Music Helps Autism
Case Study

A study of the musical and non-musical benefits of specific music curricula for children with autism

By
Denie Riggs

Founding Director, Early Childhood Music ~ Give Them the Best Start
Vice President Perfect Praise, Inc.
President of Perfect Praise Publishing LLC

Case Study Director and Facilitator, Author of Music Helps Autism
Founding Director of Music4Me

P.O. Box 18008, Huntsville, AL 35804
256-348-6634
MsDenie@earlychildhoodmusic.net

March 2014
Music Helps Autism
Case Study

A study of the musical and non-musical benefits of specific music curricula for children with autism

Abstract

The Music Helps Autism Case Study was conducted in summer 2013 to scientifically document the musical and non-musical benefits received by children with autism when they participate in specifically planned, musical structures. The study spanned eight weeks with 18 children ranging in age from 4 to 10 years, divided according to age and abilities.

A specific plan of daily at-home activities was prescribed, based on four levels of active musical participation and their researched music benefits. Parents and team members carefully documented home activities and in-studio class participation. Through the use of weekly Assessment Forms, we tested and measured for: Socialization, Behavior, Cognitive Skills, Vocalization and Musicality in the classroom, creating a Standard Score used for analysis purposes.

This study strongly documents that a specifically formulated musical structure with non-traditional curriculum brings great enrichment. The number of language breakthroughs experienced early in this study surprises even the facilitator; some reporting as early as Week 2. During the study, five out of seven nonverbal children experienced breakthroughs in the area of language; sixteen out of eighteen students indicated enrichments in the tested areas during studio lessons.

Since most children with autism perform best in a familiar environment, an at-home assessment score would have benefited this study. Summer vacations and camps hindered some student participation. Had this study been conducted in a controlled environment, like a school, the results would have been even greater.

Key Words

music helps autism, music therapy, piano therapy, autism therapy
Music Helps Autism Case Study

A study of the musical and non-musical benefits of specific music curricula for children with autism

Disclaimer

The families who participated in case study gave written consent to have their documentation shared in this document.

Sources of Financial Support

Students attended tuition free; materials were provided through scholarships, if requested.

This study was supported financially by Perfect Praise, Inc. and Perfect Praise Publishing LLC, Huntsville, AL.

Introduction

Since 1998, Perfect Praise, Inc. has used its non-traditional piano curriculum with children with autism and experienced incredible results. In 2009, a department called Music4Me was established just for children with special needs, age 3 years and up. Denie Riggs’s book Music Helps Autism (March 2013) shares amazing results and gives parents tools to enhance the lives of their children with autism.

The Music Helps Autism Case Study was conducted four months after the book’s publication to further study and scientifically document the musical and non-musical benefits received by children when they participate in a specifically planned musical environment.

Students

Twenty children initially enrolled for this study, ranging in age from 4 years to 10 years. They were divided into two groups according to specific criteria:

1. Group A:
   Booking criteria: verbal children ages 3-5 and any age nonverbal
   Thirteen students were accepted; A-11 withdrew before the study began, A-5 withdrew in the first few weeks. Eleven students completed the study and provide data.

2. Group B:
   Booking criteria: verbal children ages 5 years and up
   Seven students were accepted and provide data.
Date and Location

The study spanned from June 24, 2013, to August 14, 2013, and took place at AB Stephens Music, 2828 Drake Avenue, Huntsville, AL 35805.

Parental Commitment

This study was offered tuition free. Each family committed to complete and document various specific musical HomePlay activities on a daily basis (six days a week); creating an experience of intensive musical exposure for eight weeks.

Studio Lessons

Parents committed to attend one in-studio lesson each week; Group A met for 35 minutes and Group B for 45 minutes.

Virtual Lessons

To ensure great exposure to musical activities, Virtual Lessons were developed for at-home daily engagement, available on PerfectPraise.TV.

Intercessors

Citywide intercessors supported the program in prayer.

Video

Pre-study appointments were videoed, as were most classes.
1. Collecting the Data

1.1 Parent Data

A. Questionnaires: Pre-, Mid- and Post- study questionnaires were completed by each parent.
B. HomePlay: Students were to be immersed in HomePlay musical activities based on the *Music Helps Autism* book, which describes Four Levels of Active Musical Participation. Daily documentation was provided by the parent on seven colorful HomePlay sheets, creating a Case Study Standard Score for each area of participation.
C. Testimonies: Parent comments were invited and proved helpful both to enhance the program and to give updates on their child’s progress throughout the study, noting areas of breakthrough, etc.

1.2 Buddy Data

Perfect Praise provided a “Buddy” who attended lessons with each student and his/her partner. The Buddies consisted of staff, interns, and volunteers who trained for 7.5 hours and were tested prior to the start of the study.

At the conclusion of each lesson, the Buddy assessed the student’s progress on a form developed by an Autism Specialist. Students’ progress in the classroom was assessed on five indicators, including: *Socialization, Behavior; Cognitive Skills, Vocalization,* and *Musicality.*

The Buddy comments provide documentation in areas of breakthrough, and shared important circumstances regarding each child’s responses in the classroom.

1.3 Other Data

Additional documentation exists from conversations, e-mails, and phone calls with the facilitator.

2. Assessing the Raw Data

We carefully documented everything related to this study, so that we could scientifically present accurate data in every area.

2.1 Charting Specific HomePlay

Specific, developmentally appropriate HomePlay activities were assigned, creating a Case Study Standard Score used for analysis purposes:
A. Level 1: Listening Therapy CD—a 65-minute CD of Preferred Classical Music, to be incorporated into their daily routine 6 reps first two weeks, 12 reps each additional week. Groups A and B Case Study Standard Score: 72

B. Level 2: Singing Therapy CD—children’s voiced singing CD, to be incorporated into their daily routine 3 reps, six days each week. Groups A and B Case Study Standard Score: 126

C. Level 3: Active Participation Classes—attendance in one weekly studio lesson, and daily virtual classes via www.perfectpraise.tv.

In Studio Lessons: 8
Virtual Lessons: 42
Groups A and B Case Study Standard Score: 50

D. Level 4: Keyboard Therapy Specifics:

Group A: Keyboard therapy included via virtual lessons (above)

Group A Case Study Standard Score: 42

Group B: In addition to the above 42 virtual lessons, Group B students studied a non-traditional piano curriculum, which added 156 reps of practice at the keyboard/piano.

Group B Keyboard Therapy Case Study Standard Score: 198

Total HomePlay Case Study Standard Scores used for participation analysis:
1. Group A: 290
2. Group B: 446

2.2 Enrichment Analysis

Students’ progress in the classroom was assessed on five indicators with 23 sub-categories of assessment.

Students earned a score for each of the 23 sub-categories according to the following:
0 = Student does not exhibit the behavior
1 = Student needs prompting to exhibit the behavior
2 = Student exhibits the behavior

Case Study Standard Score:

The total possible weekly assessment score of 46 is based on measuring the following:

A. Socialization Total possible score: 8
B. Behavior Total possible score: 12
C. Cognitive Total possible score: 10
D. Vocalization Total possible score: 8
E. Musicality Total possible score: 8
We charted the Percentage of Enrichment for each assessment category, by subtracting each student’s beginning assessment total from their end total, dividing by the total score possible for the specific category, indicating the percentage of improvement.

2.3 Language Development

We use two terms for testing and measuring language: vocalization and language development. For clarity, we want to define the difference as presented in this study.

Vocalization in the classroom offered the following sub-categories for weekly Buddy assessment:

1) Responds to greetings with signs, gestures, or words
2) Tells his/her name
3) Answers “wh-” questions
4) Sings along with songs

Language Development relates to being verbal or nonverbal, using the voice to speak words, building a vocabulary, and using words meaningfully.

We charted vocalization in the enrichment analysis above, and charted language development using applications, Pre-, Mid- and Post- parent questionnaires, phone calls, Buddy comments and parent testimonies.

2.4 Testimonies

Assessing data with testimonies may be less scientific; however, it contains the best type of assessment—parent comments in their own words from questionnaires, comments, e-mails, and phone calls.

3. Participation Percentages

In order to document the enrichments of those who performed a moderate amount of the assigned activities aside from those who did not, we tracked the participation of students in weekly HomePlay.
3.1 Group A: Charting Participation Percentages

Table 1: Charting HomePlay participation for Group A

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>8</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>74</td>
</tr>
<tr>
<td>Level 1 Listening Therapy CD</td>
<td>65</td>
<td>62</td>
<td>12</td>
<td>72</td>
<td>26</td>
<td>68</td>
<td>73</td>
<td>108</td>
<td>73</td>
<td>110</td>
<td>70</td>
<td>739</td>
</tr>
<tr>
<td>Level 2 Singing Therapy CD</td>
<td>240</td>
<td>77</td>
<td>56</td>
<td>139</td>
<td>37</td>
<td>85</td>
<td>30</td>
<td>121</td>
<td>160</td>
<td>137</td>
<td>1102</td>
<td></td>
</tr>
<tr>
<td>Level 3 Virtual Lessons</td>
<td>69</td>
<td>36</td>
<td>7</td>
<td>42</td>
<td>36</td>
<td>26</td>
<td>10</td>
<td>21</td>
<td>31</td>
<td>65</td>
<td>46</td>
<td>389</td>
</tr>
<tr>
<td>Level 4 Keyboard Therapy</td>
<td>62</td>
<td>36</td>
<td>0</td>
<td>44</td>
<td>3</td>
<td>40</td>
<td>10</td>
<td>55</td>
<td>31</td>
<td>68</td>
<td>47</td>
<td>396</td>
</tr>
<tr>
<td>Group A Case Study Standard Score: 290</td>
<td>444</td>
<td>218</td>
<td>81</td>
<td>303</td>
<td>108</td>
<td>225</td>
<td>129</td>
<td>210</td>
<td>264</td>
<td>410</td>
<td>308</td>
<td>2700</td>
</tr>
<tr>
<td>HomePlay Participation</td>
<td>153.1%</td>
<td>75.1%</td>
<td>27.9%</td>
<td>104.4%</td>
<td>37.2%</td>
<td>77.5%</td>
<td>44.4%</td>
<td>72.4%</td>
<td>91.0%</td>
<td>141.3%</td>
<td>106.2%</td>
<td>84.6%</td>
</tr>
</tbody>
</table>

Participation Categories A-1 and A-2:

To document the enrichment comparison between those who moderately completed the HomePlay activities and those who did not, we break down the analysis process into two Group A categories: A-1 and A-2.

**Group A-1:** Eight Group A students participated in more than 66% of the assigned activities.

**Group A-2:** Three Group A students participated in less than 66% of the assigned activities.
3.2 Group B: Charting Participation Percentages

Table 2: Charting HomePlay participation for Group B

<table>
<thead>
<tr>
<th>Case Study Student Number</th>
<th>B-1</th>
<th>B-2</th>
<th>B-3</th>
<th>B-4</th>
<th>B-5</th>
<th>B-6</th>
<th>B-7</th>
<th>Group B Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance</td>
<td>8</td>
<td>8</td>
<td>5</td>
<td>4</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>49</td>
</tr>
<tr>
<td>Level 1 Listening Therapy CD</td>
<td>105</td>
<td>65</td>
<td>25</td>
<td>15</td>
<td>71</td>
<td>38</td>
<td>89</td>
<td>408</td>
</tr>
<tr>
<td>Level 2 Singing Therapy CD</td>
<td>162</td>
<td>137</td>
<td>37</td>
<td>22</td>
<td>117</td>
<td>53</td>
<td>166</td>
<td>694</td>
</tr>
<tr>
<td>Level 3 Virtual Lessons</td>
<td>51</td>
<td>44</td>
<td>18</td>
<td>5</td>
<td>44</td>
<td>36</td>
<td>91</td>
<td>289</td>
</tr>
<tr>
<td>Level 4 Keyboard Therapy via Virtual Lessons</td>
<td>54</td>
<td>39</td>
<td>22</td>
<td>12</td>
<td>47</td>
<td>35</td>
<td>250</td>
<td>459</td>
</tr>
<tr>
<td>Level 4 Keyboard Therapy via Practicing</td>
<td>180</td>
<td>138</td>
<td>0</td>
<td>52</td>
<td>118</td>
<td>129</td>
<td>180</td>
<td>797</td>
</tr>
<tr>
<td>Group B Standard Score: 446</td>
<td>560</td>
<td>431</td>
<td>107</td>
<td>110</td>
<td>405</td>
<td>299</td>
<td>784</td>
<td>2696</td>
</tr>
<tr>
<td>Percentage of HomePlay Participation</td>
<td>125.5%</td>
<td>96.6%</td>
<td>23.9%</td>
<td>24.6%</td>
<td>90.8%</td>
<td>67.0%</td>
<td>175.8%</td>
<td>86.3%</td>
</tr>
</tbody>
</table>
4.1 Category A-1: Rate of Enrichment

Category A-1 indicates the Rate of Enrichment for students in Group A-1 who participated in more than 66% of assigned HomePlay activities.

Table 3: Average enrichment of A students participating more than 66%

<table>
<thead>
<tr>
<th>Case Study Student Number</th>
<th>A-1 Attendance</th>
<th>A-2 Attendance</th>
<th>A-4 Attendance</th>
<th>A-7 Attendance</th>
<th>A-9 Attendance</th>
<th>A-10 Attendance</th>
<th>A-12 Attendance</th>
<th>A-13 Attendance</th>
<th>Average Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance</td>
<td>100%</td>
<td>87.5%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>100%</td>
<td>87.5%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>HomePlay Participation (Table 1)</td>
<td>153.1%</td>
<td>75.1%</td>
<td>104.4%</td>
<td>77.5%</td>
<td>72.4%</td>
<td>91.0%</td>
<td>141.3%</td>
<td>106.2%</td>
<td></td>
</tr>
<tr>
<td>Socialization</td>
<td>0.0%</td>
<td>0.0%</td>
<td>25.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>12.5%</td>
<td>25.0%</td>
<td>37.5%</td>
<td>12.5%</td>
</tr>
<tr>
<td>Behavior</td>
<td>8.3%</td>
<td>0.0%</td>
<td>8.3%</td>
<td>0.0%</td>
<td>8.4%</td>
<td>8.4%</td>
<td>0.0%</td>
<td>16.6%</td>
<td>6.3%</td>
</tr>
<tr>
<td>Cognitive Skills</td>
<td>40.0%</td>
<td>20.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>10.0%</td>
<td>30.0%</td>
<td>30.0%</td>
<td>40.0%</td>
<td>21.3%</td>
</tr>
<tr>
<td>Vocalization</td>
<td>37.5%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>12.5%</td>
<td>12.5%</td>
<td>7.8%</td>
</tr>
<tr>
<td>Musicality</td>
<td>75.0%</td>
<td>12.5%</td>
<td>25.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>25.0%</td>
<td>12.5%</td>
<td>18.8%</td>
</tr>
<tr>
<td>Overall Enrichment</td>
<td>32.4%</td>
<td>6.5%</td>
<td>11.7%</td>
<td>0.0%*</td>
<td>3.7%</td>
<td>10.2%</td>
<td>18.5%</td>
<td>23.8%</td>
<td>13.3%</td>
</tr>
</tbody>
</table>

* See testimonies

Figure 1: Benefits received by Group A students participating more than 66%
4.2 Category B-1: Rate of Enrichment

Category B-1 indicates the Rate of Enrichment for students in Group B-1 who participated in more than 66% of assigned HomePlay activities.

**Table 4:** Average enrichment of B students participating more than 66%

<table>
<thead>
<tr>
<th>Case Study Student Number</th>
<th>B-1</th>
<th>B-2</th>
<th>B-5</th>
<th>B-6</th>
<th>B-7</th>
<th>Average Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance</td>
<td>100%</td>
<td>87.5%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>HomePlay Participation (Table 2)</td>
<td>125.5%</td>
<td>96.6%</td>
<td>90.8%</td>
<td>67.0%</td>
<td>175.8%</td>
<td></td>
</tr>
<tr>
<td>Socialization</td>
<td>25.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>25.0%</td>
<td>0.0%</td>
<td>10.0%</td>
</tr>
<tr>
<td>Behavior</td>
<td>5.0%</td>
<td>25.0%</td>
<td>16.7%</td>
<td>41.7%</td>
<td>0.0%</td>
<td>17.7%</td>
</tr>
<tr>
<td>Cognitive Skills</td>
<td>30.0%</td>
<td>0.0%</td>
<td>40.0%</td>
<td>90.0%</td>
<td>0.0%</td>
<td>32.0%</td>
</tr>
<tr>
<td>Vocalization</td>
<td>50.0%</td>
<td>25.0%</td>
<td>0.0%</td>
<td>25.0%</td>
<td>0.0%</td>
<td>20.0%</td>
</tr>
<tr>
<td>Musicality</td>
<td>37.5%</td>
<td>25.0%</td>
<td>37.5%</td>
<td>37.5%</td>
<td>0.0%</td>
<td>27.5%</td>
</tr>
<tr>
<td>Overall Enrichment</td>
<td>29.5%</td>
<td>15.0%</td>
<td>18.8%</td>
<td>43.8%</td>
<td>0.0%*</td>
<td>21.4%</td>
</tr>
</tbody>
</table>

*See testimonies

**Figure 2:** Benefits received by Group B students participating more than 66%
4.3 Category A-2: Rate of Enrichment

Category A-2 indicates the Rate of Enrichment for Group A students who participated in less than 66% of assigned HomePlay activities.

Table 5: Average enrichment of A students participating less than 66%

<table>
<thead>
<tr>
<th>Case Study Student Number</th>
<th>A-3</th>
<th>A-6</th>
<th>A-8</th>
<th>Average Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance</td>
<td>75%</td>
<td>100%</td>
<td>75%</td>
<td></td>
</tr>
<tr>
<td>HomePlay Participation (Table 1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socialization</td>
<td>27.9%</td>
<td>37.2%</td>
<td>44.4%</td>
<td></td>
</tr>
<tr>
<td>Behavior</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>4.2%</td>
</tr>
<tr>
<td>Cognitive Skills</td>
<td>10.0%</td>
<td>20.0%</td>
<td>10.0%</td>
<td>13.3%</td>
</tr>
<tr>
<td>Vocalization</td>
<td>25.0%</td>
<td>12.5%</td>
<td>12.5%</td>
<td>16.7%</td>
</tr>
<tr>
<td>Musicality</td>
<td>12.5%</td>
<td>12.5%</td>
<td>0.0%</td>
<td>8.3%</td>
</tr>
<tr>
<td>Overall Enrichment</td>
<td>9.5%</td>
<td>11.5%</td>
<td>4.5%</td>
<td>8.5%</td>
</tr>
</tbody>
</table>

Figure 3: Benefits received by Group A students participating less than 66%
4.4 Category B-2: Rate of Enrichment

Category B-2 indicates the Rate of Enrichment for Group B students who participated in less than 66% of assigned activities.

Table 6: Average enrichment of B students participating less than 66%

<table>
<thead>
<tr>
<th>Case Study Student Number</th>
<th>B-3</th>
<th>B-4</th>
<th>Average Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance</td>
<td>62.5%</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>HomePlay Participation (Table 2)</td>
<td>23.9%</td>
<td>24.6%</td>
<td></td>
</tr>
<tr>
<td>Socialization</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Behavior</td>
<td>8.3%</td>
<td>8.3%</td>
<td>8.3%</td>
</tr>
<tr>
<td>Cognitive Skills</td>
<td>30.0%</td>
<td>0.0%</td>
<td>15.0%</td>
</tr>
<tr>
<td>Vocalization</td>
<td>0.0%</td>
<td>12.5%</td>
<td>6.3%</td>
</tr>
<tr>
<td>Musicality</td>
<td>0.0%</td>
<td>50.0%</td>
<td>25.0%</td>
</tr>
<tr>
<td>Overall Enrichment</td>
<td>7.7%</td>
<td>14.2%</td>
<td>10.9%</td>
</tr>
</tbody>
</table>

Figure 4: Benefits received by Group B students participating less than 66%
4.5 Category C-1: Overall Rate of Enrichment from Groups A-1 and B-1

Category C-1 indicates the overall Rate of Enrichment for Groups A and B students who participated in more than 66% of assigned HomePlay activities.

Table 7: Average enrichments of all students participating more than 66%

<table>
<thead>
<tr>
<th></th>
<th>Socialization</th>
<th>Behavior</th>
<th>Cognitive Skills</th>
<th>Vocalization in Classroom</th>
<th>Musicality</th>
<th>Average Enrichment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A-1 (Table 3)</td>
<td>12.5%</td>
<td>6.3%</td>
<td>21.3%</td>
<td>7.8%</td>
<td>18.8%</td>
<td>13.3%</td>
</tr>
<tr>
<td>Group B-1 (Table 4)</td>
<td>10.0%</td>
<td>17.7%</td>
<td>32.0%</td>
<td>20.0%</td>
<td>27.5%</td>
<td>21.4%</td>
</tr>
<tr>
<td>Average</td>
<td>11.3%</td>
<td>12.0%</td>
<td>26.7%</td>
<td>13.9%</td>
<td>23.2%</td>
<td>17.4%</td>
</tr>
</tbody>
</table>

Figure 5: Benefits received by students participating more than 66%
4.6 Category C-2: Overall Rate of Enrichment from Groups A-2 and B-2

Category C-2 indicates the Rate of Enrichment for Groups A and B students who participated in less than 66% of assigned HomePlay activities.

Table 8: Average enrichments of all students participating less than 66%

<table>
<thead>
<tr>
<th></th>
<th>Socialization</th>
<th>Behavior</th>
<th>Cognitive Skills</th>
<th>Vocalization in Classroom</th>
<th>Musicality</th>
<th>Average Enrichment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A-2 (Table 5)</td>
<td>4.2%</td>
<td>0.0%</td>
<td>13.3%</td>
<td>16.7%</td>
<td>8.3%</td>
<td>8.5%</td>
</tr>
<tr>
<td>Group B-2 (Table 6)</td>
<td>0.0%</td>
<td>8.3%</td>
<td>15.0%</td>
<td>6.3%</td>
<td>25.0%</td>
<td>10.9%</td>
</tr>
<tr>
<td>Average Enrichment</td>
<td>2.1%</td>
<td>4.2%</td>
<td>14.2%</td>
<td>11.5%</td>
<td>16.7%</td>
<td>9.7%</td>
</tr>
</tbody>
</table>

Figure 6: Benefits received by students participating less than 66%
4.7 Category D: Enrichment Comparisons

In order to measure whether the amount of musical participation makes a difference in the enrichments obtained, in Category D we compare the average enrichments obtained by those who completed more than 66% of the assigned musical activities (Groups A-1 and B-1) with those who completed less than 66% of the assigned musical activities (Groups A-2 and B-2).

Table 9: Benefit comparison between those participating more and less than 66%

<table>
<thead>
<tr>
<th></th>
<th>Socialization</th>
<th>Behavior</th>
<th>Cognitive Skills</th>
<th>Vocalization in Classroom</th>
<th>Musicality</th>
<th>Average Enrichment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups A-1 and B-1</td>
<td>11.3%</td>
<td>12.0%</td>
<td>26.7%</td>
<td>13.9%</td>
<td>23.2%</td>
<td>17.4%</td>
</tr>
<tr>
<td>Averages (Table 7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groups A-2 and B-2</td>
<td>2.1%</td>
<td>4.2%</td>
<td>14.2%</td>
<td>11.5%</td>
<td>16.7%</td>
<td>9.7%</td>
</tr>
<tr>
<td>Averages (Table 8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 7: Participation makes a huge difference in benefits
5. Language Development

There is not a standardized method of measuring language development in children with autism. Since we witnessed incredible results in this area, we are going to share all of our nonverbal student’s data.

5.1 Language Development in Nonverbal Students

Seven of the ten students were declared to be nonverbal at the start of the study, ranging in ages from 4 to 10 years.

![Group A Language at Beginning of Study](image)

Figure 8: 7 nonverbal students begin

![Language Breakthrough in Nonverbal Children](image)

Figure 9: 5 out of 7 nonverbal children experience breakthroughs
Nonverbal Student’s Stories

Because our results are so high and the types of language breakthroughs differ by student, below we share the individual and specific story of each nonverbal student.

1. **Student A-2:** This 4-year-old student began the study with a vocabulary of five words, which he would spontaneously mimic but not use meaningfully. His breakthrough began in Week 2 when he said “I love you” unprompted after being picked up from camp. He began saying his name in his studio lessons.

2. **Student A-3:** This 4-year-old student came into the study mimicking words, with no meaningful use of language. Week 4, his mother shared that he said “I love you” unprompted. That was the beginning of his continuing breakthrough into useful language. He began singing along in his studio lessons.

3. **Student A-7:** This 5-year-old came in nonverbal only occasionally saying “mama”. Although he participated in 78% of the HomePlay assignments, documentation provided no improvement in language development during the study.

4. **Student A-8:** This 5-year-old student knew the meaning of 50 words, however he had never spoken. Week 4 his father called the facilitator, weeping. He exclaimed, “My son is 5 years old and I have never heard his voice, until today. He has experienced a *Helen Keller* breakthrough!” While working with a therapist that day, he started saying his words out loud. From that day forward, he began saying words in the studio lessons and at home.

5. **Student A-9:** This child began to speak at 16 months old. He later regressed, and when he came into the study at age 4, he was mute. Although he and his mother participated in 72% of the HomePlay activities, he did not experience language breakthrough. His mother, however, reports improvement in his communication with sign language and gestures to let her know his needs.

*Music Helps Autism Case Study © 2014 by Denie Riggs Page 18*
6. **Student A-12:** This 4-year-old was diagnosed with echolalia with no meaningful use of his less-than-20-word vocabulary. He mimicked only when prompted. His mother shared in Week 4 that he was trying to communicate, although she couldn’t understand all of his words. In Week 7 she reported that he communicated with the family all the time and his language was becoming clearer. The last few weeks, he sang along during his studio lessons.

7. **Student A-13:** At the start of the study, this 10-year-old had only two words in her spoken vocabulary, “love” and “bye”. Considered hopeless, she was given a talk box to communicate with her family and her school teachers. Her breakthrough began in Week 2 when her mom said that she quit screaming when listening to the Classical Therapy CD. In Week 4 she began speaking “mama.” She continues to make progress with spoken language, saying new words each week, astounding her family, therapists and teachers.

### 5.2 Language Development in Verbal Students

Parents of verbal students also document improvements in language development during the study. Here are their specific stories:

1. **Student A-1:** This 5-year-old began the study fluently verbal. In Week 3, his mother stated that his vocabulary was increasing, and by study’s end he was able to answer several “wh-” questions.

2. **Student A-10:** This 5-year-old began the study with limited spoken language. He could say “Hungry-Eat” but could not tell what he wanted to eat. At the end of the study, he sang intermittently in the studio lesson and would answer simple questions.

3. **Student B-2:** This 5-year-old began answering “wh-” questions during Week 5.

4. **Student B-7:** This 5-year-old gained expanded vocabulary and engagement in family conversations. He began composing new lyrics to the program’s songs to include what he desired at the time.

### 6. Testimonies

Following are comments made by parents and Buddies as related to the five assessment categories and in Language Development. The Case Study Student Number and the week of the study are given as references.

Note: These comments have been edited slightly, maintaining important content; full testimonies are on file.

#### 6.1 Language Development

1. **A-1—Parent Week 3:** Since the class started, his vocabulary has gotten larger ... he makes better, longer sentences. **Buddy Post-Study:** I saw the biggest improvement ... in the use of his words. Early on, he would look down when singing was involved, sometimes humming but never moving his mouth. By the
last class, [he] tapped and said his name and sang along ... intermittently. **Parent Post-Study:** At the beginning ... my son could only answer two “wh-” questions and at the end, he would answer several.

2. **A-2—Parent Week 2:** [My child] said “I love you” when picked up from camp.

3. **A-3—Parent Week 4:** I am beginning to see his connected/meaningful speech improve. [My son] ... said, “I love you, Mama.” I did not prompt him to say that at all ... this time it was totally out of the blue. **Week 5:** [He] continues to show improvement in language/verbal skills ... he said “I love you” and “Goodbye” without being prompted. **Week 6:** My son asked to eat ... **Buddy Post-Study:** At the beginning ... he did not participate at all ... the last two lessons he began singing along with the songs, did some of the motions and played the keyboard.

4. **A-4—Buddy Week 5:** [He] followed motions and will repeat vocalizations ... he answered the teacher’s simple question ... “What says quack?”

5. **A-8—Buddy Post-Study:** [This student] responded verbally with “hi” and “bye” during the last two classes. Before this, he had not spoken any words in class, only noises.

6. **A-9—Parent Week 6:** [My son’s] communication has broadened and he is using more details when telling me something. He does not speak yet, but is using more signing gestures.

7. **A-12—Parent Week 4:** [My son] loves to listen to his CDs ... his words are becoming clearer, and he is trying to use more words. **Week 7:** He tries to tell his needs ... and to communicate with our family all the time now ... he is actively trying to speak ... he has more words that are recognizable.

8. **A-13—Parent Week 4:** I’m crying with happiness ... [My daughter] is saying ...“Mama.” **Week 8:** At school, [my daughter] ... saw her friend and said “hi” to him for the first time ever ... the teachers were amazed at her new words ... now they are very interested in learning about the music class. **Week 8:** She said several new words this week. She is now able to tell me what she had for lunch hours later. **Buddy Week 8:** She played the scale on step bells and said “high do.”

9. **B-2—Parent Week 5:** My son answered some “why” and “where” questions. These had been very difficult for him.

10. **B-7—Parent Week 6:** (My son) is still more and more engaged ... in conversations. He changes the words in songs to include what he ... is thinking about.

6.2 Socialization

1. **A-2—Parent Week 3:** [My son] has been making progress ... with potty training, taking turns, listening, and showing affection. **Buddy Week 3:** [He] played “Beach Ball Boogie” and said his name. **Buddy Week 5:** [He] loves giving high-fives and ... hugs. **Parent Week 6:** After class, I rewarded [him] with water play, his favorite activity, and he ... let other kids touch him and run around with him.
2. **A-3—Parent Week 4:** My son came up to hug me [for the first time].

3. **A-9—Parent Week 6:** [My son] waves hello and goodbye ... to family members ... before, he rarely ever did. **Buddy Post-Study:** Throughout the study ... [he] enjoyed music more and his interaction with others and his social skills improved.

4. **B-7—Parent Week 5:** [Our son] has been engaging in and initiating ... conversation with just about anyone who will listen.

### 6.3 Behavior

1. **A-1—Parent Week 3:** The listening therapy CD relaxes him ... it will relax him when he gets upset. **Buddy Week 6:** He left [music class] saying over and over, “It was so good!” **Parent Post-Study:** At the beginning ... he could not follow two-step directions but at the end, he could.

2. **A-2—Parent Week 2:** He sits on the toilet longer. **Parent Week 6:** I tried an experiment ... [going] a few days without music therapy. The first day he had tantrums off and on. The second day ... he woke up in a bad mood, had tantrums all day, and it was hard to control him. The third day, he had bad tantrums. Potty training has become harder and he has been showing signs of sensory overload. [After four days] we started [the music therapy] back, [he] still had tantrums that day ... on [the next day] he had no tantrums.

3. **A-3—Parent Week 3:** My son has been learning to use the potty and [music] helps him. **Parent Week 4:** I can stop a temper tantrum dead in its tracks by singing “Oscar the Octopus.”

4. **A-9—Parent Week 6:** ... Whenever we would want to go [out to] eat ... and [my son] was ... just not in the mood ... we had to change our plans. Now, he will go in ... and will behave very well! **Parent Post-Study:** [My son] loved the classical therapy CD ... [it] helps him stay calm.

5. **A-10—Buddy Week 8:** This student continually threw rhythm instruments [in the classroom]... however ... today, he handed me his maracas and said “All done.”

6. **A-13—Parent Week 2:** The listening therapy has been really good for her ... when the music is on, all the yelling and loud sounds go away ... Now there is a less stressful house to live in. **Parent Week 3:** We play the [listening therapy] CD ... in the car ... to keep her calm.

### 6.4 Cognitive Skills

1. **A-3—Parent Week 4:** [My son’s] attention span has gotten better ... when we first started, he would not sit and listen ... now he will.

2. **A-4—Parent Week 7:** [My son] did really well this week. He used his “stop hands” a few times without prompting ... things seem to have really clicked.
3. **A-7—Buddy Post-Study:** [Initially] he ... covered his ears and made his own noise to drown out the [piano] music. His mother was discouraged that he did not like to listen to the CDs. In class he [started] calming down for the lower [piano] tones and rocking motion of our “Tick-Tock” song. Week 4, [he] started listening to the singing CD and even asked to hear it. He came to class and had a good time ... smiling ... watching the [other] kids ... and enjoyed being at the keyboard. He performed “Ready, set, go” on the keyboard. He clapped for the first time.

4. **A-9—Parent Post-Study:** Recently, [my son] has been able to play games on his tablet ... that involves using his left hand for one button ... while also using his right hand for another button that does a different action.

5. **A-13—Parent Week 4:** [My daughter] really enjoys the virtual classes. I saw her getting the “Tick-Tock” part right... **Parent Week 5:** [Her] school teacher noticed that her handwriting has slowed down.

6. **B-1—Parent Week 6:** My daughter ... sings the songs ... and participates with the virtual lessons. **Week 7:** [She] sang “Follow me...” then hummed the rest of the song. She played “do,” “re,” “mi” on the piano for five minutes. **Buddy Post-Study:** The first few weeks, there seemed to be no real improvement; then it suddenly clicked ... this is definitely a program that works for her.

7. **B-3—Parent Week 3:** We play his listening therapy CD multiple times a day. It helps him relax ... sleep better ... and calm himself.

8. **B-6—Parent Post-Study:** The whole family has grown to appreciate listening to this calming/relaxing CD. I have seen a change in [him]... he is able to follow the lesson independently ... he seems more confident in his abilities.

9. **B-7—Parent Week 5:** Our son is remembering lots of things. He is also doing so much better with finger separation on the keys. He has been working on snaps and buttons.

### 6.5 Musicality

1. **A-1—Parent Post-Study:** [Initially] my son could not clap to the beat of a song but at the end he could.

2. **A-4—Buddy Week 5:** He played the keyboard great ... he played “Beach Ball Boogie” on his own.

3. **A-6—Parent Week 4:** [My son] seems to enjoy [music] more and is more engaged ... He can play “Papa do” and “Mama do” at the piano. **Week 6:** [He] knows all the songs and loves the *Music4Me* CD. He loves playing the piano and ... plays all the rhythms to the songs on the piano. **Buddy Post-Study:** The keyboard seemed to delight this student... he participated with all the playing/keyboard motions of the songs ... his rhythm was excellent and he knew the songs.

4. **A-7—Buddy Week 6:** He liked the tambourine ... the “Choo-Choo” songs and was intrigued by watching the keys he was pounding.
5. **A-13—Buddy Week 5**: She said the solfege word “do” today. She is calm and happy, no yelling or getting upset. **Week 6**: [She] is doing better slowing down to play “Mama do” and doing the hand movements. She was on the beat with “Clap and Thump.”

6. **B-1—Parent Week 2**: [She] ... played [the piano] for ... ten minutes on her own trying out the different music and playing different notes. **Buddy Week 6**: I saw a real improvement. This is the first time that she sang and played!

7. **B-2—Parent Week 5**: [He] spontaneously played “do, do, do” and “Jesus Loves Me” on his keyboard [by ear] ... only knowing it from the CDs. **Buddy Week 5**: He tapped and said his name. I see lots of progress.

8. **B-3—Parent Week 3**: [He] likes to play piano when he is tired or upset. He will ... play random notes or play his homework from memory. **Buddy Week 5**: [He] performed “Follow Me,” performed a solo at the keyboard and answered several music questions.

9. **B-5—Buddy Post-Study**: [He] improved every week. He struggled with the piano because he is left-handed, but he loves to play it. He sang ... and would attempt to do the movements.

10. **B-7—Buddy Post-Study**: [He] improved ... in social skills and ... learning piano and music theory. The structure of the music program made music easier and more enjoyable for him and his parents. They enjoyed the accountability … daily tasks and detailed structure. His skills improved throughout the program.

6.6 Additional Parent Comments

1. *Music4Me* is the most incredible program. I believe this program should be a must for all autistic children, and I believe it should be the first step in them getting help.

2. This music program is wonderful, and being that the class was only eight weeks long and had the effect it had on my son … has blown my mind.

3. This class covers multiple therapies all in one and is essential for the growth of autistic children and it is fun and very entertaining for the children.
7. Conclusion

Can you imagine the isolation experienced of not being able to communicate with another person, unable to express your love, desires, or feelings? Can you imagine the joy of witnessing those communication barriers crack and begin to crumble? Our students, families and staff experienced both extreme emotions during this study.

The inability to express themselves with verbal language is one of the most difficult challenges children with autism face. Based on today’s percentages, nearly 1,400 babies will be born today worldwide who will never speak, and another 1,400 tomorrow, and so on. If you start counting today, there will be more than 5 million nonverbal individuals on our planet within 10 years. The percentages are increasing every year, painting a very dismal picture for the future of the children, their families, and society as a whole.

But there is hope!

The power of music is greatly underestimated. Music is a God-given tool to enhance us—spirit, soul, and body. Based on what we have witnessed in our special needs music program since 2009, shared in our *Music Helps Autism* book, and carefully documented in this study, a specifically formulated plan of involvement with music will enrich almost all children with autism. In this study, sixteen out of eighteen students documented enrichment benefits; that’s 88.8%!

Our study outlined a developmental, specific, four-level plan for musical engagement, culminating with the piano, the number-one instrument for brain function enhancement. We found that our non-traditional preschool piano curriculum works for children with autism, while sometimes a traditional approach does not.

The enhanced brain function produced by music’s engagement brings about incredible changes in the area of language. Also enriched are life’s basic cognitive skills, expanding attention spans, even the ability to sleep, just to name a few. Involvement with the piano releases children into the simple joy of expression, confidence, calmness, and peace. It gives them a leisure skill in which they can excel, all the while producing even more brain function benefits.

What does all of this mean to the parents of children with autism, their teachers, families and our society? It brings us hope; hope for a better today ... and hope for a better tomorrow.

*Let’s make music!*
8. Acknowledgments

8.1 Students

We would like to thank all the precious families who participated in this project ~ our lives have been enriched by your involvement.

8.2 Leadership Committee who gave direction and aid in their area of expertise:

1. Michael Riggs ~ President, Perfect Praise, Inc., VP Perfect Praise Publishing LLC
2. Amy Varnon ~ Autism Specialist, Huntsville City Schools, Huntsville, AL
3. Susan Dill ~ Board Member, Perfect Praise Projects, Inc., retired teacher, Huntsville, AL
4. Sandra Harper ~ Retired educational director, Florence, AL
5. Linda Soule ~ Founding Director, Covenant Dancers, Huntsville, AL
6. Connie Oakley ~ Intercession Coordinator, Perfect Praise, Inc., Huntsville, AL
7. Caleb Grissett ~ Puppeteer trainer for virtual lessons, Huntsville, AL
8. Rick and Beckie Trussell ~ Virtual lessons filming and editing

8.3 Buddies: volunteers and staff ~ who served countless hours in training, testing and working with the children

8.4 City-wide intercessors ~ whose involvement brought about great success

8.5 Financial Acknowledgement:

This work was supported by Perfect Praise, Inc and Perfect Praise Publishing LLC. P.O. Box 18008 Huntsville, AL 35804.

This research received no specific grant from any funding agency.

9. References

This case study was based on the book *Music Helps Autism*, by Denie Riggs. Much research went into her book, and it includes references supporting the Four Levels of Musical Participation demonstrated in this project. The book is available on Amazon.com and by contacting Perfect Praise Publishing, P.O. Box 18008, Huntsville, AL 35804, Info@musichelpsautism.com.