THE EFFECTS OF MUSICAL STIMULI ON THE
GROSS MOTOR ACTIVITY OF PROFOUND
MENTAL RETARDATES

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GROSS MOTOR ACTIVITY OF PROFOUND 
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CHAPTER I

INTRODUCTION

The fact that music exerts a vast influence on human responses is rooted in antiquity. History tells us that the ancient Egyptians of over four thousand years ago were the first people to become acquainted with the use of music for healing the body and mind. From that time forward, innumerable early philosophers and men of medicine espoused upon the healing values of music. Unfortunately, much of what these early wise men prophesied in regard to the healing potential of music was shrugged off as exaggerated claims and superstitious interpretations too closely allied with bizarre magical powers and fanatical religious worship rites.

Today, however, modern science with its increasing scientific sophistication is confirming what these early philosophers and men of medicine had prophesied. Numerous studies have now empirically demonstrated that music indeed does exert a vast influence on human responses. More importantly, these studies have shown music to possess seemingly unlimited potential in regard to its healing powers.
Consequently, music has taken its place among the leaders of therapeutic agents which are proving to be very successful in the treatment of physical and mental ills of all varieties.

Keeping abreast of these findings demonstrating the therapeutic potential of music, the many institutions which care for the mentally retarded have been increasingly adopting the use of music in their rehabilitation programs. As a result, numerous instances can be cited from these institutions reflecting how the application of music has proven itself to yield therapeutic benefits. However, there still remains one level of mental retardation where such instances cannot be cited. That level is composed of those individuals categorized as "profound mental retardates".

Related Literature

While the healing values of music have been suspected for over four thousand years, it has only been within this present century that serious, scientific research has attempted to seek out the specific effects and influences of music on man and to factually determine therapeutic usages of music. For example, as early as the third decade of this century, Diserens (7) found that music appeared to exercise an influence on the muscular activity of man by increasing or decreasing it according to the nature of the melodic stimuli. A few years later, after extensive use of musical stimuli in institutional settings, Van de Wall (18) found that music
appeared to reach almost every patient who was subjected to it, even the lowest range of mental defectives, who generally responded with vigorous movements of body and limb.

About the time that Van de Wall published the results of his numerous findings in his book entitled *Music in Institutions*, in 1936, psychiatrist Ira M. Altshuler (2) applied music clinically in an experimental setting for the first time. As a result of this first application of music, it was found that music appeared to be very beneficial in decreasing the output of disturbed and inaccessible mental patients.

Since Altshuler's first clinical application of music, the tempo of research seeking out possible therapeutic benefits arising out of the application of music has been especially vigorous as the following references will reveal. For example, Julia Eby (8), a music therapist, found that many patients she had worked with tended to reveal increases and decreases in muscular tonicity after the introduction of music. She also found that many of these same patients revealed an increase rate of motor activity with improved motor coordination, greater physical endurance, and improvement in consciously controlled body movements. A few years later, Gaston (10) concluded that rhythm was the primitive, dynamic factor in music and appeared to stimulate muscular action and induce bodily movement. Gaston felt that this finding had many implications in the type of music to be
used with many apathetic and hypoactive patients. Along these same lines, Shelly and Haslerud (15) studied the effects of livelier music on the general activity of apathetic schizophrenics. As a result, they concluded that both individually and as a group these patients showed significant increases in activity when such music was played to them. In a related study, Brown (6), while director of music therapy at the New Jersey State Hospital, observed that rhythmical music induced desirable motor responses in severe mental patients. Along these same lines, Luckey et al. (11) found that rhythm band instruments provided an effective means of stimulating gross motor responses in severely retarded adults and Arrington (4) found mental defectives to be more easily handled when rhythmic music was played to them.

While the above studies have focused their attention on the aspects of rhythm and livelier music in relation to the resulting effects on human responses, a number of other studies have investigated the resulting effects from the application of varying types of music. For example, Alexander (1), studying the effects of stimulative, sedative, and the absence of music on normal subjects' performance on a psychomotor task, concluded that psychomotor performance could be manipulated by varying types of music. Related to this finding, Zimmy and Weidenfeller (19), after measuring changes in the galvanic skin response of children listening to various
types of music, concluded that music was a useful agent in the manipulation of emotional excitability in young children. Along these same lines, Reiber (14), after studying the effects of no music, fast music, and slow music on the activity of young children, found that the condition of fast music produced the more marked effect. In another study in reference to varying types of music, Slaughter (16) investigated the effects of both stimulative and sedative music on the pupillary dilation of both mental patients and normals. As a result, he reported that stimulative music dilated the pupil and sedative music caused constriction in both groups.

Whereas the studies mentioned to this point have been concerned primarily with discovering therapeutic benefits arising from varying tempos of music, there have been a number of other investigations which have observed therapeutic benefits resulting from just the application of music in general. For example, Bradley (5), after working with low IQ subjects, found that many children of lower intelligence and disturbed personalities who could not be previously approached in any other manner were susceptible to the influence of musical stimuli. In another study, Ludwig (12), while working with moderate to high grade hyperactive mental retardates, concluded that music, in general, enabled the retarded to function both intellectually and socially at a level much closer to his potential. In a related observation,
Alvin (3), who has worked extensively with handicapped children, has concluded that music may help the mental, perceptual, or emotional growth of even the most handicapped child. In yet another finding, Timberlin and Trousdale (17), after studying the specific effects of music on behavior and performance of mental retardates, concluded that music could be used as a beneficial agent in teaching self-help skills. Finally, in another related study, Furrer (9), after grouping severely retarded children according to whether they needed stimulation or calming down, reported that music therapy appeared to be an effective adjunct in modifying the behavior of the mentally retarded.

As can be readily seen from the references just made to the numerous studies concerned with investigating the various effects of musical stimuli, many common themes and generalizations arise. Of particular significance, for example, is that the possible therapeutic benefits that can be derived through the usage of music are widespread and do not appear limited to any one group or segment of subjects studied. Pertinent to this observation, Dr. Martin F. Palmer, Director, Institute of Logopedics, Wichita, Kansas, states:

The areas of the brain subserving musical reception and performance are practically invulnerable except in trauma from automobile accidents, etc., against which nature has not provided adequate safeguards. In addition, neuroanatomicophysical arrangements (which is beyond the scope of this paper to describe) preserve musical integration in cases of maldevelopment, anomalies and lesions of the brain (13, p. 49).
Another pertinent observation in regard to the generalizing of therapeutic benefits from music is one by Ira M. Altshuler, who states:

Music, even more than the spoken word, lends itself as a therapy because it meets little or no intellectual resistance and does not need to appeal to logic to initiate action. It is more subtle and more primitive and therefore its appeal is wider and greater (2, p. 267).

These two excerpts would appear to lend support and explanation for probably the most significant observation that can be deduced from this review of the literature. That is, as previously brought out, the possible therapeutic benefits that can be derived through the utilization of musical stimuli are widespread and do not appear limited to any one group or segment of subjects that have been studied.

On the basis of this review of the literature, it would appear that the following conclusions can be drawn:

1. Music has proven itself to be a very successful therapeutic agent with all types of disorders.

2. Musical stimuli have reached many who had previously appeared unresponsive to most forms of stimulation.

3. Rhythmical, stimulating music appears to enhance physiological activity whereas soothing, sedative music appears to suppress it with the more marked effect resulting from stimulating music.

4. Music has been demonstrated to be beneficial in eliciting motor responses, facilitating self-control and
learning of self-help skills, and in general, enhancing
the over-all behavior of mental retardates.

5. Although therapeutic benefits resulting from the
application of music have been demonstrated with most levels
of mental retardation, very little is known in regard to the
profound level.

Statement of the Problem

In reference to mental retardates, the introduction of
musical stimuli has been demonstrated to stimulate the inactive,
calm the hyperactive, facilitate self-control and self-help
training, and in general, be an effective adjunct in modifying undesirable behavior. As a result, many mentally retarded
children, after the introduction of music, have appeared to
function at a level closer to their true potential. Unfortunately, however, there has been one group of mental retardates
on whom there is very little known in regard to the effects
of musical stimuli on their behavior. This group, categorized as functioning at the profound level of mental retardation,
has been apparently felt to be inaccessible to any benefits
that might arise through the introduction of music. However,
as numerous studies have already demonstrated, the possible
therapeutic benefits that might be derived through the
utilization of musical stimuli do not appear limited to
any one group or segment of subjects studied to date. Therefore, it was the purpose of this present study to investigate
the effects of two types of music, tonic and sedative, on
the gross motor activity of profound mental retardates. It
is hoped that many profound mental retardates who are now
inactive to the point of progressive muscular deterioration
and others so hyperactive to the point of almost complete
dependence on heavy dosages of sedative drugs, might have
their behavior desirably modified with the introduction of
musical stimuli. Furthermore, in view of the fact that
the particular group of profounds who will serve as subjects in
this study are currently in the beginning stages of a
newly initiated self-help training program, the possibilities
for benefits deriving from the findings of this study are
even more pertinent and filled with potential.

Hypotheses

Using the foregoing related literature as a basis, the
following hypotheses were postulated:

1. The gross motor activity of profoundly mentally
retarded subjects under the condition of tonic music will be
significantly higher than under the conditions of either
sedative or no music.

2. The gross motor activity of profoundly mentally
retarded subjects under the condition of sedative music will be
significantly lower than under the conditions of either
tonic or no music.
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CHAPTER II

METHOD

Subjects

The subjects for this study consisted of twenty-four male and eight female residents of a Texas state school for the mentally retarded. All subjects were officially classified as "profoundly retarded" on the basis of existing psychometric scores on file. These scores indicated that each subject participating in this study had an intelligence quotient estimated to be twenty or below. The chronological age of the subjects ranged from seven to sixteen years, with a mean of eleven and one-half years. The social quotients as measured by the Vineland Social Maturity Scale ranged from two to nineteen, with a mean of nine. For the most part, the subjects were nonambulatory or semiambulatory, with only six of the subjects being fully ambulatory.

Each subject who participated in this study was previously observed in his everyday institutional surroundings, and his medical, social and psychological files were reviewed so as to assure that he possessed adequate physical and sensory capacities for making motor responses to musical stimuli.
In other words, none of the subjects who participated in this study previously appeared to have such an extreme physical or sensory impairment that his capacity to make motor responses to musical stimuli might have been prevented or greatly hindered.

Description of Measuring Instrument

On the basis of a review of the literature, there has been no one standard measuring instrument developed to date which has been employed to measure gross motor activity. Some of the various techniques that have been used for measuring motor activity are reviewed by Ellis (3). Therefore, in order to measure motor responses to music, a gross motor activity rating scale was constructed by the experimenter based on similar scales developed by Newman (4) and Addison (1). The scale provided for three categories of physical movement, with forty scoring spaces following each category, for recording individual movements of subjects at fifteen-second intervals for a ten-minute observation period. The categories of physical movement which were observed and rated were (1) arm movement, (2) trunk movement, and (3) leg movement. Included within each category of physical movement were the appendages. For example, within the category of arm movement was included hand movement, within trunk movement was included head movement, and within leg movement was included foot movement. In order to take into account the vigor and intensity of movement, numerical values ranging
from zero (none) to three (gross) were incorporated into the scale. Then, in order to give meaning to these values, separate operational definitions were attached to each value. These numerical values and their corresponding operational definitions were as follows:

0 — NONE

No perceptible bodily movement of arm, trunk, or leg; stationary, showing no overt activity.

1 — SLIGHT

Any bodily movement of arm, trunk, or leg (horizontal, vertical, diagonal, or circular) which is just barely perceptible; movement is of a very slow and lethargic nature, showing no vigor, consistency, or steady rate.

2 — MODERATE

Any bodily movement of arm, trunk, or leg (horizontal, vertical, diagonal, or circular) which is easily perceptible but of a conservative rather than animated nature; movement may cover a large area in distance but is not excessively vigorous or rapid.

3 — GROSS

Any bodily movement of arm, trunk, or leg (horizontal, vertical, diagonal, or circular) which is of a very overt and animated nature, being both vigorous and rapid.

As can be seen from the above numerical values and their corresponding operational definitions, the emphasis, in reference to degree of movement, was on vigor and intensity of movement rather than on the amount of distance covered by the movement. It was felt that this type of emphasis was a more valid indicator of therapeutic potential than just the number of movements.

In order to establish the soundness and accuracy of this measurement scale, there was another rater assisting
the experimenter at all times throughout the duration of the study.

An example of the rating sheets upon which the experimental data were collected employing this measurement scale can be seen in Appendix A.

Task and Procedure

The task of this study consisted of introducing each subject individually to separate ten-minute periods of no music, sedative music, and tonic music, during which time the motor activity of the arm, trunk, and leg (including the corresponding appendages) of each subject was observed and rated in accordance with the measurement scale just described. Therefore, the independent variable consisted of the three experimental treatment conditions of no music, sedative music, and tonic music, and the dependent variable consisted of the magnitude of the vigor and intensity of the motor activity of the arm, trunk, and leg of each subject in response to the three treatment conditions.

To carry out this task, each subject attended a ten-minute treatment session, once daily and alternately in the morning and afternoon for six consecutive days, on an individual basis. Thereby, each subject was observed and rated for a period of ten minutes at a time in the AM and PM under each of the three treatment conditions. As a result, both an AM and a PM rating were obtained for each subject under each treatment condition.
The ten-minute treatment sessions were conducted in a small training room, cleared of all furniture, which was located at the rear of the larger room in which the subjects resided. Each subject was brought into the room individually and placed in the middle of the room. He then was allowed complete freedom of movement about the room. In order to prevent the subjects from interacting with the experimenter and the assisting rater, the latter assumed a position behind a six-gauge, Milium vinyl window shade which had been placed in the doorway of an adjoining room. To even further prevent any possible interaction with the experimenter and assisting rater on the part of the subjects, a 3' x 3' piece of plywood, one inch in thickness, was placed in front of the vinyl window shade. This prevented the possibility of any of the more active subjects' crawling or walking through or pulling down the light-weight shade and discovering the presence of the experimenter and assisting rater. In order for the experimenter and the assisting rater to observe and rate the motor activity of the subjects without being seen themselves, a small, oval-shaped section of the vinyl shade was removed and filled in with dark green cellophane, which, against the darkened background of the adjoining room, provided the experimenter and assisting rater with the equivalent of a one-way mirror.

Also located behind the vinyl shade was the portable Norelco tape recorder, model EL 3586, from which the music
was produced. The volume level was held constant at volume level three throughout the study. The music played was chosen from the lists of "musical tonics" and "musical sedatives", as compiled by Arrington (2, p. 236). As established on the basis of extensive medical and therapeutic usage by Arrington, the musical tonics were the faster, more stimulating selections and the musical sedatives were the slower, more relaxing selections. From Arrington's lists, the following musical tonics were selected: Bizet--"Toreador Song"; Sousa--"The Stars and Stripes Forever"; and Offenbach--"Gaîté Parisienne". The following musical sedatives were selected: Debussy--"Clair de Lune"; Schubert--"Ave Maria"; and Mascagni--"Intermezzo".

Each of these two types of music was taped and timed at ten minutes in duration. Each of the three individual selections which were included within each type of music was taped and timed at three minutes and twenty seconds in duration. As a result, each individual selection was played for an equal length of time. The period of no music was also timed at ten minutes in duration.

Before any of the subjects were observed and rated, the assisting rater was given an explanation of the measurement scale by the experimenter. Just prior to the observation and rating of the first subject in the study, the assisting rater was given the following set of instructions:
The observation of the subject by the experimenter and assisting rater must be made at precisely the same time. Therefore, a standard stop watch will be used. When the experimenter says the word "now", this is your signal to look up and observe the motor activity of the subject. When the experimenter says the word "down", this is your signal to look down and write your ratings of arm, trunk, and leg movement on the rating sheet before you. Since only a quick glance will be made of the subject, stay alert and ready to immediately respond to the words "now" and "down". This same procedure will be carried out until ten minutes have passed. Again, remember to keep your eyes off the subject until you hear the word "now".

The above mentioned quick glance was of approximately one second in duration, just long enough to observe the arms, trunk, and legs of the subject.

In order to prevent fatigue and consequently possible inaccurate ratings on part of the experimenter and assisting rater, the thirty-two subjects in this study were assigned to one of four blocks of eight subjects each by the method of random numbers for the purpose of administering the treatment conditions. For the first six days of the study, two blocks of eight subjects each were used. The first block of subjects were seen individually for a ten-minute period of no music in the AM of the first day and in the PM of the second day. On the third day, each subject was given a ten-minute period of tonic music in the AM followed by a ten-minute period of sedative music in the PM of the next day, followed by an AM period of sedative music on the fifth day and a PM session of tonic music on the sixth day. The second block of eight subjects followed the same pattern as
the above mentioned first block except that the ten-minute observation periods and type of music played was just reversed. That is, when the first block was seen in the AM, the second block was seen in the PM, and when the first block received tonic music, the second block received sedative music and vice-versa. Both blocks started off with two days of no music. The same procedure was carried out for the third and fourth blocks of subjects during the following six days. A diagram illustrating this scheduling of treatment conditions can be seen in Appendix B.

Statistical Treatment of Data

The resulting data from this study were statistically treated in two ways. First, the amount of agreement between the ratings of the experimenter and assisting rater were examined to determine the soundness and accuracy of the measurement scale which was employed. This was done by averaging the AM and PM ratings of each subject under each of the three treatment conditions and then finding the absolute and relative differences of all ratings of all subjects between the experimenter and assisting rater. Absolute differences were determined by comparing the ratings of each subject by the experimenter and assisting rater without regard to direction of differences. Relative differences were determined in the same manner as above except that direction of differences was taken into account.
Secondly, the data were statistically treated by averaging AM and PM ratings in the same manner as described above and then further averaging the ratings of both the experimenter and assisting rater and subjecting the resulting average ratings to a single-classification analysis of variance for repeated measures (5) in order to statistically test the hypotheses of the study.
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CHAPTER III

RESULTS

Before statistically testing the hypotheses of this study, the amount of agreement between the ratings of the experimenter and assisting rater was examined. As a result of this examination, it was found that an average difference of 3.87 per pair of ratings existed between the experimenter and assisting rater. This figure was derived on the basis of ninety-six pairs of ratings on which absolute differences between each pair were obtained, totaled, and then averaged. One rating apiece by both experimenter and assisting rater for each of the thirty-two subjects under each of the three treatment conditions yielded the ninety-six pairs of ratings that were compared.

This average difference of 3.87 between each pair of ratings did not take into account the direction of differences in ratings. Therefore, an examination of relative differences was undertaken. As a result, it was found that an average difference of .42 per pair of ratings existed between experimenter and assisting rater. This finding of an average difference of .42 would appear to indicate that neither the experimenter nor assisting rater tended to rate consistently higher or lower than the other. Instead, a balancing-out
effect appeared to result when all ratings were considered together. Consequently, the low magnitude of those average differences in ratings would seem to indicate that the measurement scale used in this study afforded a high amount of agreement between raters. As a result, this measurement scale appeared to be a sound and accurate measure of gross motor activity.

Next, the data obtained from the measurement scale were statistically tested to determine the effects of the musical stimuli on the gross motor activity of the subjects.

The mean magnitudes of the subjects' gross motor activity scores under each of the three treatment conditions are presented in Table I.

### TABLE I

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Means</th>
<th>Standard Deviations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedative Music</td>
<td>104.01</td>
<td>44.94</td>
</tr>
<tr>
<td>No Music</td>
<td>119.65</td>
<td>47.47</td>
</tr>
<tr>
<td>Tonic Music</td>
<td>122.49</td>
<td>49.61</td>
</tr>
</tbody>
</table>
It is revealed in Table I that mean differences in subjects' motor activity among the three treatment conditions did exist. To determine if these differences were significant, a single-classification analysis of variance for repeated measures was applied. This analysis is shown in Table II.

### TABLE II

**SUMMARY OF ANALYSIS OF VARIANCE FOR THE THREE TREATMENT CONDITIONS OF SEDATIVE MUSIC, NO MUSIC, AND TONIC MUSIC**

<table>
<thead>
<tr>
<th>Source of Variability</th>
<th>Sum SQ</th>
<th>df</th>
<th>Mean SQ</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td>160201.300</td>
<td>31</td>
<td>5167.783</td>
<td></td>
</tr>
<tr>
<td>Within Subjects</td>
<td>61630.400</td>
<td>64</td>
<td>962.819</td>
<td></td>
</tr>
<tr>
<td>Music</td>
<td>6340.200</td>
<td>2</td>
<td>3170.100</td>
<td>3.554*</td>
</tr>
<tr>
<td>Residual</td>
<td>55290.200</td>
<td>62</td>
<td>891.777</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>221831.700</td>
<td>95</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at .05.
Because a significant F value for the treatment conditions was found, further analysis was done with a Newman-Keuls test (1) to determine the location of the significance. Table III illustrates the critical values for differences between treatment totals.

**TABLE III**

CRITICAL VALUES FOR DIFFERENCES BETWEEN TREATMENT TOTALS

<table>
<thead>
<tr>
<th>Truncated Range r</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( q^{.95} (r.62) )</td>
<td>2.83</td>
<td>3.40</td>
</tr>
<tr>
<td>( q^{.95} (r.62) \sqrt{\text{nMS error}} )</td>
<td>477.70</td>
<td>573.92</td>
</tr>
</tbody>
</table>

Table IV illustrates the treatment totals.

**TABLE IV**

TOTALS FOR THE TREATMENT CONDITIONS

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedative Music</td>
<td>3,328.00</td>
</tr>
<tr>
<td>No Music</td>
<td>3,828.75</td>
</tr>
<tr>
<td>Tonic Music</td>
<td>3,919.75</td>
</tr>
</tbody>
</table>
Table V shows the differences between totals for the three treatment conditions. Treatment 1 represents the condition of sedative music, Treatment 2 represents the condition of no music, and Treatment 3 represents the condition of tonic music.

<table>
<thead>
<tr>
<th>Treatments in Order of Totals</th>
<th>Treatment 1</th>
<th>Treatment 2</th>
<th>Treatment 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment 1</td>
<td>...</td>
<td>500.75*</td>
<td>591.75*</td>
</tr>
<tr>
<td>Treatment 2</td>
<td>...</td>
<td>...</td>
<td>91.00</td>
</tr>
<tr>
<td>Treatment 3</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

* Significant at .05.

The data in Table V reveal that the condition of sedative music (Treatment 1) was significantly different from the conditions of no music (Treatment 2) and tonic music (Treatment 3) at the .05 level of significance. In retrospect, the data also reveal that the condition of tonic music was significantly different from the condition of sedative music but not significantly different from the condition of no music at the .05 level of significance.
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CHAPTER IV

DISCUSSION

As can be seen from the major results of this study as revealed in Table V, significant differences between totals for the three treatment conditions existed. It is shown that the condition of sedative music was significantly different from both the conditions of no music and tonic music. Consequently, part of the first hypothesis and all of the second hypothesis of this study were confirmed. In reference to the first hypothesis, gross motor activity under tonic music was significantly higher than under sedative music. However, as can also be seen in Table V, gross motor activity under tonic music was not significantly higher than under no music. Rather, as can be seen from the treatment totals in Table IV, gross motor activity under tonic music was only slightly higher than under no music.

Upon re-examination of the results in Table V, it can be seen that the second hypothesis of this study was completely confirmed. That is, gross motor activity under sedative music was significantly lower than under either no music or tonic music.
Since so little has been demonstrated in regard to the effects of musical stimuli on profound retardates, the above findings cannot be said to either directly support or contradict the findings of other studies. However, on the basis of generalizing from several other studies using somewhat different populations of subjects, these findings are in close accord with those of Altshuler (1), Bradley (2), Eby (4), and Diserens (3). For example, Altshuler (1) found music to be very useful in decreasing the output of disturbed and inaccessible mental patients. Bradley (2) found that children of lower intelligence were susceptible to the influence of musical stimuli. Eby (4) found many mental patients to exhibit increases and decreases in muscular tonicity after the introduction of music. Along these same lines, Diserens (3) found music to exercise an influence on muscular activity by increasing or decreasing it according to the nature of the melodic stimuli.

In regard to therapeutic benefits arising from the application of music, the findings of this study appear to indicate that such benefits are applicable with profound retardates. On the basis of the major significant findings of this study, sedative music appears to hold the most therapeutic potential. One instance, for example, might be in the area of self-help training. Under the calming influence of sedative music, many hyperactive profound retardates should become less active and more amenable to the training tasks at hand. Consequently,
numerous profound retardates now felt to be too difficult to
manage might be able to benefit from self-help training
with the complement of sedative music. This application is
in keeping with the findings of Timberlin and Trousdale (6)
and Furrer (5). For example, Timberlin and Trousdale (6),
after studying the effects of music on mental retardates,
found that music could be used as a beneficial agent in teaching self-help skills. Along these same lines, Furrer (5) found
that music appeared to be an effective adjunct in modifying
the behavior of those whom he described as the "feebleminded."
Another instance where sedative music might yield therapeutic
benefits is in the area of dependence on drugs. For example,
the calming influence of sedative music might enable many
hyperactive profound to receive progressively lesser
dosages of tranquilizing drugs. Naturally, in any instance
where there is a lesser dependence on drugs, a healthier
situation ensues.

The above examples are but two areas where the
introduction of sedative music might provide therapeutic
benefits. The findings of this study have demonstrated
their feasibility. It is hoped that studies in the near
future will not only demonstrate favorable outcomes from
their application, but will bring out numerous other areas
of therapeutic possibilities. As a result, it is hoped that
many mental retardation institutions will apply the findings
on a widespread basis.
In reference to therapeutic benefits arising from the application of tonic music, less can be said on the basis of the findings of this study. Although tonic music significantly increased gross motor activity as compared to sedative music, only very slight increases were observed when compared to no music. Quite possibly, not enough of the thirty-two subjects in this study possessed more than a minimal capacity to make adequate motor responses to musical stimuli. This may have been due to the fact that many of the subjects possessed little, if any, ambulatory abilities. Consequently, their relative lack of mobility and versatility in making motor movements may have acted as a restraint to any large increases in motor activity under tonic music. Perhaps a larger selection of fully ambulatory subjects would have allowed for greater increases in motor activity. As a result, significant increases in motor activity under tonic music might have been obtained as was expected.
CHAPTER BIBLIOGRAPHY


Summary and Conclusions

The purpose of this study was to investigate the effects of musical stimuli on the gross motor activity of profound mental retardates. The primary objective was to determine if therapeutic benefits resulting from the application of music could be extended to profound retardates as has already been demonstrated with other levels of retardation.

It was hypothesized that the gross motor activity of profound retardates would be significantly affected by varying types of music. Specifically, it was hypothesized that (1) gross motor activity under the condition of tonic music would be significantly higher than under either sedative or no music and (2) gross motor activity under the condition of sedative music would be significantly lower than under either tonic or no music.

Twenty-four male and eight female profoundly retarded residents of a Texas state school for the mentally retarded were chosen as the subjects for this study. Each subject was presented periods of sedative, tonic, and no music. Gross motor activity of the arms, trunk, and legs were
observed and rated on a scale developed by the experimenter. This scale emphasized the recording of the vigor and intensity of these movements. Mean magnitudes of the subjects' gross motor activity scores under each of the three treatment conditions were then subjected to a single-classification analysis of variance to determine if significant differences existed. Upon discovering significant differences as a result of this analysis, a Neuman-Keuls test was applied in order to determine the location of significance. As a result, it was found that the condition of sedative music was significantly different from either the conditions of no music or tonic music at the .05 level of significance. Consequently, part of the first hypothesis and all of the second hypothesis of this study were confirmed. Therefore, from the results of this study, the following findings were obtained:

1. In reference to the first hypothesis of this study, gross motor activity under tonic music was significantly higher than under sedative music but only slightly higher than under no music. Consequently, only partial support of the first hypothesis was obtained.

2. In reference to the second hypothesis of this study, gross motor activity under sedative music was significantly lower than under either no music or tonic music. Consequently, the second hypothesis was completely supported.
3. On the basis of the above finding, the application of sedative music appears to hold the most therapeutic potential with profound retardates.

4. Using sedative music as a complement to self-help training and more generally as a means of enabling many hyperactive profounds to receive progressively lesser dosages of tranquilizing drugs appear to be two feasible therapeutic possibilities.

5. The absence of significant increases in gross motor activity under tonic music was attributed to the small ratio of subjects having any degree of ambulatory abilities. It was felt that the large majority of subjects having little, if any, ambulatory abilities acted as a restraint to any significant increases in motor activity under tonic music.

Recommendations

Based on the results and conclusions of this study, several recommendations might be made.

1. Further studies are needed to support the findings of this study.

2. Should the findings of future studies support the findings of this study, the feasibility of the two therapeutic applications brought out in this study should be tested.

3. Future studies similar to this one should attempt to select a closer ratio of fully ambulatory subjects to nonambulatory and semiambulatory subjects.
APPENDIX A

RATING SHEET

10 min. -- 15 sec. intervals

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **ARM** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **TRUNK** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **LEG** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **ARM** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **TRUNK** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **LEG** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

**SCALE:**
0 -- None
1 -- Slight
2 -- Moderate
3 -- Gross

TOTAL =
## APPENDIX B

### DIAGRAM ILLUSTRATING SCHEDULING OF TREATMENT CONDITIONS

32 Ss -- 4 Blocks of 8

<table>
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<th>(3)</th>
<th>(4)</th>
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<td>(1) S Ss</td>
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32 Ss -- 12 days

T = Tonic Music
S = Sedative Music
BIBLIOGRAPHY

Books


Van de Wall, W., Music in Institutions, New York, Russell Sage Foundation, 1936.


Articles


Eby, Julia, "The Value of Music in a Psychiatric Institution," Occupational Therapy and Rehabilitation, XXII (February, 1943), 31-35.


Unpublished Materials