

# Can the use of background music improve the behaviour and academic performance of children with emotional and behavioural difficulties?

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**Historically, there have been many claims regarding the beneficial effects of music on behaviour and development, but there has been little empirical work to verify them. Our present research studied the effects of providing background music in the classroom on the behaviour and performance in mathematical tasks of ten children attending a school for children with emotional and behavioural difficulties, who exhibited a high frequency of disruptive behaviour. There was a significant improvement in behaviour and mathematics performance for all the children. The effects were particularly marked for those whose problems were related to constant stimulus-seeking and over-activity. Improvements were also observed in improved co-operation and a reduction in aggression during the lessons immediately following the study.**

### Introduction

The effect of music on the moods, emotions and behaviour of both individuals and groups has been noted throughout history. A number of writers have discussed the functions of music (Merriam, 1964; Gaston, 1968), while others have researched both the physiological and psychological effects (reviewed in Radocy & Boyle, 1988). As a result of this research, music has come to be considered as lying on a continuum from highly stimulating and invigorating to soothing or calming (Gaston, 1968). There is certainly strong evidence from a variety of sources that people respond differently to stimulative and sedative music (Radocy & Boyle, 1988). Within the field of education, however, there have been few studies investigating the non-contingent use of music in influencing the behaviour and performance of children.

Hall (1952), exploring the possible uses of music in schools, found that performance on reading comprehension tests was significantly improved when background music was playing; 58% of the 245 8th and 9th graders taking part in the study, showed an increase in scores on the Nelson Silent Reading Tests. There were also 'settling down periods' at the beginning of the morning and afternoon sessions and a mid-afternoon 'fatigue period' when music was of the greatest assistance. Her study also suggested that the major portion of the aid given by background music was an increase in accuracy, and that those students who were 'below average in intelligence and achievement' benefited more from the presence of background music than those 'above average', suggesting that these students were more in need of an aid to concentration.

In a smaller scale study of four hyperactive pupils, Scott (1970) found that the introduction of background music into the classroom had a calming influence. Comparison of performance on an arithmetic task across four conditions: the normal classroom environment; the introduction of background music into the normal classroom; children sitting in three-sided booths; and children sitting in the booths with background music, revealed that the children were most productive when background music was introduced into the normal classroom setting.

Savan (1996) describes how a group of ten children with special educational needs, all of whom exhibited angry, disruptive behaviour in lessons, were played music, usually Mozart, during normal learning activities. The effects on their behaviour were remarkable. While the music was playing the pupils became calm and co-operative. This effect was noted over a five-month period. While the music was being played there were significant changes in body temperature, blood pressure, breathing rate and pulse rate. She suggests that certain frequencies, or combinations of sounds, may stimulate parts of the brain to produce biochemical changes which produce a calming effect on the pupils.

These studies suggest that the use of music in the classroom may be beneficial to pupils' behaviour and performance. Giles (1991) also suggests that most pupils function very well with music in the background and that the right music at the right time can make them less stressed, more relaxed, happier and more productive. She provides a list of music which pupils have identified as preferable for enabling them to relax.

The aims of this study were to assess if the introduction of background music into a class of children with emotional and behavioural difficulties would improve behaviour and performance on their work in mathematics.

### Method

#### *The pupils*

The pupils were a group of children aged between 9 and 10 (eight boys and two girls) attending a day school for children with emotional and behavioural difficulties. Most of them attended for four or five days per week, although one child attended for only three days per week. Observations of the group revealed a high frequency of disruptive behaviour such as tantrums, crying, destructive behaviour, overt verbal and physical aggression and general over-activity. None of the children had any diagnosis of brain injury and all were reported to have IQs within normal limits.

## Materials

The music for the study was selected from that suggested, on the basis of previous research with children, by Giles (1991) as 'mood calming'. To ensure that this music was perceived as 'mood calming' by the children in the school, short extracts (60-90 seconds) from a random selection of pieces already identified by Giles, were played to a group of 26 pupils attending the school. They were asked to assess each piece of music on three dimensions 'happy/sad', 'calming/exciting', and 'like/dislike'. The criterion for inclusion of any individual piece of music in the research was that it should be interpreted as 'calming' by the majority of the respondents.

A standard Sony camcorder was mounted on a tripod in the corner of the classroom to record each research session. A booklet of arithmetic problems within the child's level of achievement was prepared for each child. The music was played on a good quality cassette player.

## Design

The design of the study was counterbalanced with each pupil acting as his/her own control. The first four trials were completed *without* background music, followed by four trials *with* background music. After a gap of one week, the procedure was repeated in reverse order for three trials under each condition. To minimise the effects of external factors, the trials took place at the same time each day, immediately after lunch, and the procedures by which the children entered the classroom and began to undertake their work were rigorously maintained across trials. To counteract the effects of practice and boredom, the arithmetic task was changed for phase two, although the new problems remained within each child's level of competence.

## Procedure

During the study the instructions given to the children were those which would have been given routinely during lessons where quiet desk work was required. Before each session, whether music was to be played or not, the pupils were requested to sit quietly and complete as many maths problems correctly as possible in a given time span. They were asked not to speak to the other children or move around the room. If a teacher's help was required they were asked to raise their hands and wait until they were asked to speak. They were given no information about the study itself; the presence or absence of the music was not alluded to.

The pupils were reminded of the rules at regular intervals. If one of the pupils broke a rule he or she would initially be given a reminder, e.g. 'You are expected to sit quietly' or 'You are expected to remain in your seat'. If the behaviour was so extreme or persistent that it gave the remainder of the group little realistic chance of settling to their tasks, the pupil would be told that he or she would be asked to leave the room if they continued. If the pupil was removed from the room then his or her scores for that session were omitted. These conditions were applied rigorously for all the trials with and without music. One of the researchers was present throughout, to ensure that the behaviour of the teachers was consistent.

For each session two measures were recorded: the number of correctly completed maths problems and the number of times rules were broken (10 second interval sampling). Rule breaking behaviour included:

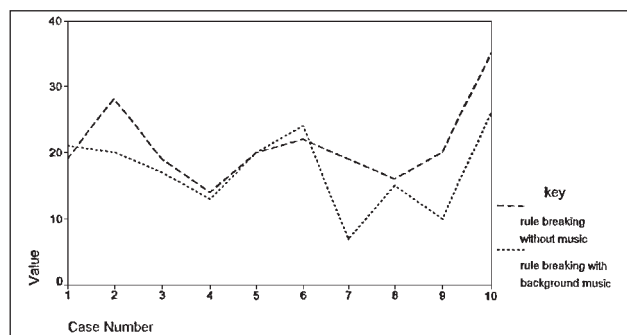
- addressing a teacher without first raising a hand and waiting to be spoken to;
- comments to other children;
- leaving seats without first gaining permission;
- hitting or making threatening gestures;
- making excessive noise non-verbally (e.g. banging an object).

The explicit criteria as outlined above enabled observers to be trained easily and led to very high levels of inter-rater reliability. The video sequences were analysed by three observers, all teachers at the school. They were each allocated pupils to observe for each session, and in every second session a cross observation was conducted by the researchers as a simple running check of observer reliability.

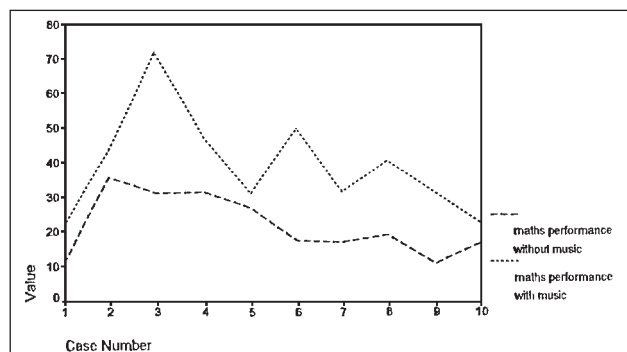
## Results

The main findings for individual pupils are summarised in Figures 1 and 2. The mean score for mathematics performance with background music was 38.5 (SD 15.1) and without background music 21.5 (SD 8.91). A repeated measures t-test revealed that the differences were significant at the .002 level ( $t = -4.7$ ,  $df = 8$ ).

**Figure 1: Rule breaking with and without background music**



**Figure 2: Maths performance with and without background music**



In relation to rule breaking, the mean scores were 17.3 (SD 6.07) for background music and 21.2 (SD 6.09) without background music. This finding was not significantly different ( $t = 1.9$ ,  $df = 8$ ,  $p = .09$ ). Examination of the data revealed that the initial session of the first trial was largely

responsible for the lack of difference; the time when the pupils were adjusting to having background music. With this initial session taken out of the analysis, a paired t-test revealed a significant difference between the two conditions at the .001 level ( $t = 4.89$ ,  $df = 8$ ), with significantly fewer instances of rule breaking when background music was being played.

Correlations carried out between the number of completed maths problems and the number of rule breaking incidents revealed a significant negative association:  $r = -.47$ ,  $p = .036$ . This negative association suggests that the improvement in mathematics performance, in part, was related to the improvement in behaviour, which itself seemed to be related to the influence of the music.

Further analysis, comparing individual sessions in each trial, revealed that in four out of the seven sessions there was a significant positive effect on mathematics performance when background music was used. Even where the differences were non-significant, the effects of the music were always positive. The background music at no time had a detrimental effect on performance. The differences in behaviour were much less marked, although it was only in the very first session using music where there was a negative effect on behaviour over the whole group of children. In three out of seven sessions there was an improvement in behaviour with background music, and in three there was no significant difference. This suggests that, after the initial settling down session, there were no negative effects on either behaviour or performance with background music playing.

### Discussion

The findings suggested that the performance and behaviour of emotionally disturbed children within the special school classroom may be enhanced by the introduction of background music, although further research will need to be undertaken over a longer period to eliminate the possibility of the effects being due to novelty or other antecedent factors.

Nevertheless, all the pupils performed better on the maths task when background music was present, although the extent of the effects varied between pupils. The pupils who benefited most were those whose difficulties were associated with constant stimulus seeking and over-activity, closely resembling the 'hyperactive' syndrome (pupils 3, 6, 8 and 9). These pupils were disruptive but not perceived to be suffering from any deep emotional trauma. The background music may have served as sufficient stimulus to satisfy their stimulus hunger whilst not interfering with their ability to concentrate on the task. While the music did not appear to change their 'rule breaking behaviour', they were more often talking *while* working rather than talking *instead* of working. Perhaps stimulus *replacement* rather than stimulus *reduction* is effective in helping children with such difficulties.

The pupils for whom the background music had least effect (1, 2, 5 and 10) were all reported by the school staff

to have deep-seated emotional problems stemming from an acknowledged history of abuse, both physical and emotional, separation and loss. The behaviour of these children was described as 'driven by internal emotional states; being unpredictable and difficult to manage'. These children did show improved performance with the background music, although the effects were less marked. Perhaps the changes in their performance occurred as a result of the reduction in distractions from the other pupils who were concentrating more intensely.

The findings in relation to 'rule breaking' are less clear. This may be due to limitations in the assessment of rule breaking. To facilitate ease of identification and recording, and high inter-rater reliability, the scoring system was simple and qualitative variation in rule breaking was not recorded. For instance, if children were observed talking, it was counted as rule breaking even if the nature of the interaction varied from mutual praises to belligerent abuse. A more sophisticated analysis might have taken this into account. In this case, the constraints of the recording equipment and the difficulties of providing appropriate training for observers made it impossible. However, the observers did note a decrease in hostility when the background music was present, with children tending to show off the number of problems they had completed and attempting to help others rather than denigrating performance and swapping insults. The observers, also teachers, commented on the greater degree of co-operation observed, following sessions with background music present, with children offering to collect pencils or rearrange chairs. While this has not been substantiated empirically in this study, Fried and Berkowitz (1979) found that university students who had listened to calming music were significantly more helpful afterwards than those who had no music or who listened to aversive or stimulating music. The music which appeared to be most beneficial in enhancing performance and improving behaviour was instrumental as opposed to vocal. Further research is required to establish the particular characteristics of music which has positive effects.

### Conclusion

The study indicates that:

- the introduction of background music of a 'calming' nature into the classroom significantly improved the performance of a group of emotionally and behaviourally disturbed children on a maths task, and led to a significant decrease in rule breaking behaviour over the period of the study;
- the introduction of 'calming' music had the greatest effect on those children whose behaviour could be described as hyperactive;
- further research is required to establish whether these effects can be sustained over time if music is played on a regular basis, whether they occurred because of the novelty of the experience, or other unidentified antecedent factors.

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