Level 1 to Level 4a) were converted to National Curriculum point score equivalents for all statistical analyses (see Appendix) following the guidance provided by the UK Department for Education website (http://nationalstrategies.standards.dcsf.gov.uk/node/169521). The National Curriculum Assessments represent an ordinal level of measurement, but such measures can be analysed (with caution) using multiple regression (see D'Agostino, 2012). Data from all four time points were entered as additional fields onto the European Centre for Reading Recovery database for analysis.

Procedure

Reading Recovery Teacher Leaders in the UK or Ireland were asked to identify up to six trained Reading Recovery teachers from their Local Authority that were working with a child who was about to have their Reading Recovery programmes successfully discontinued. Informed consent was then obtained from these children, their guardians, and their school. Data were collected in May, June, and July 2010 at exit from the programme, and then again at three-, six-, and twelve-month follow-up points.

Results

Description of performance on individual measures

Table 1 shows the mean and standard deviations for the Observation Survey subtests, Text Reading Level, phonological processing, reading comprehension, and the reading, spelling, and writing tasks at exit from the programme and at three- (3m), six- (6m), and twelve-month (12m) follow-up points, where available.

<TABLE 1 NEAR HERE>

It can be seen from Table 1 that participants scored ~Level 16 on the Text Reading Level assessment; this is an expected level for students who are about to have their Reading Recovery programmes successfully discontinued (Clay, 2005). Performance on the five subtests of the Observation Survey was towards ceiling, but this was also as expected. On the phonological processing measures (Alliteration Test, Non-Word Reading Test, Rhyme Test) participants' raw scores were equivalent to mean standardized scores of 99, 106 and 107 respectively, which fall in the 'average score' range. The mean word reading raw score of the sample at exit from the programme was 29.26 (*SD* = 7.28), which equates to a reading age equivalent of 7 years and 1 month (7 months ahead of their chronological age). At first follow-up

three-months later, the mean word reading raw score was 31.95 (*SD* = 9.04), which equates to a reading age equivalent of 7 years and 1 month (4 months ahead of their chronological age). At second follow-up six-months later, the mean word reading raw score was 38.07 (*SD* = 10.07), which equates to a reading age equivalent of 7 years and 7 month (7 months ahead of their chronological age). A similar pattern of results was observed on the spelling measure where performance was higher at second follow-up (20.55) than it was at first follow-up (18.04), and this was higher than the mean score obtained at exit from the programme (17.96). At third follow-up twelve-months later, for children attending English schools, they had reached an average of 2c in reading and 2c in spelling, which is within the expected Level 2 at the end of Key Stage 1, albeit at the lower end. While these results should be treated with caution due to high attrition rates, they do suggest that children are maintaining their gains up to twelve months after the programme has been discontinued.

Relationships between individual measures

Prior to any correlational analyses, the data were inspected to ensure they met the underlying assumptions. Many of the Observation Survey assessments were negatively skewed (as expected), and to rectify this, a composite measure for the Observation Survey was constructed by obtaining a z-score for each of the five subtests and then adding them together. A composite measure of phonological processing was also constructed following the same procedure (by adding together z-scores for the three phonological measures); however, this was to produce a single phonological measure that represented a range of phonological skills, rather than to rectify any violation of assumptions.

Pearson's correlations among the variables at exit from the programme, and at three-, six-, and twelve-month follow-up points are presented in Table 2.

<TABLE 2 NEAR HERE>

1. What is the bivariate relationship between the standard Reading Recovery assessments (the Observation Survey and text reading level), phonological processing, reading comprehension, and the reading, spelling, and writing tasks at exit from the programme and at three-, six-, and twelve-month follow-up points, where available?

To give a sense of scale to the correlations shown in Table 2, correlations of less than .24 can be considered small, .24-.36 medium, and greater than .36 large (Cohen, 1988). It can be seen from Table 2 that all of the variables measured at exit from the programme (the Observation Survey, Text Reading Level, phonological processing, and reading comprehension) were significantly correlated with word reading and spelling concurrently, and at three- and six-month follow-up points, and these were generally large correlations. These variables were also significantly correlated with each other (with the exception of the relationship between reading comprehension and the standard Reading Recovery assessments). Aside from the word reading and spelling measures, only Text Reading Level and reading comprehension were able to predict National Curriculum reading and writing twelve-months later; the Observation Survey and phonological processing were unable to do so. Multiple regression analyses are required to extend beyond these simple correlations and these are now reported.

Independent contributions of predictor variables to outcome variables

As we have seen from the bivariate (zero-order) correlations in Table 2, while a number of measures administered at exit from the programme were significantly related to children's performance three-, six-, and to a lesser extent, twelve-months later, they were also found to correlate with each other. In order to examine which

measures are the best at predicting, and are most uniquely related to, children's reading, spelling, and writing at all four time points, where available, we need to put them all into one analysis, a multiple regression.

A series of multiple regression analyses were used in which the relative contribution of the predictor variables measured at exit from the programme (Observation Survey, Text Reading Level, phonological processing, and reading comprehension) to the outcome variables of reading, spelling, and writing at all four time points, where available, was explored. Word reading and spelling, while also measured at exit from the programme, were not included as predictors of themselves because this seemed counterintuitive and was beyond the focus of the present study.

In Tables 3-6 the statistical significance and standardised Betas are reported, the latter giving an indication of the magnitude of the relationship with the outcome variables. However, it should be noted that the ratio of participants to predictors for the six-month 'spelling' follow-up was not substantial enough, $N = 40$ (Tabachnick & Fidell, 2007) and therefore the *p*-values associated with this analysis should be treated with caution.

2. Can any of the variables measured at exit from the programme (Observation Survey, Text Reading Level, phonological processing, and reading comprehension) make a unique contribution (beyond the influences of the other predictors) to reading, spelling, and writing at three-, six-, and twelve-month follow-up points, where available?

<TABLE 3 NEAR HERE>

It can be seen from Table 3 that at exit from the programme (concurrently), only the standard Reading Recovery assessments made a significant unique contribution to word reading. A series of regressions were run to identify unique

variance explained by these predictors. As a whole, the model predicted 50% of the variance in word reading. Once the other variables in the model had been accounted for, Text Reading Level was able to account for an additional 16.2% of the variance, R^2 change = .162, $F(1, 99) = 32.243$, $p < .001$; the Observation Survey was able to account for an additional 7.5% of the variance, R^2 change = .075, $F(1, 99) = 14.921$, $p < .001$. The unique contribution of phonological processing to word reading was marginally non-significant.

In predicting concurrent performance in spelling, it can be seen that Text Reading Level, the Observation Survey, and phonological processing all made significant unique contributions. As a whole, the model predicted 39.9% of the variance in spelling. Once the other variables in the model had been accounted for, the Observation Survey was able to account for an additional 8.4% of the variance, R^2 change = .084, $F(1, 100) = 13.95$, $p < .001$; phonological processing was able to account for an additional 7.2% of the variance, R^2 change = .072, $F(1, 100) = 12.06$, $p = .001$; Text Reading Level was able to account for an additional 2.9% of the variance, R^2 change = .029, $F(1, 100) = 4.745$, $p = .032$.

<TABLE 4 NEAR HERE>

It can be seen from Table 4 that at first follow-up three-months later, Text Reading Level, phonological processing, and reading comprehension (but not the Observation Survey) all made significant unique contributions to word reading and spelling. A series of regressions were run to identify unique variance explained by these predictors. In predicting word reading, the whole model accounted for 38.3% of the variance. Once the other variables in the model had been accounted for, Text Reading Level was able to account for an additional 11.4% of the variance, R^2 change = .114, $F(1, 92) = 17.013$, $p < .001$; reading comprehension was able to account for an

additional 6.7% of the variance, R^2 change = .067, $F(1, 92) = 10.029$, $p = .002$; phonological processing was able to account for an additional 3.4% of the variance, R^2 change = .034, $F(1, 92) = 5.093$, $p = .026$.

In predicting spelling, the whole model accounted for 51.5% of the variance. Once the other variables in the model had been accounted for reading comprehension was able to account for an additional 12.8% of the variance, R^2 change = .127, $F(1, 51) = 13.332$, $p = .001$; Text Reading Level was able to account for an additional 7.1% of the variance, R^2 change = .071, $F(1, 51) = 7.482$, $p = .009$; phonological processing was able to account for an additional 4.2% of the variance, R^2 change = .042, $F(1, 51) = 4.396$, $p = .041$.

<TABLE 5 NEAR HERE>

It can be seen from Table 5 that at second follow-up six-month later, only Text Reading Level made a significant unique contribution to word reading and spelling. In predicting word reading, after the other predictor variables accounted for a collective 23.7% of the variance, Text Reading Level was able to account for an additional 15% of the variance in word reading, R^2 change = .15, $F(1, 75) = 18.361$, $p < .001$. Phonological processing made a marginally non-significant contribution to word reading.

In predicting spelling, after the other predictor variables accounted for a collective 32.2% of the variance in spelling, Text Reading Level was able to account for an additional 8.4% of the variance, R^2 change = .084, $F(1, 34) = 4.782$, $p = .036$. The Observation Survey and reading comprehension made marginally non-significant contributions to spelling.

<TABLE 6 NEAR HERE>

It can be seen from Table 6 that at third follow-up twelve-months later, there were no significant predictors of reading using the National Curriculum sublevels and the overall effect was non-significant, $F(4, 55) = 2.009$, $p = .106$. In predicting National Curriculum sublevels in writing, both reading comprehension and text reading level made significant unique contributions. The whole model predicted 21.1% of the variance. After the other predictor variables accounted for reading comprehension was able to account for an additional 9% of the variance, R^2 change = .09, $F(1, 55) = 6.298$, $p = .015$; Text Reading Level was able to account for an additional 6.8% of the variance, R^2 change = .068, $F(1, 55) = 4.759$, $p = .033$.

Discussion

The study set out to examine the bivariate and independent contribution of four predictor variables: the standard Reading Recovery assessments (the Observation Survey and Text Reading Level), phonological processing, and reading comprehension to children's reading, spelling, and writing concurrently, at exit from the programme, and at three-, six-, and twelve-month follow-up points, where data were available.

While performance on the Observation Survey was found to be significantly associated with most other variables, especially at exit from the programme, as expected (Clay, 2013), it was unable to make a unique contribution to reading, spelling, or writing at any follow-up point. This was perhaps unsurprising given that children who have their Reading Recovery programmes successfully discontinued typically perform at ceiling on these tasks. This was borne out by the evidence in the present study where performance (with the exception of the Writing Vocabulary task) was at ceiling and lacked variation. This may partly explain the non-significant relationship found between the Observation Survey and reading comprehension,

which was surprising. Conversely, Text Reading Level was found to be significantly correlated with phonological processing, word reading, spelling, and writing at all time points and was consistently the best predictor of word reading. This was anticipated given the overlapping task demands and the findings from other longitudinal research in this area (e.g., Rowe, 1995; Schwartz, 2005; Jesson & Limbrick, 2014). These findings are also in line with Clay's (2013) assertions that progression to higher levels on the Text Reading Assessment will enable children to benefit more from the literacy environment of the classroom.

One of the newly introduced assessments at exit from the programme – phonological processing – was found to make independent contributions to word reading and spelling in the shorter term, and this was consistent with other research in this area (Bradley & Bryant, 1983; Bryant et al., 1990; Bus & van IJzendoorn, 1999; Ehri et al., 2001). As noted earlier, some have questioned the coverage of phonological processing in the Reading Recovery programme (Reynolds & Wheldall, 2007) and argued that it would be more effective if more phonological processing skills were incorporated into it (Hatcher, Hulme, & Ellis, 1994; Iversen & Tunmer, 1993). Moreover, it has been argued that the programme does not sufficiently support those children with phonological processing difficulties (Center et al., 1995; Spector & Moore, 2004) or remediate difficulties in phonological processing (Chapman et al., 2001). Without any measure of phonological processing at pre-test in the present study it is not possible to inform arguments concerning the 'development' of phonological skills during the programme or whether the programme works more of less well for those with phonological processing difficulties. However, it is evident that the phonological processing of children who had their Reading Recovery programmes successfully discontinued was in the expected range for their age. This

skill (phonological processing) was found to predict later literacy performance in the shorter term in a way that could not be sufficiently explained via its association with the core assessments in the Reading Recovery programme.

The other newly introduced assessment – reading comprehension – was found to predict word reading and spelling at three and six months. Interestingly, reading comprehension at baseline made a unique contribution to both word reading and spelling at three months even after accounting for the arguably more proximal measures of phonological processing and text reading level (principally a measure of reading accuracy). Reading comprehension failed to make a unique contribution to word reading and spelling at six months. It was the best predictor of National Curriculum sublevels for reading and writing, twelve-months later, which reflects the broader assessment of reading and writing at this time. Nonetheless, the relationship between reading comprehension and National Curriculum reading failed to reach conventional levels of statistical significance. Text Reading Level also made a unique contribution to writing. This is consistent with other research which signifies the importance of reading comprehension and shows that this skill is predictive of subsequent reading performance independent of decoding ability (e.g., Cain & Oakhill, 2007 for a review). It seems plausible that 'poor comprehenders' (who struggle to understand what they are reading) may find the activity of reading less rewarding. This is likely to impact upon their vocabulary growth (Cain & Oakhill, 2011), motivation, later literacy engagement (after the programme has been discontinued) and subsequent literacy development (the 'Matthew effect', Stanovich, 1986).

A limitation of the present study (see Holliman & Hurry, 2013; Ruhe & Moore, 2005) is that the sample comprised only of those children whose programmes

had been successfully discontinued; thus, we do not know whether the same results would apply to all children who enter the programme. However, since the purpose of this study was to ascertain the extent to which the set goals and outcomes for Reading Recovery equipped children for long term literacy success, it would cloud the issue to include the relatively small proportion of children (15-20%) who had not achieved the goals of the programme. Attrition rates were also high, especially for the spelling data; therefore, the results for reading and spelling may not be viewed as equivalent in terms of reliability. While it was demonstrated that traced and untraced children were pretty well matched on measures at exit from the programme, this depleted sample size resulted in less statistical power.

In spite of these limitations, the findings reported here indicate that levelled texts, as employed in Reading Recovery, provide a good indication of later progress in literacy, after the programme has been discontinued. This is perhaps in line with Byrne, Samuelsson, and Olson's (2013) assertions that successful reading interventions should include 'actual reading measures' and abundant opportunities to engage with them, as is done in Reading Recovery. However, the findings also indicate that phonological processing (in the shorter term) and reading comprehension, which are not formally measured in a standardised way in the core assessments of the Reading Recovery programme, make independent contributions to later progress in literacy. This presents a case for assessing these reading skills at exit from Reading Recovery in order to further evidence the trajectory of sustained progress in literacy. This may also inform Reading Recovery teachers about the sorts of reading profiles children should ideally achieve before discontinuation (incorporating phonological processing and reading comprehension). However, due to the acknowledged limitations of the present study, especially the relatively small

sample size, a degree of caution is offered with respect to the interpretation of these findings. Indeed, further research is warranted to consolidate the findings from the present study.

References

Adams, M. (1990). *Beginning to read: Thinking and learning about print.* Cambridge, MA: MIT Press.

Bradley, L., & Bryant, P. E. (1983). Categorizing sounds and learning to read: A causal connection. *Nature, 301,* 419-421. doi: 10.1038/301419a0

Bryant, P., MacLean, M., Bradley, L., & Crossland, J. (1990). Rhyme and alliteration, phoneme detection and learning to read. *Developmental Psychology, 26,* 429-438. doi: 10.1037/0012-1649.26.3.429

Bus, A. G., & van IJzendoorn, M. H. (1999). Phonological awareness and early reading: A meta-analysis of experimental training studies. *Journal of Educational Psychology, 91,* 403-414. doi: 10.1037/0022-0663.91.3.403

Byrne, B., Samuelsson, S., & Olson, R. K. (2013). Dyslexia. In A. J. Holliman (Ed.), *The Routledge International Companion to Educational Psychology*. (pp. 297-306) Abingdon, Oxon, Routledge.

Cain, K. (2010). *Reading development and difficulties*. Oxford: Wiley-Blackwell publishers.

Cain, K., & Oakhill, J. (2007). Reading comprehension difficulties: Correlates, causes and consequences. In K. Cain & J. Oakhill (Eds.), *Children's Comprehension Problems in Oral and Written Language: A Cognitive Perspective*. (pp. 41-75) New York, Guildford Press.

Cain, K., & Oakhill, J. (2011). Matthew effects in young readers: reading comprehension and reading experience aid vocabulary development. *Journal of Learning Disabilities, 44*(5), 431-443. doi: 10.1177/0022219411410042

Catts, H., Adlof, S. M., & Weismer, S. E. (2006). Language deficits in poor comprehenders: A case for the simple view of reading. *Journal of Speech, Language and Hearing Research, 49*, 278-293. doi:10.1044/1092-4388

Catts, H. W., Hogan, T.P., & Fey, M.E. (2003). Subgrouping poor readers on the basis of individual differences in reading-related abilities. *Journal of Learning Disabilities, 36*, 151-164. doi: 10.1177/002221940303600208

Center, Y., Wheldall, K., Freeman, L., Outhred, L., & McNaught, M. (1995). An evaluation Reading Recovery. *Reading Research Quarterly, 30*, 240-263. doi: 10.2307/748034

Chapman, J. W., Tunmer, W. E., & Prochnow, J. E. (2001). Does success in the Reading Recovery program depend on developing proficiency in phonological processing skills? A longitudinal study in a whole language instructional context. *Scientific Studies of Reading*, *5*(2), 141-176. doi: 10.1207/S1532799Xssr0502_2

Clarke, P., Snowling, M., Truelove, E., & Hulme, C. (2010). Ameliorating children's reading comprehension difficulties: A randomised controlled trial. *Psychological Science, 21*, 1106-1116. doi: 10.1177/0956797610375449

Clay, M. M. (2001) *Change over time in children's literacy development.* Portsmouth, NH: Heinemann.

Clay, M. M. (2002). *An Observation Survey of early literacy achievement* (2nd ed.) Auckland: Heinemann.

Clay, M. M. (2005). *Literacy lessons designed for individuals: Part One: Why? When? and How?* Auckland: Heinemann.

Clay, M. M. (2009). Implementing Reading Recovery internationally. In B. Watson and B. Askew (Eds.), *Boundless Horizons: Marie Clay's Search for the Possible in Children's Literacy*. Rosedale, North Shore, NZ: Pearson Education.

Clay, M. M. (2013). *An Observation Survey of early literacy achievement* (3rd ed.) Auckland: Heinemann.

Cohen, C. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.). Lawrence Erlbaum Associates.

D'Agostino, J. V. (2012). Technical Review Committee confirms highest review ratings for Observation Survey of Early Literacy Achievement. *Journal of Reading Recovery 11*(2) 53-56. Retrieved from http://readingrecovery.org/images/pdfs/Journals/JRR/Vol11_No2_Spring-2012/jrr_11.2_ncrti_review.pdf

Ehri, L. C., Nunes, S. R., Willows, D. M., Schuster, B. V., Yaghoub-Zadeh, Z., & Shanahan, T. (2001). Phonemic awareness instruction helps children learn to read: Evidence from the National Reading Panel's meta-analysis. *Reading Research Quarterly, 36*, 250-287. doi: 10.1598/RRQ.36.3.2

Elbaum, B., Vaughn, S., Hughes, M. T., & Moody, S. W. (2000). How effective are one-to-one tutoring programs for reading for elementary students at risk for reading failure? A meta-analysis of the intervention research. *Journal of Educational Psychology, 92*, 605-619. doi: 10.1037/0022-0663.92.4.605

Elliott, P., Smith, P. & McCulloch. K. (1996). *British Abilities Scales*. Windsor: NFER-Nelson.

Elwér, A., Keenan, J., Olson, R., Byrne, B., & Samuelsson, S. (2013). Longitudinal stability and predictors of poor oral comprehenders and poor decoders, *Journal of Experimental Child Psychology 115*, 497-516. http://dx.doi.org/10.1016/j.jecp.2012.12.001

European Centre for Reading Recovery (2013). *Reading Recovery annual technical report for the United Kingdom and the Republic of Ireland: 2012-13*. Institute of Education, University of London. Available at: http://readingrecovery.ioe.ac.uk/reports/documents/RR_annual_technical_report_for_UK_and_RoI_-_12-13.pdf

Frater, G., & Staniland, B. (1994). Reading Recovery in New Zealand: A report of the Office of Her Majesty's Chief Inspector of Schools. Literacy, *Teaching and Learning, 1*(1), 143-162.

Frederickson, N., Frith, U., & Reason, R. (1997). *Phonological assessment battery.* Windsor: NFER.

Gough, P. B., & Tunmer, W. E. (1986). Decoding, reading, and reading disability. *Remedial and Special Education, 7*, 6-10. doi: 10.1177/074193258600700104

Greaney, K. T. (2011). The Multiple Cues or 'Searchlights' word reading theory; implications for Reading Recovery. *Perspectives on Language and Literacy*, *Fall 2011*, 15-20.

Hatcher, P. J., Hulme, C., & Ellis, A. W. (1994). Ameliorating early reading failure by integrating the teaching of reading and phonological skills: The phonological linkage hypothesis. *Child Development, 65*, 41-57. doi: 10.1111/j.1467-8624.1994.tb00733.x

Hiebert, E. H., Colt, J. M., Catto, S. L., & Gury, E. C. (1992). Reading and writing of first-grade students in a restructured Chapter 1 program. *American*

Educational Research Journal, 29(3), 545–572. doi: 10.3102/00028312029003545

Holliman, A. J., & Hurry, J. (2013). The effects of Reading Recovery on children's literacy progress and special educational needs status: a three-year follow-up study. *Educational Psychology: An International Journal of Experimental Educational Psychology, 33*(1), 32-48. Doi: 10.1080/01443410.2013.785048

Hurry, J., & Sylva, K. (2007). Long-term outcomes of early reading intervention. *Journal of Reading Research, 30*, 227-248. doi: 10.1111/j.1467-9817.2007.00338.x

Iverson, S., & Tunmer, W. E. (1993) Phonological processing skills and the Reading Recovery program. *Journal of Educational Psychology, 85*, 112-126. doi: 10.1037/0022-0663.85.1.112

Jesson, R., & Limbrick, L. (2014). Can gains from early literacy interventions be sustained? The case of Reading Recovery. *Journal of Research in Reading, 37*, 102-117. doi: 10.1111/1467-9817.12017

Juel, C. (1998). Learning to read and write: A longitudinal study of fifty-four children from first through fourth grade. *Journal of Educational Psychology, 80*, 437-447. doi: 10.1037/0022-0663.80.4.437

Pinnell, G. S., Lyons, C. A., DeFord, D. E., Bryk, A. S., & Seltzer, M. (1994). Comparing instructional models for the literacy education of high-risk first graders. *Reading Research Quarterly, 29,* 9–39. doi: 10.2307/747736

Reynolds, M., & Wheldall, K. (2007). Reading Recovery 20 years down the track: Looking forward, looking back. *International Journal of Disability, Development and Education, 54*(2), 199-223. Doi: 10.1080/10349120701330503

Rowe, K. J. (1995). Factors affecting students' progress in reading: Key findings from a longitudinal study. *Literacy, Teaching and Learning: An International Journal of Early Literacy, 1*(2), 47–110. Retrieved from http://www.readingrecovery.org/pdfs/LTL-CW/1.2/rowe.pdf

Sacre, L., & Masterson, J. (2000). *Single Word Spelling Test.* Windsor: NFER-Nelson.

Schmitt, M. C., & Gregory, A. E. (2005). The impact of an early literacy intervention: Where are the children now? *Literacy Teaching and learning: An International Journal of Early Reading and Writing, 10*(1), 1-20. Retrieved from http://www.education.purdue.edu/cms/cascade/clear/research/rr_research/Indiana_Follow_Up_St.pdf

Schwartz, R. (2005). Literacy Learning of At-Risk First-Grade Students in the Reading Recovery Early Intervention. *Journal of Educational Psychology, 97(*2), 257-267. doi: 10.1037/0022-0663.97.2.257

Schwartz, R. M., Hobsbaum, A., Briggs, C. & Scull, J. (2009). Reading Recovery and evidence-based practice: A response to Reynolds and Wheldall (2007). *International Journal of Disability, Development and Education, 56*(1), 5-15. doi: 10.1080/10349120802681564

Snowling, M. J., Stothard, S., Clarke, P. J., Crane, C., Harrington, A., Truelove, E., & Hulme, C. (2009). *York Assessment of Reading for Comprehension*. London: GL Assessment.

Spector, J. E., & Moore, P. (2004). Does phonological processing distinguish between students who are more versus less responsive to Reading Recovery? *Literacy Teaching and Learning, 8*, 1-25. Retrieved from http://files.eric.ed.gov/fulltext/EJ966155.pdf

Stainthorp, R., & Hughes, D. (2004). What happens to precocious readers' performance by the age of eleven? *Journal of Research in Reading, 27*(4), 357-372. doi: 10.1111/j.1467-9817.2004.00239.x

Stanovich, K. E. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly, 21*(4), 360-406. doi: 10.1598/RRQ.21.4.1

Tabachnick, B. G., & Fidell, L. S. (2007). *Using Multivariate Statistics* (5th ed.). Boston: Allyn and Bacon.

Tunmer, W. E., & Chapman, J. W. (2003). The Reading Recovery approach to preventive early intervention: As good as it gets? *Reading Psychology, 24*, 337-360. doi: 10.1080/02702710390227378

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: MIT Press.

Wahlberg, H. J., & Reynolds, A. J. (1997). Longitudinal evaluation of programme effectiveness. In B. Spodek and O. N. Soracho (Eds.), *Issues in Early Childhood Assessment and Evaluation* (pp. 28-47) New York: Teachers College Press.

Wasik, B. A., & Slavin, R. E. (1993). Preventing early reading failure with one-to-one tutoring: A review of five programs. *Reading Research Quarterly, 28*(2), 179-200.

Appendix

National Strategy Sublevels: point score equivalents using the a, b, c indicator

Level	Point score
1c	7
Level 1	9
1b	9
1a	11
2c	13
Level 2	15
2b	15
2a	17
3c	19
Level 3	21
3b	21
3a	23
4c	25
Level 4	27
4b	27
4a	29

Note. a = strong level, b = sound level, c = weak level.

Table 1

Means (and *SDs*) for the Observation Survey (OS) subtests, text reading level, phonological processing, reading comprehension, and the reading, spelling, and writing tasks at exit from the programme and at three- (3m), six- (6m), and twelve-month (12m) follow-up points, where available

Measure	*M*	*SD*
Letter Identification, OS (Max = 54)	53	1.38
Concepts about Print, OS (Max = 24)	20.47	2.22
Duncan Word Test, OS (Max = 23)	22	1.52
Writing Vocabulary, OS (Max = NA)	42.32	13.7
Hearing and Recording Sounds, OS (Max = 37)	35.32	2.01
Text Reading Level (Max = 30)	17.51	1.7
Alliteration Test (Max = 10)	8.06	1.97
Non-Word Reading Test (Max = 20)	11.51	3.43
Rhyme Test (Max = 21)	14.07	5.29
Reading Comprehension (Max = 68.6)	40.92	24.7
BAS Word Reading *Raw Score* (Max = 90)	29.26	7.28
Spelling (Max = 30)	17.96	4.89
BAS Word Reading (3m) *Raw Score* (Max = 90)	31.95	9.04
Spelling (3m) (Max = 30)	18.04	4.08
BAS Word Reading (6m) *Raw Score* (Max = 90)	38.07	10.07
Spelling (6m) (Max = 30)	20.55	4.47
NC point score for Reading (12m) (Max = 29)	14.78	1.42
NC point score for Writing (12m) (Max = 29)	14.02	1.25

Table 2

Correlation matrix between the Observation Survey (OS), text reading level (TRL), phonological processing (PP), reading comprehension (RC), word reading (WR), spelling (SP), National Curriculum reading (NCR), and National Curriculum writing (NCW) at three- (3m), six- (6m), and twelve-month (12m) follow-up points

	OS	BL	PP	RC	WR	SP	WR3	SP3	WR6	SP6	NCR
OS											
TRL	.338**										
PP	.391**	.295**									
RC	.141	.103	.284**								
WR	.527**	.593**	.427**	.204*							
SP	.513**	.387**	.500**	.194*	.587**						
WR3m	.305**	.476**	.419**	.377**	.611**	.461**					
SP3m	.429**	.460**	.498**	.495**	.563**	.732**	.401**				
WR6m	.372**	.536**	.408**	.252*	.669**	.477**	.637**	.520**			
SP6m	.453**	.465**	.394*	.359*	.494**	.597**	.420**	.575**	.724**		
NCR12m	.113	.253*	.148	.276*	.311*	.173	.198	.108	.307*	.181	
NCW12m	.154	.326**	.21	.353**	.356**	.292*	.079	-.02	.097	-.27	.685**

*p<.05; **p<.01; ***p<.001

Table 3

Standard multiple regression analysis predicting BAS word reading and spelling (concurrently) from the Observation Survey (OS), text reading level (TRL), phonological processing (PP) and reading comprehension (RC)

Predictor	Word Reading			ΔR^2	Spelling			ΔR^2
	B	*SE B*	β		*B*	*SE B*	β	
OS	0.690	.179	.308	.075***	.490	.131	.325	.084***
TRL	1.865	.328	.435	.162***	.525	.241	.183	.029*
PP	0.481	.245	.159	.019†	.625	.180	.307	.072**
RC	0.021	.022	.071	.005	.008	.016	.042	.002

Note. Tabled values are presented in nonstandardized regression coefficients (*B*) with standard errors (*SE*), standardized regression coefficients (β) and changes in R^2 (ΔR^2), and each line represents individual contributions are controlling for all other variables.

†p=.05; *p<.05; **p<.01; ***p<.001

Table 4

Standard multiple regression analysis predicting BAS word reading and spelling (three-months later) from the Observation Survey (OS), text reading level (TRL), phonological processing (PP) and reading comprehension (RC)

Predictor	Word Reading			ΔR^2	Spelling			ΔR^2
	B	*SE B*	β		*B*	*SE B*	β	
OS	0.169	.256	.061	.003	.237	.138	.188	.028†
TRL	1.944	.471	.366	.114***	.693	.254	.289	.071**
PP	0.794	.352	.211	.034*	.397	.189	.234	.042*
RC	0.099	.031	.271	.067**	.061	.017	.372	.127**

Note. Tabled values are presented in nonstandardized regression coefficients (*B*) with standard errors (*SE*), standardized regression coefficients (β) and changes in R^2 (ΔR^2), and each line represents individual contributions are controlling for all other variables.

†p=.05; *p<.05; **p<.01; ***p<.001

Table 5

Standard multiple regression analysis predicting BAS word reading and spelling (six-months later) from the Observation Survey (OS), text reading level (TRL), phonological processing (PP) and reading comprehension (RC)

Predictor	Word Reading			ΔR^2	Spelling			ΔR^2
	B	*SE B*	β		*B*	*SE B*	β	
OS	0.423	.315	.136	.015	.361	.205	.261	.054†
TRL	2.483	.579	.419	.150***	.823	.376	.313	.084*
PP	0.809	.433	.193	.029†	.237	.281	.127	.012
RC	0.055	.038	.135	.017	.046	.025	.254	.059†

Note. Tabled values are presented in nonstandardized regression coefficients (*B*) with standard errors (*SE*), standardized regression coefficients (β) and changes in R^2 (ΔR^2), and each line represents individual contributions are controlling for all other variables.

$^{\dagger}p<.10$; *$p<.05$; **$p<.01$; ***$p<.001$

Table 6

Standard multiple regression analysis predicting National Curriculum reading and writing (twelve-months later) from the Observation Survey (OS), text reading level (TRL), phonological processing (PP) and reading comprehension (RC)

Predictor	Reading			ΔR^2	Writing			ΔR^2
	B	*SE B*	β		*B*	*SE B*	β	
OS	-.002	.114	-.003	.000	.000	.113	.000	.000
TRL	.345	.209	.225	.043	.454	.208	.283	.068*
PP	.013	.156	.012	.000	.043	.155	.038	.001
RC	.026	.014	.250	.058†	.035	.014	.314	.090*

Note. Tabled values are presented in nonstandardized regression coefficients (*B*) with standard errors (*SE*), standardized regression coefficients (β) and changes in R^2 (ΔR^2), and each line represents individual contributions are controlling for all other variables.

†$p<.10$; *$p<.05$; **$p<.01$; ***$p<.001$