

Paper 7. Movement placebo controlled long-term follow-up of the precursor programme to Move4words - Pupils from Year 11.

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This paper describes data analyses carried out by Elizabeth McClelland. Preliminary versions of these analyses were presented by her on 6th September 2009 to senior staff and governors of the school where the study was carried out.

Abstract:

The precursor programme to Move4words, then called Coordinated Movement (CM), had a significant long-term impact on academic performance three years after the end of the three month intervention, compared to two other intervention techniques and also normal teaching (Total exam points in Year 11, $p = 0.046$; effect size $d = 0.632$). All four groups were matched on reading before the start of the trials, with median reading ages of 9 – 9.25 years in Year 7.

The 23 students in the Coordinated Movements group achieved a median of a complete GCSE grade higher than the students from the other three originally matched groups (N = 24, 23 & 20). More than 50% of the CM group achieved the benchmark of 5 or more A* to C grades including English and Maths in Year 11 exams compared to fewer than 25% in the other three initially matched groups.

The Coordinated Movements group were as successful in their Year 11 exams as 109 initially good readers who started with median reading age of 12.25 years (more than three years ahead of the CM group), in terms of total Year 11 points, number of students achieving 5+ A* - C grades including English and Maths, and median group grades.

The follow-up:

This paper describes a long-term follow-up to the trial described in Paper 6, where three intervention groups of 24 or 25 students were taken out of lessons for a total of 20 hours, and received one of three interventions for a 12 week period in their Year 8: Mixed Movements, a mix of very slow and rapid body movements; Coordinated Movements, intermediate speed coordinated body and eye movements; the Listening Program, classic version. A fourth group of 25 students remained in lessons with 20 hours more instruction than the other 3 groups.

Six months after the end of the interventions, reading age had increased for all three intervention groups by 12 to 18 months more than the No Intervention group.

Before the study began, the aim had been that the no-intervention group would be trained in the most successful technique. However, due to logistical problems the project did not start as early as initially had been hoped, and the final results were only available in the students' Year 9 when they had already started on final exam options. The school decided not to take any more students out of class, as the disadvantages were considered to outweigh any possible benefits in terms of academic attainment, which were uncertain.

This means that we can compare the final exam results of all four groups, who continued through to Year 11 examinations at age 16 in Year 11 without any further special interventions. These examinations were taken three years after the end of the interventions, and by this time, a number of the original students had left the school, so the group sizes are different from the original 24 or 25 (CM = 23, MM = 23, LP = 20, NI = 24).

Figure 7.1 provides several comparisons. It shows the initial and final reading ages of all four groups (9 to 9.25 years), alongside initial reading ages for the rest of the year group, who had much higher initial reading age of 12.25 years. It shows the total points scores of each of the five groups (the four initial groups and the rest) at the Year 11 examinations taken at age 16. It also shows the percentage of each group who achieved the benchmark result of at least 5 or more A* to C exam grades including English and Maths at age 16.

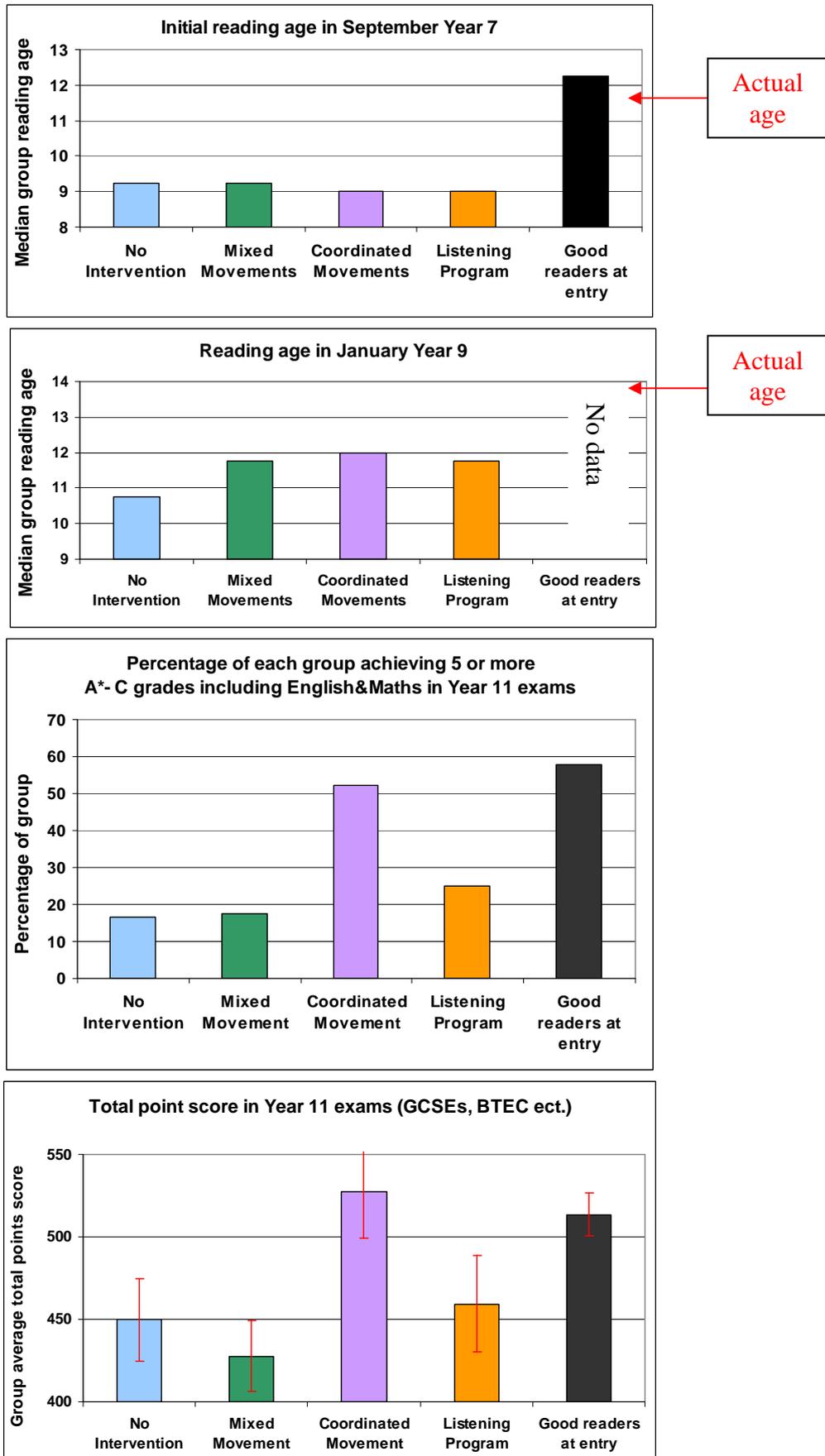


Figure 7.1: Dramatic improvement in academic achievement for the Coordinated Movements group, who started at entry to the school at the same reading age as three other groups, and ended up with much higher achievement in year 11 exams, five years later.

Results:

Only students who were assessed for reading in year 7 were included in this analysis. New students who arrived after this time are NOT included, because this cohort includes some students who would have been included in the intervention trials on the basis of poor reading. Conversely, some students had left the school, so there are now fewer in each group than described in Paper 6.

Remarkably, given that all four initially matched groups started with equivalent reading age (9 – 9.25 years), and were initially more than three years behind in reading compared to the rest of the year group (12.25 years), the Coordinated Movements group achieved median group exam results in Year 11 equivalent to those from the rest of the year group, who started three years ahead in reading in Year 7 (See Figure 7.1).

I have carried out statistical analysis of the data with the standard ANOVA (analysis of variance) and t-tests to assess whether this is a significant result.

Total points scored in Year 11 exams: Comparison by ANOVA of total exam points in Year 11 between the four intervention groups shows that one group did significantly better than the other three ($F = 2.78$, $df = 3$, $p = 0.046$).

Year 11	No Intervention	Mixed Movements	Coordinated Movements	Listening Program	Initially good readers
Average total points score	449.67	427.70	527.22	459.40	513.69
Standard Deviation (SD)	122.78	103.10	135.50	131.48	139.73
Number in group	24	23	23	20	109

Table 7.1: Total points scored in Year 11 examinations, including GCSEs and BTECs, by the four initially matched intervention groups, and the rest of the year group, who were initially good readers.

Table 7.1 shows that the group average total points score for the Coordinated Movements group is the highest out of all five groups. This means that the ANOVA test demonstrated that the Coordinated Movements group scored significantly higher across GCSEs, BTECs etc than the other three intervention groups.

To estimate the effect size, d , we can compare the total points score of the Coordinated Movements group with that of the No Intervention group. This gives an effect size $d = 0.632$, which is a medium effect in the classification scheme of Cohen, and 50% greater than the minimum threshold of $d = 0.4$ recommended by Hattie (2008) for interventions of value to education.

Percentage of student achieving benchmark of 5+ A* - C grades including English and Maths: Figure 7.1 shows that more than 50% of the Coordinated Movements group achieved this benchmark, while less than 25% achieved the benchmark for the other three groups of initially poor readers.

A very similar percentage of students in the Coordinated Movements group achieved this benchmark (52%) compared to 58% of the rest of the year group, who started three years ahead of the Coordinated Movements group in reading in Year 7.

GCSE grades achieved: Figure 7.2 compares GCSE grades achieved by each intervention group and the initially better readers who were not part of the original trial.

Figure 7.2 shows that the Coordinated Movements group achieved a complete grade higher in English, Maths and Science compared to the other three intervention groups (except for the

Listening Program group in Maths, who achieved a half-grade higher than the Mixed Movements and No Intervention).

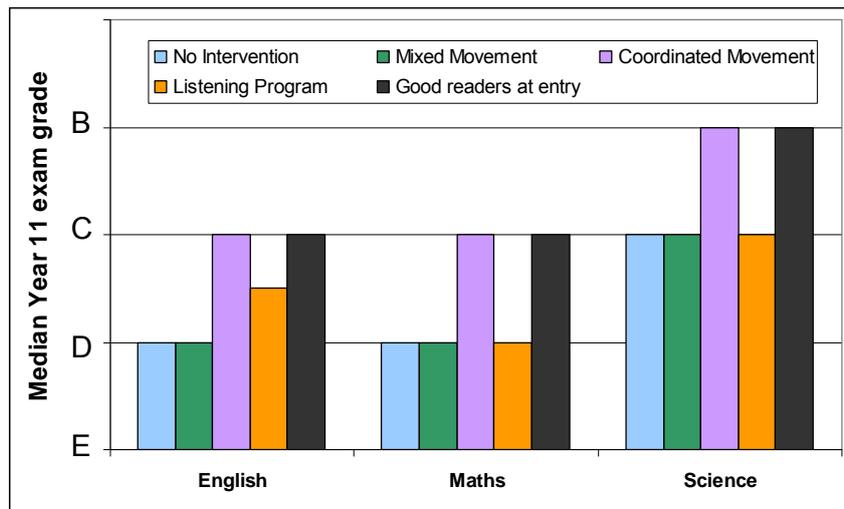


Figure 7.2: Comparing median Year 11 exam grades for the five groups: 1) GCSE English; 2) GCSE Maths; 3) BTEC Applied Science.

The Coordinated Movements group achieved the same median grades in English, Maths and Applied Science as the rest of the year group, who started three years ahead of the Coordinated Movements group in reading in Year 7. This is really remarkable!

Again, this result suggests strongly that the Coordinated Movements intervention is the only one of the three interventions used which has had a significant long-term impact on the academic attainment of these initially poor readers.

Comparing Year 11 grades achieved to those predicted at earlier stages of student’s school careers: I wanted to make sure that the apparent enhancement in achievement of the Coordinated Movements group is really reflected in measurable long-term improvements of performance, and is not an artefact of the CM group actually being higher achievers before the interventions started (as the groups were chosen on the basis of their scores on a word reading test, not on overall academic performance).

Two earlier measures of performance were provided to me, which allowed me to compare them with actual Year 11 performance. Firstly, these were the Fischer Family Trust (FFT) predictions of Year 11 performance which are an independent assessment made by using the results of Year 6 KS2 exams taken at age 11. Secondly, the school ran CAT (Cognitive Abilities Test) tests in Year 9 taken at age 13, after the end of the interventions, and made predictions of Year 11 attainment on the basis of these scores.

Figure 7.3 compares these three measures (predicted at age 11, predicted at age 13 and actual at age 16) for each intervention group and the initially better readers who were not part of the original trial. All four intervention groups were initially predicted to get a median grade of D in English, Maths and Science (except the lower median grade of E in Maths which was predicted for the Listening Program group).

This means that all four intervention groups were equally matched on academic performance as well as reading at the start of the trial.

The Coordinated Movements group were initially predicted (at age 11) to get a median of D grade in all three subjects, while the initially good readers were predicted to get a median of a grade higher (grade C), so the Coordinated Movements group were initially lower achievers than the better readers in Year 7.

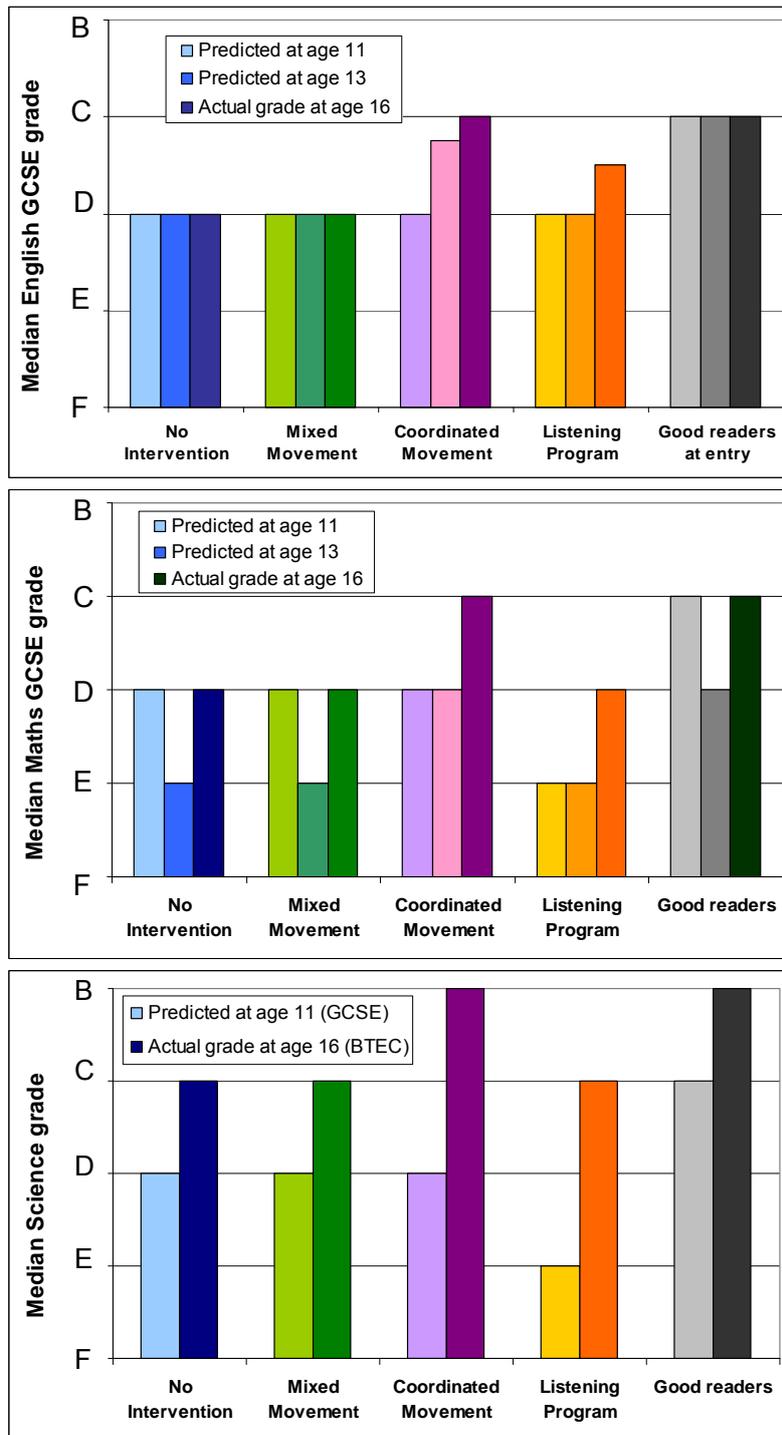


Figure 7.3: Comparing predictions against actual Median group GCSE grades: 1) predicted by the Fischer Family Trust (FFT) on the basis of student’s performance in KS 2 exams at the end of Primary school, shown in lightest shade; 2) median group GCSE grades predicted on the basis of Year 9 CAT exams taken AFTER the end of the intervention period, shown in mid range shade; 3) actual median group grades actually achieved in Year 11 exams, shown in darkest shade.

English and Maths GCSE: It is clear that the Coordinated Movements group achieved a complete grade enhancement in performance at GCSE for Maths and English, compared to what was predicted at age 11. In contrast, there were no grade enhancements for the No Intervention and Mixed Movements groups in English and Maths. All these three groups were initially predicted to get a median grade of D. Shortly after the end of the interventions, when

the Year 9 CAT tests were done, the enhancement in English performance for the Coordinated Movements group was already apparent.

The median grade of C achieved by the Coordinated Movements group in Year 11 was the same as that achieved by the initially better readers and higher academic achievers. The initially good readers' group showed no enhancement in English or Maths.

The Listening Program group showed a half grade enhancement in English and a whole grade enhancement in Maths (they were initially predicted to get a complete grade lower in this subject than were the other three intervention groups).

An interesting effect is visible in Figure 7.3 for Maths performance. Three groups (No Intervention, Mixed Movements, initially good readers) show a fall-back in mathematical performance in Year 9 compared to Year 6. This has been noted before by other commentators, and appears to reflect the significant change in cognitive skills required to cope with Secondary School level maths compared to Primary school maths. This step-change is very challenging to many students, and their performance drops as a result.

An important observation is that this fall-back in maths is completely overcome by the Coordinated Movements programme and by the Listening program, too.

Applied Science BTEC: It is more complicated to compare predicted to actual results in Science, because the age 11 predictions were made on the assumption that the pupils would take GCSE exams, although they actually took BTEC Applied Science. All students who took this BTEC exam gained a minimum grade of C, because of the large coursework element.

Despite this complication, Figure 7.3 shows that the Coordinated Movements group achieved the same median group grade (B) as did the initially better readers, and a complete grade higher than the other three intervention groups.

Conclusions:

There is conclusive evidence that the Coordinated Movements programme had a long-lasting and significant impact on academic performance for students who followed the 12 week programme in their Year 8. They achieved higher GCSE grades than matched groups of students who followed another movement programme, providing movement placebo control.

There also is some evidence that the auditory stimulation of the Listening Program (classic version, used with cheap headphones and basic CD players) also had a long-term impact on increasing academic attainment, although this is not statistically significant.

The current Move4words programme has combined and refined elements of the earlier Coordinated Movements programme, together with an element of auditory stimulation through rhythmic melodic music in order to maximise the effectiveness of the new Move4words programme.