

A Pilot study to investigate the efficacy of using the Test of Auditory and Visual Skills (TAVS) for pre and post testing measures

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February 16, 2015

Abstract

6 students age 12 and 13 were identified from a Secondary School in the North of England due to difficulties with reading, listening and learning challenges. All the students undertook a screening to ensure their hearing levels were within normal ranges. They then were tested using SCAN A, a measure of auditory processing disorder in adolescents and adults and also a TAVS auditory quick screening. Following a 10 week cycle of The Listening Program post testing was undertaken. Improvements shown in SCAN A were mirrored by improvements in the TAVS auditory quick screening. This illustrates the validity of using TAVS as a measure of auditory processing difficulties.

Introduction

A number of studies have already shown that auditory processing assessment measures such as SCAN A, (Keith, 1994) illustrate the gains that can be made from The Listening Program®. These benefits are regularly seen in areas such as auditory figure-ground, auditory closure (Butler and Clarke, 2003), (Davies, 2002), temporal pattern perception, matching rhythms (Treharne, 2003), and auditory discrimination (Jeyes, 2003).

There is no consensus on agreed testing for auditory processing and many of the widely used tests use speech and words as a method for testing auditory skills. There are also tests of pattern recognition, gap detection, gap in noise, auditory fusion and other areas of fundamental auditory processing skills.

The Test of Auditory and Visual Skills (TAVS) is a new screening tool from Advanced Brain Technologies (Ogden, Utah) to assess a range of fundamental auditory processing skills such as timing, pitch perception and rhythm and others that are needed for developing the skills mentioned above.

There is a need for testing of auditory processing skills to be at a level which assesses the component skills of auditory processing.

The research question was therefore whether TAVS is a screening tool that can be valuable as a pre and post test tool for auditory processing skills.

Study Design

Subjects

All Saints Catholic College is a school for 11-16 year old pupils in Huddersfield, West Yorkshire. It has around 730 pupils and almost 50% do not have English as their first language. In 2013, GCSE results were below the local authority average and 26% of pupils are classed as 'disadvantaged'.

The 6 students, age 12 and 13, were chosen by the College as they had a variety of learning challenges around phonological awareness, reading, listening, language delay, memory and attention.

Assessment and method

All pupils undertook a screening audiogram to ensure hearing was within normal levels. SCAN A was then administered and the auditory quick screening test from TAVS. This comprises a pre-test to ensure compliance followed by tests of auditory temporal order, auditory fusion, auditory motor skills, pitch discrimination and duration pattern.

Following testing, a 10 week base schedule of The Listening Program Level One nature was completed and then retesting took place.

The 6 students were retested immediately after the 10 week cycle and then again 6 months after completion of listening.

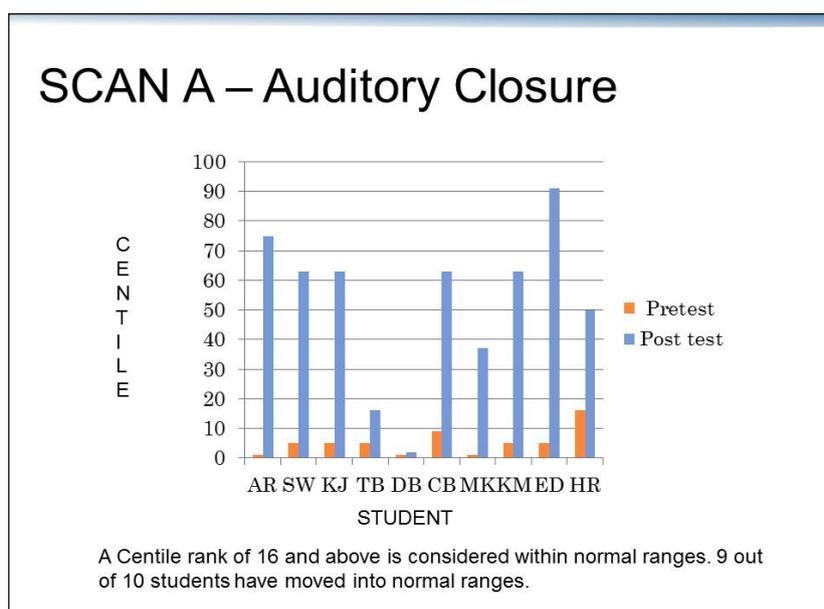
Results

SCAN

The SCAN results for the 6 students can be seen below. One student, DB was unavailable for retesting at the 6 month post test.

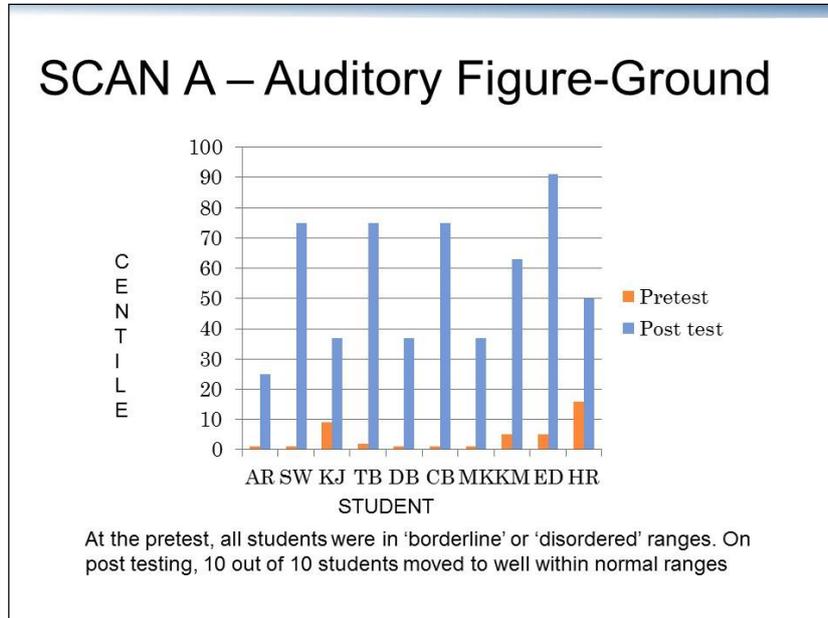
Auditory Closure

It can be seen that all the 5 pupils have improved auditory closure scores. In fact all pupils moved from disordered or borderline ranges to normal range within the period. As found in previous research, further testing 6 months after the end of listening, shows continuing improvements in auditory closure skills. Immediate gains were also seen after the initial 10 week listening period.



Auditory Figure-Ground

On the initial pretest it can be seen that all pupils were in the disordered ranges for this important skill of listening in background noise. After the initial 10 week cycle of listening, all pupils have improved with 5 out of 6 pupils moving to normal ranges. 4 out of the 5 pupils have continued to show good improvements 6 months after the end of the listening.



Dichotic Listening- Competing Words

We can see in Figure 1. that 3 students have improved their Competing Words score with AR moving into normal ranges. The detail contained in Figure 2. illustrates that the 3 students showing no change have in fact continually improved their raw score but from a very low base they have not yet improved sufficiently to improve centile results. It can also be seen from Figure 2 that students continue to improve many months after the completion of a cycle of listening.

Figure 1. Competing Words Overview

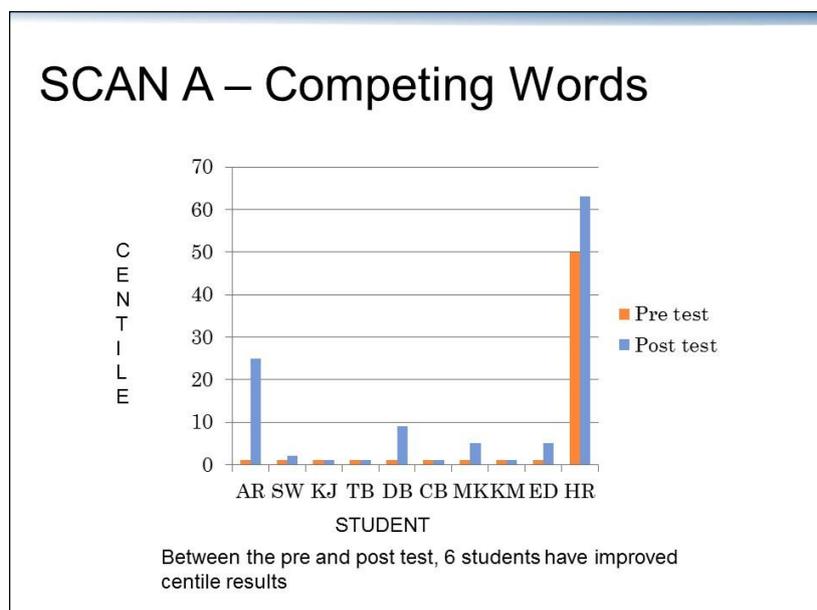
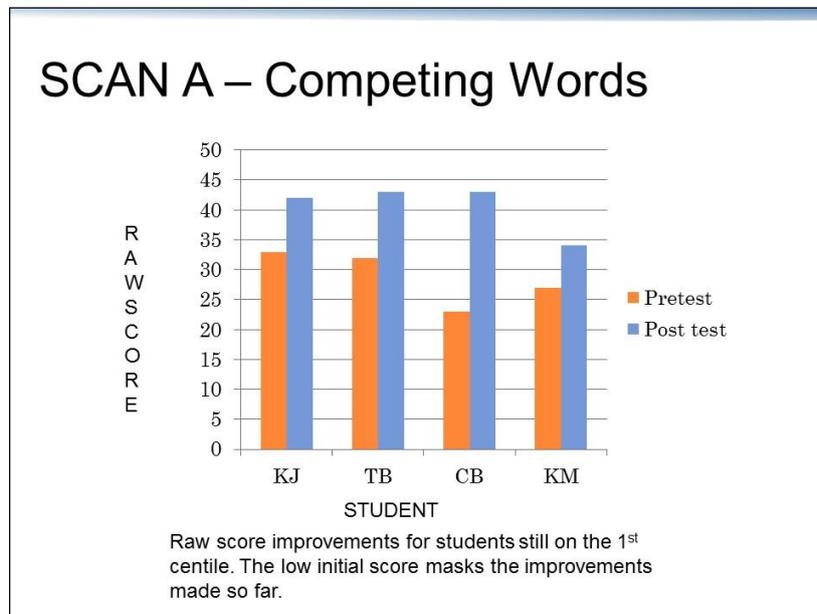
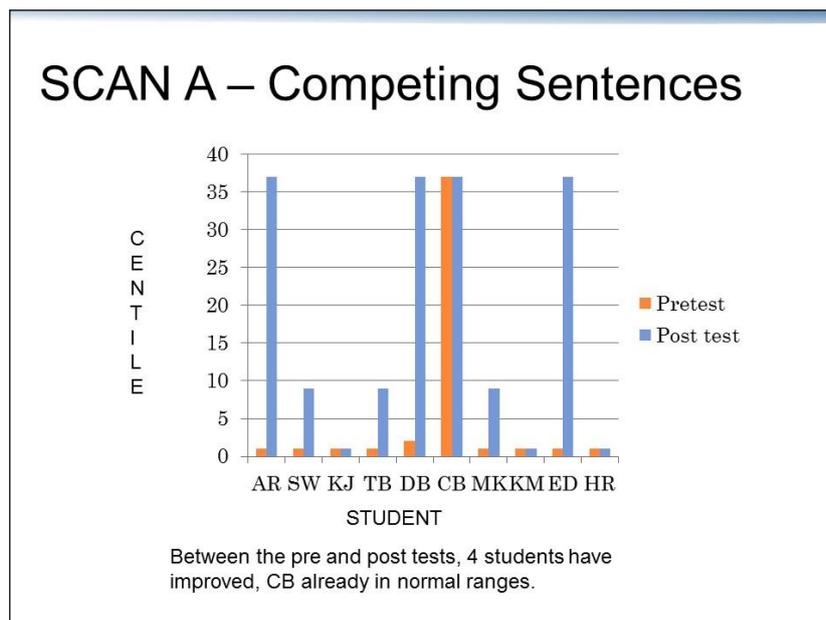


Figure 2. Competing Words Detail



SCAN A also offers a dichotic test requiring sentence recall. Here we can see that 4 students have improved scores with 2 moving from 'disordered' to 'normal' ranges and 2 moving from "disordered' to 'borderline'.



We are able to note these improvements in the student’s auditory processing abilities. As TAVS is assessing deeper individual auditory processing skills that will impact upon SCAN results, for TAVS to be a valid pre and post assessment we should be able to note commensurate improvements in areas of TAVS screenings.

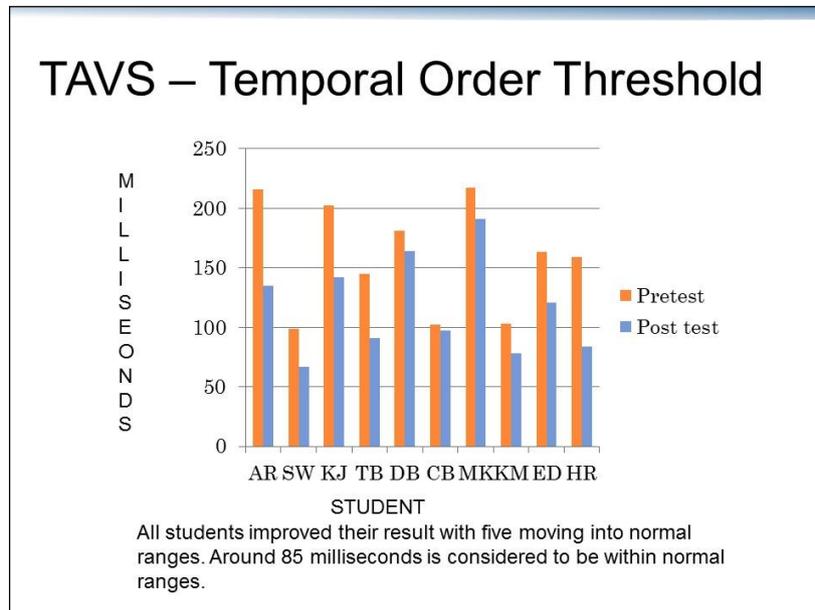
There are 5 areas of a TAVS auditory quick screening. These are auditory temporal order, auditory fusion, auditory motor, pitch perception and duration pattern.

TAVS

Auditory Temporal Order

Auditory temporal order measures the ability to lateralize sound; the lower the score, the stronger the result.

All students have improved their auditory temporal order results with 2 students moving within normal ranges.



Auditory Fusion Threshold

Auditory fusion measures the threshold level at which two distinct sounds are fused perceptually and heard as one sound. This measure of temporal resolution is important for reading and language development. A result of around 8 milliseconds is considered to be within normal ranges.

TAVS – Auditory Fusion Threshold

	Pre test	Post test
AR	n/r	3.98
SW	6.64	-
KJ	2.00	-
TB	7.22	-
DB	8.16	5.67
CB	9.30	8.41
MK	12.87	3.49
KM	3.00	-
ED	3.61	-
HR	4.60	-

The results are shown in milliseconds. A figure of 8msec is considered to be within normal ranges. 6 students within normal ranges were not retested. All other students improved their result moving into normal ranges

A number of students were within normal ranges for this subtest at the initial pretest and so were not retested. One student could not obtain a result on pretesting; on post testing all students have moved to normal ranges.

Auditory Motor

This subtest assesses beat competency and links to literacy and phonological development.

TAVS – Auditory Motor

	Pre test	Post test
AR	540	540
SW	480	280
KJ	500	400
TB	n/r	440
DB	n/r	340
CB	n/r	200
MK	n/r	n/r
KM	320	320
ED	n/r	440
HR	320	260

The results are shown in milliseconds. A figure of up to 353msec is considered to be within normal ranges. 7 students improved their result with five moving into normal ranges.

Three students (TB, DB and CB) could not access the beat on pretesting and so a score was not obtained. SW was within normal ranges at the first post test and not reassessed.

All students were well outside normal ranges at the pretest. By the 6 month post test, 3 were within normal ranges with a further 2 improving their scores.

Pitch Discrimination

The skill of pitch discrimination is also linked to strong reading skills and phonological awareness. 5 out of the 6 students were outside normal ranges at the pretest.

TAVS – Pitch Discrimination

	Pre test	Post test
AR	n/r	n/r
SW	8.5	0.5
KJ	11.5	4.5
TB	8.5	1.5
DB	9.0	not tested
CB	3.0	3.0
MK	n/r	9.5
KM	not tested	0.5
ED	6.0	0.5
HR	0.5	0.5

The results are shown in semitones. A figure of up to 4.5ST is considered to be within normal ranges. 6 students improved their result with 5 moving into normal ranges.

By the 6 month post test 4 out of the 5 who were available for testing were within normal ranges.

Duration Pattern

This requires listening to three tones and assessing which tone is the longest. Children with reading disorders are shown to make many errors in detecting patterns relating to the length of sounds.

	Pre test	Post test
AR	n/r	137
SW	n/r	97
KJ	240	200
TB	87	-
DB	328	266
CB	132	-
MK	n/r	n/r
KM	n/r	83
ED	145	-
HR	87	-

The results are shown in milliseconds. A figure of up to 170msec is considered to be within normal ranges. 4 students were in normal ranges at the pre test. Five students improved at the post test with 3 moving into normal ranges.

At the pretest AR and SW could not complete this test and TB and CB were within normal ranges. At the first post test there were 5 out of the 6 students within normal ranges. Unfortunately, it was not possible to post test CB at the second post test.

Discussion

The results obtained from both the SCAN A test and TAVS show improvements across the areas of auditory processing measured. Areas such as auditory closure and auditory figure-ground will clearly be affected by the more fundamental auditory skills such as temporal order, fusion, duration pattern and beat competency. These correlated improvements suggest that we are assessing different levels of function with SCAN and TAVS.

TAVS is assessing the more fundamental auditory processing elements of areas of temporal processing as well as pitch perception, beat competency and others. These are the basic skills that underpin good sound localization skills, auditory attention and others that will naturally then impact upon auditory closure and auditory figure-ground.

Many individual tests already exist for pitch pattern perception, duration pattern, auditory fusion, gap detection and other areas that TAVS is able to assess. Uniquely, the TAVS machine brings many of these individual tests together to enable a more complete profile of auditory processing skills to be obtained in only around 20 minutes.

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