

Research Article

The power of musical learning: A pilot study of whether private music lessons can decrease parental stress and disruptive behavior in children

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ABSTRACT

Childhood disruptive behavior is a major societal issue and has been linked with more serious disorders, such as Conduct Disorder and Oppositional Defiant Disorder. Research has documented an association between parental stress and child disruptive behavior, while those who are poor or homeless having additional stressors to contend with due to the uncertainty of whether they will be able to meet basic needs on a consistent basis. Music instruction has been shown to promote self-discipline and increase various cognitive functions. The primary aim of this study was to evaluate whether private music instruction can lead to decreases in childhood disruptive behavior as well as, by extension, parental stress; an exploratory

interest was whether there is a correlation between whether a parent practices with their child and decreases in both disruptive behaviors in children and parental stress. Participating families received 12 weeks of private violin instruction and collected data was analyzed using statistical and visual analysis. Results of the Conners-3 showed a decrease in disruptive behavior on a week-to-week basis, while pre- and post-evaluations of the Behavior Assessment System for Children, 2nd edition (BASC-2) saw no decrease. Results showed no decrease in parental stress. One limitation of the study was the inconsistency of lessons, which could not be held, as intended, every week. Future directions should focus on just child disruptive behavior changes, stressing an expanded demographic with more students and multiple teachers.

The Power Of Musical Learning: A Pilot Study Of Whether Private Musical Lessons Can Decrease Parental Stress And Disruptive Behavior In Children

Childhood disruptive behavior (hereafter referred to by the acronym, CDB) is that which is troublesome, interruptive, and/or disturbing in a familial, academic, or social context. According to Bierman et al. [1] CDB in schools predicted academic difficulties such as low grades and failure to graduate. Byrd *et al.* [2] demonstrated that prolonged disruptive behavior can lead to delinquent behavior in adulthood. There are currently millions of children diagnosed with Attention Deficit/Hyperactivity Disorder (ADHD), Oppositional Defiant Disorder (ODD), and Conduct Disorder (CD) [3,4]. Each of the disorders shares common symptoms with disruptive behavior. CDB is associated with increased parental stress [5]. According to Barry et al. [6], mothers dealing with depression and anxiety tended to also report having boys displaying CDB. Further, longitudinal studies have demonstrated the relationship between parental influences and CDB [7]. It should be noted that Barry *et al.* [6], call into question the directionality of this relationship; that is, whether the CDB in the child caused the parental depression/

anxiety or if parental practices caused the CDB, or, alternatively if a stressful home environment contributed to an increase in CDB.

Parents play a pivotal role in how their children adapt to adversity. Within families, the ability of the children to adapt to various life experiences depends significantly on their parental influence [8]. Whether children with mental health needs are able to take advantage of mental health services also depends heavily on their parental influence and mindset. Perception towards mental health treatment can present obstacles to children receiving the services that they need. According to Smith et al. [9], there are a number of reasons why parents of children with mental health needs remove their children from services: These include a distrust in pharmacotherapy, lack of psychoeducation, lack of faith in the competency of their clinician, and a false belief that the child is fully healthy after roughly three sessions. Given such barriers to care, it would be advantageous for research to explore novel intervention approaches that could exhibit efficacy for leading to improvements in the core problems and associated sequelae of CDB.

Compounding the problematic nature of CDB and access to services are the issues that accompany being a low-income or

homeless family, which continues to be a major challenge for society in the United States of America. According to Trentacosta *et al.* [10] children in low-income families were found to be more at risk to develop a disruptive behavior disorder due to the additional pressures that low-income families face in regards to meeting ongoing housing concerns, food, and other basic needs. While the overall percentage of homelessness in the USA is declining, there were still 20 states that saw an increase in the homeless population from 2012 to 2013; of those, Mississippi had the lowest rate at 8 per 100,000 people, while the District of Columbia had the highest number of homeless individuals per 10,000 peoples with 106 [11]. Of particular concern is that, in spite of the overall decline in homelessness, the number of homeless youth, and families continues to rise [12]. These low-SES and homeless families are more affected by the effects of imprisonment than other populations. Individuals who have been identified as poor or homeless at some point in their lives are also overrepresented in the correctional facilities system, as the majority of currently incarcerated inmates are minorities from low-income backgrounds [13]. To add to this, Massoglia *et al.* [13] reported that former-inmate minorities generally return to the same low-SES neighborhoods following release as prior to their imprisonment. While this may not relate to the children directly, such youth are growing up in communities that are heavily represented by individuals who have been incarcerated. This could lead to the assumption that low-income families are at an even greater disadvantage in terms of possible perceived inevitability of imprisonment due to environmental risks.

With the United States underperforming overall in regards to delivering mental health services [14], children in need of mental health services are falling through the gaps, especially children in low-income families. Whether this is due to parental barriers to treatment, or to children not being identified, more education-based interventions could provide a way to help fill in the gaps in the mental health system. With the current state of education budgets in the USA, however, there are many systems that have forced schools to make decisions about which programs are more valuable than others. Oftentimes, the arts are not seen as a necessity, and these programs become eliminated from school curricula [15].

Certain methods of music instruction, particularly the Suzuki Method, focus on positive reinforcement and self-discipline, also stressing parental involvement and character development (Niles, 2012). In music instruction with young children, parental involvement is vital to the child's growth due to the expectation that the parent will serve as the teacher at home [16]. Thus, it is assumed that how a parent views his or her relationship with the child can affect the learning environment, particularly the home-based musical learning environment of the child, and thus may influence the ultimate the nature of benefit experienced. There are many cognitive and psychological benefits associated with music. Just listening to music has been shown to decrease anxiety in a multitude of situations, including for patients that are about to undergo surgery [17]. Music may have the capacity to decrease CDB [18]. For instance, music has been shown to decrease instances of bullying behavior and associated thoughts on the playground, as Ziv *et al.* [18] found that playing calming

background music – defined by sparse melodies on top of a musical drone – during recess decreased bullying behavior and arousal overall for the children at recess, leading to a higher level of enjoyment during recess. This led to their conclusion that music can “have a calming effect, reduce anxiety, improve mood, and influence arousal levels” [18] In terms of neurocognitive benefits, music training has recently been shown to improve language skills by activating centers of the brain that process rhythm, timbre, and pitch, which can in turn lead to improvements in school performance due to strengthening neural processes, especially for children with learning disorders [19]. Additionally, direct music therapy has been shown to lead to improvements in communication, self-esteem, and levels of depression [20].

Even where some schools attempt to keep general music education in public schools, few offer private music education, which is described as one-on-one musical instruction. Due to the limited number of schools offering this service, it is generally seen as a service that is reserved for families who can find private instruction for their children on their own which, due to the associated financial cost of paying for lessons out in the community, tends to be reserved for middle-SES families and above. A recent study has found that private music lessons improve “language abilities including verbal memory, literacy, verbal intelligence, and speech processing” [21]. This means that there is an entire subsection of the population that has a very limited opportunity to reap the many benefits that are associated with private music instruction. The present study therefore aims to investigate whether private music instruction is an efficacious intervention for reducing disruptive behavior in economically disadvantaged youth.

This research stems from the hope that music lessons might reflect an alternative vehicle – as compared to a traditional therapy session – for acclimating a child to a structured environment and teaching discipline to children. It is also believed that parental involvement is vital to this process. According to Bugeja [22] both the relationship between the parent and teacher, along with the parent's involvement in their child's lessons, have a significant role in creating a home environment conducive to musical learning. If parents are involved, it is believed that the child will generalize the structure learned from musical instruction with the parent to the home environment. It is also hoped that with the music teacher modeling positive verbal responses and encouragement, the parent may eventually begin to adopt the same language towards their child. This would hopefully lead to the parent also focusing on encouragement rather than punishment to achieve goals and changing the dynamic of the parent-child relationship.

This research is important for various reasons. Tierney *et al.* [21] suggests that exceptional musical ability is not necessary to reap the benefits associated with musical instruction. Strictly from a cognitive standpoint, musical instruction produces benefits that can translate both directly and indirectly to various stages in life. Music has been associated with neurological functions that provide advantages during grade school, high school, college, and even reduces the progression of hearing loss in aging adults [23]. To the degree that musical instruction contributes to the

hypothesized improvements, such an approach could provide an alternative that might help address the previously mentioned barriers to treatment, such as a distrust in mental health services [9], and might possibly function as a preventative measure for at-risk youth and youth that already have disruptive tendencies. Music instruction could provide an alternative way to have a child get accustomed to a structured learning environment while focusing on positive development of coping mechanisms and an emotional outlet for children who are at risk of eventually, as stated earlier, developing delinquent behavior into adulthood. We are focusing on CDB and parental stress due to their bidirectional relationship to a stressful home environment. If evidence is obtained in support of the proposed hypotheses, we would argue that more research should be conducted on finding a cost effective way to improve behavioral outcomes of children who are at risk for disruptive behavior using music; we would also argue, relatedly, for keeping music lessons in school and adding an option for private instruction for children that have difficulties in group settings.

The first hypothesis was that the proposed intervention will lead to a reduction in behaviors associated with CDB. Our second hypothesis is that the intervention will lead to reductions in parental stress as well, due to the bidirectional relationship between parental stress and CDB. Additionally, an exploratory interest was to examine whether there was a correlation between whether the parent practiced with the child or not and decreases in both CDB in children and parental stress, provided the latter findings are demonstrated.

Methods

Participants

For the present investigation, potential participants were drawn from a pool of low-income families who have experienced homelessness at some point in their lives, and are now living in subsidized housing in a large metropolitan region in the USA. Three children, along with their parents, were selected to participate in this study. All three children were classified as minorities and lived with their mothers in single family homes. For the purposes of this study, homelessness was defined here as one or more instances where an individual or family has had to spend at least one day on the street or in shelters due to no other housing options. This population was chosen due to the rise in the number of children and families experiencing homelessness in the USA, along with the risks they are exposed to. Eligible families were those with a child between the ages of 6 years, 0 months and 15 years, 11 months. Those families that expressed interest in participating in the study were administered a battery of screening measures; those families meeting the inclusion cutoffs (See procedure section below for specifications) established for this study were invited to participate. An exclusionary criterion was that the child in the intended parent-child dyad must not have had a prior history of having received private violin lessons.

Measures

Parenting stress index: third edition—short form (PSI/SF)

The PSI Short Form is a 36 item self-report test that will be used to assess the parental stress levels. Normal scores generally fall within the 15th to 80th percentiles. The 85th percentile and above are considered high scores and are of concern. Total Stress scores of 90th percentile or higher are considered clinically significant. The PSI/SF has a reliability coefficient of .90 for total stress. It also has well-established validity [24]. This test was given at the first baseline and on a weekly basis once the intervention began to assess any changes in parental stress throughout treatment. This test gives a representation of the amount of stress being experienced by the child's parent after the first lesson. This test also gives a measurement during treatment to monitor any change to the parent's stress level throughout the course of the intervention. This test is targeted to measure the stress experienced by parents that have children between the ages of 3 months and 12 years of age.

Behavior assessment system for children: second edition, parent form

The Parent Rating Scales (PRS) is a 134-160 item scale that is completed by the child's parent. The BASC-2 is a reliable (internal consistency is in the mid .80s through .90s for composite scores; test-retest reliability from 8 to 70 day intervals is in the mid .80s to low .90s for composite scores; Inter-rater reliability median ranges from .53 - .77 for composite scores) and valid (high concurrent and convergent validity) test. On the Clinical Scale, scores from 60-69 are considered At-Risk, while scores 70 and above are considered Clinically Significant [25]. The BASC-2 was used to measure maladaptive problems by the parents' reports of how their child behaves in the home setting. CDB was measured using four subdomains of the BASC-2: Hyperactivity, Aggression, Conduct Problems, and Attention Problems. The BASC-2 PRS was administered at baseline and at the end of treatment to measure any changes.

Conners-3: parent short [26]

The Conners-3 (Figure 1 & 2)

Parent Short is a 45 item test that will be used on a weekly basis to measure disruptive behavior. The Conners-3 is a reliable (consistency coefficients = .77-.97; test-rest reliability = .71-.94; inter-rater reliability = .52-.94) and valid (tested for factorial, construct, and predictive validity) test for disruptive behavior, specifically ADHD. On the Clinical Scale, scores from 60-69 are considered At-Risk, while scores 70 and above are considered Clinically Significant [26]. The Conners-3 short form is broken up into 8 categories. This study focused on three of these categories: Inattention, Hyperactivity/Impulsivity, and Defiance/Aggression. The parent form is focused for school-aged children ages 6-18. Parents will fill out the form each week after the lesson. The test functioned as a weekly measure of the parent's assessment of their child's behavior throughout the week.

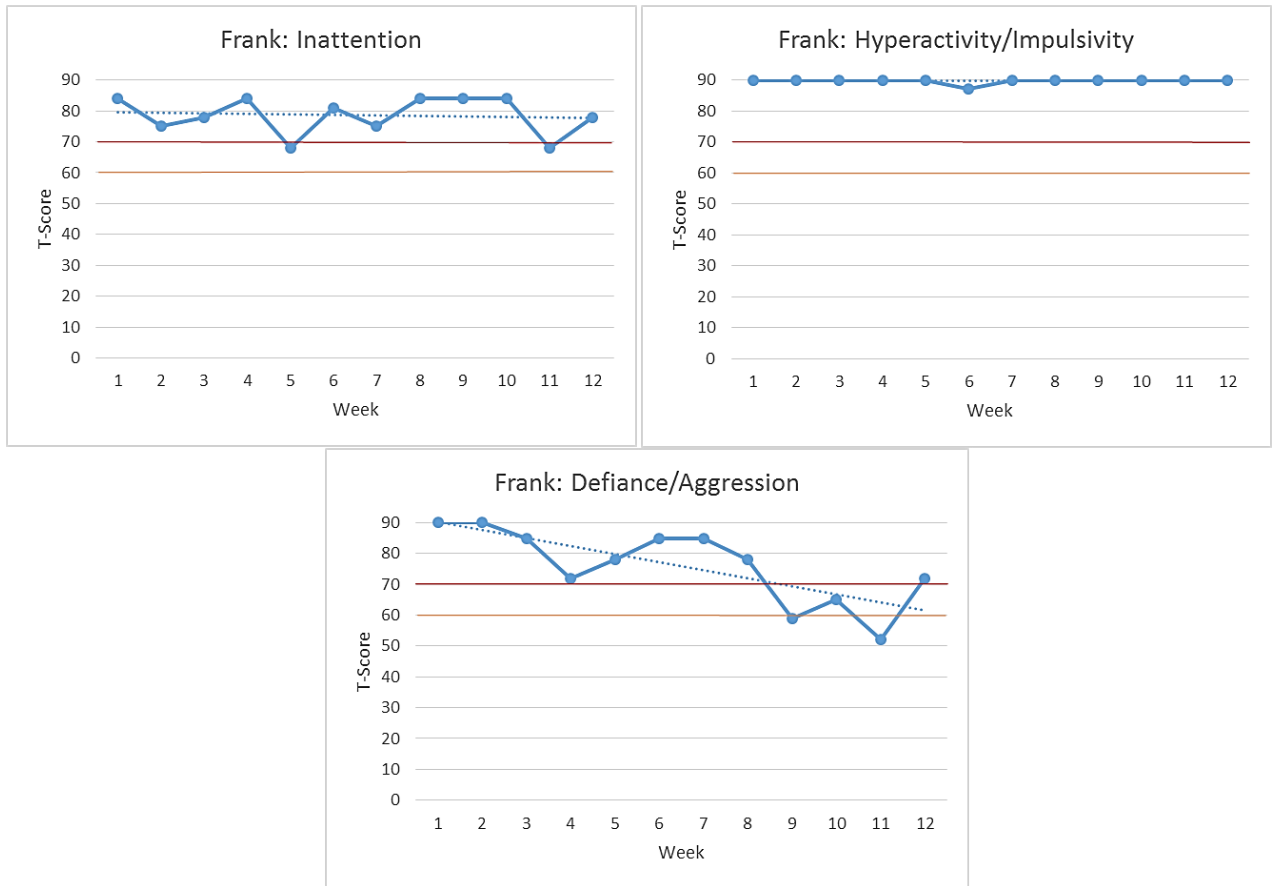


Figure 1. "Frank's" Conners-3.

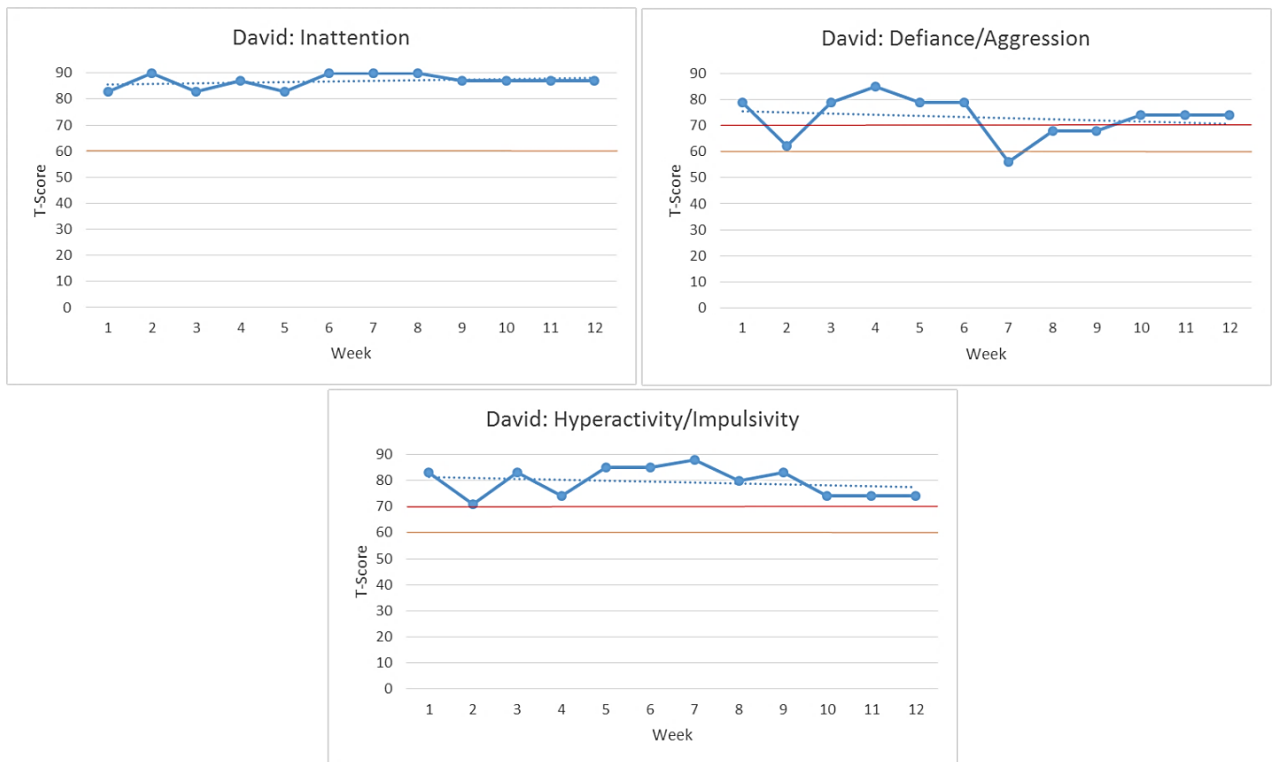


Figure 2. "David's" Conners-3

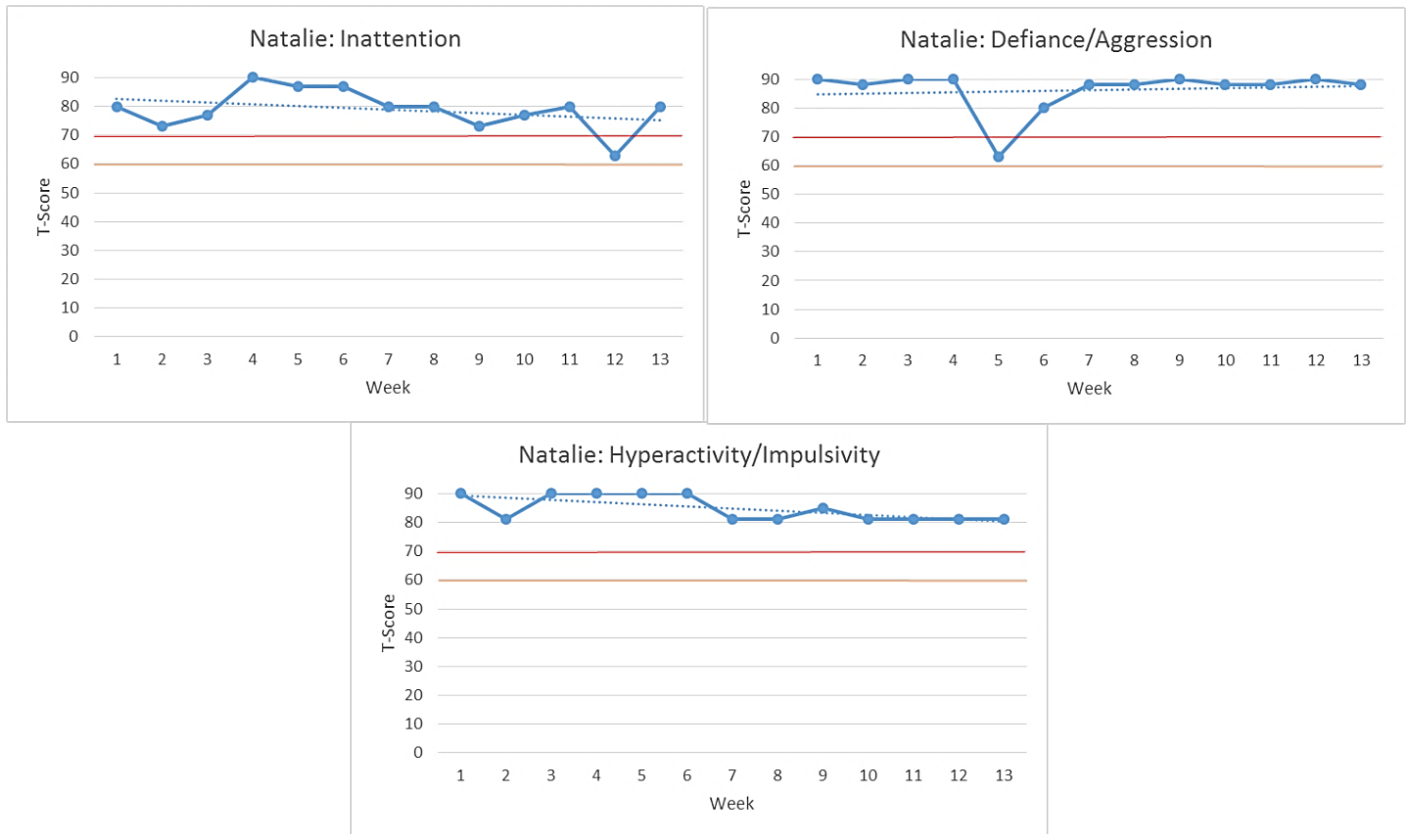


Figure 3. "Natalie's" Conner-3

Procedure

During the course of standard case management, parents with children between the ages of 6 years, 0 months and 15 years, 11 months were informed of the existence of the study by their case manager, and asked about interest in participating. The contact information of those interested parties was shared by the case manager with the Principal Investigator (PI), who subsequently contacted the parent by phone to set up a face-to-face meeting to discuss the overall focus of the research and have procedures explained to them. Flyers were also given to the case managers and posted on community meeting boards in the housing facility with the permission of the case managers. Those continuing to express interest in participating then signed a consent form, after which screening determined ultimate eligibility. Prospective participants completed the PSI short form and the Conners-3: short form to determine eligibility. To be eligible, prospective participant dyads needed to have a child with a T-score above 60 in Inattention, Hyperactivity/Impulsiveness, and Defiance/Aggression, as well as a parent that fell above the 90th percentile on the PSI. Once participants were selected, all of the participating parents completed BASC-2 report for a baseline measure one week later.

The intervention consisted of private violin instruction that was grounded in the philosophy of the Suzuki method. The Suzuki method started as a method for teaching children violin and has since expanded to include many different instruments. It focuses on learning through repetition, parental involvement, and positive encouragement [16]; its emphasis is less on

musical talent and more on hard work and dedication to achieve intended goals. Two primary foci of the Suzuki method are 1) to empathize and channel the spiritual aspect of music, and 2) to develop character [27]. This approach towards learning provides us with a perfect model to structure musical instruction for this research around, due to the focus on not just musical progress, but also due to structure that the Suzuki method provides.

All participants began the intervention after the two preliminary weeks of paperwork and sizing of the violin to be appropriate to the child. The parent completed the Conners-3: Short Form and the PSI-Short Form before the child's lesson each week. The intervention for each participant was comprised of 12 weekly 30-minute private violin lessons that were administered by the PI and grounded in the Suzuki method. Each student began the intervention learning about their instrument, proper care of the instrument, the string names, as well as how to hold it. Students were also taught beginnings of reading music, learning the letter names of the lines and the spaces. Students progressed through the Suzuki Violin Book: Volume 1 [28] at their own pace. The PI was deemed qualified to deliver these lessons as he is a professional violinist who has performed internationally and offered such private lessons in the community at the time of the study. After the completion of the final lesson, parents were given a BASC-2, PSI-Short Form, and Conners-3 Short Form. Refer to the Data Collection Schedule, which can be found before the Appendix section, for a visual guide to when each measure was administered throughout treatment. Participants were chosen with similar SES and age ranges in order to account for confounding variables in disruptive behavior and

parental stress, such as stressors associated with housing and other aforementioned circumstances associated with low-SES.

Data Analysis

In order to test the first hypothesis that private music instruction will decrease CDB, we analyzed the pre and post BASC-2 scores and compared the sub-domains of hyperactivity, aggression, conduct problems, and attention problems with a paired samples T-Test using the pretest and posttest scores. We also analyzed the weekly scores from the Conners-3: Parent short and compared the scores over time, using a paired samples T-Test along with visual analysis, to determine if there was any difference in specific behaviors on a weekly basis from the perspective of the child and the parent. For the paired samples T-Test, we first compared the baseline scores against the final week's scores. We followed this up with a comparison of the baseline scores to the average of the weekly intervention scores. In order to test the second hypothesis that parental involvement in their child's musical instruction will improve parental stress levels, we used visual analysis to compare the weekly PSI-short assessments.

Due to visual evidence that there was a decrease in CDB, we attempted to investigate a third exploratory hypothesis, that parents' rate of practice with their child at home would be correlated with reductions in symptoms. We queried the parents at the end of the intervention as to whether they practiced with their child outside of lessons. However, as all parents reported that their children practiced alone and with no parental support at home, this hypothesis could not be explored.

Results

CDB

Results from the Conners-3: Short showed a significant overall decrease in CDB symptoms comparing the baseline evaluation T-Scores versus the average T-Scores of measurements taken over the course of treatment ($p = 0.045$), along with the raw score from the baseline compared with the average of raw scores across treatment ($p = 0.032$). A test was also run to compare the baseline evaluation with the final evaluation for both the T-Scores ($p = .051$), which was above the .05 threshold that is being used for clinical significance, and Raw scores ($p = .023$), which is clinically significant. The results showed that the raw scores were more sensitive to the week to week changes that occurred throughout treatment, however we will analyze the T-Scores on an individual basis on the grounds that we are able to see the results against T-Scores that are normed for the general population. Looking at the T-Scores (Appendix D, Appendix E, and Appendix F), we can see a decrease in two out of three of the behavior problems we focused on for this study for each participant. In discussing the individual scores of each participant dyad, we will address them using pseudonyms in order to protect confidentiality of the participants. "Conners-3" showed decreases in both Inattention problems and behaviors associated with Defiance and Aggression (Appendix D). "David" showed decreases in both Hyperactivity and behaviors associated with Defiance and Aggression (Appendix E). "Natalie" showed decreased

in behaviors associated with Hyperactivity and Inattention (Appendix F).

Results from the BASC-2 PRS (Appendix G), taken at baseline and after the final lesson, showed no significant results. Looking at visual analysis, we can see increases in Hyperactive behavior for all three participants and an increase in Aggressive behavior for two out of three participants, although the third participant saw a drop in his Aggression. However, visual results also show decreases in Inattention and Conduct Problems, with one participant dropping below the score qualifying her as at risk for inattention problems.

Overall, the week-to-week results from the Conners-3 showed significant decreased in scores, while the BASC-2 that was taking pre and post did not show significant decreases.

Parental Stress

Results showed that there was no overall decrease in parental stress for any of the participants when looking at either the Baseline PSI scores against the PSI score at the end of the intervention ($p = 0.32$) or the Baseline PSI scores against the average PSI scores throughout the course of the intervention ($p = 0.38$). Visual Results did show a decrease in stress related to disruptive child behavior.

Discussion

The results from an overall analysis of the Conners-3 T-Scores for all participants showed an overall decrease in CDB symptoms, suggesting that private music lessons are correlated with a decrease in CDB. However, in viewing the BASC-2 subdomains of Hyperactivity, Aggression, Conduct Problems, and Attention Problems, results from the BASC-2 show little or no decreases in CDB from a pre- and post-test analysis. Due to the inconclusive results of the quantitative data, this discussion section will focus on combining qualitative data with quantitative data gathered through observations by the PI throughout treatment.

Also, visually analyzing the data from the Conners-3, scores from week to week varied greatly. Confounding factors played a major role in this. Each child presented with unique challenges, some of which were completely out of the family's control, and some of which were caused by the family. Parent participation varied greatly, and across the board the children displayed behaviors that suggested a need for attention from their mothers. This was evidenced by children making displays of emotion to get their mothers to respond, or repeatedly prompting their mother for feedback during lessons. For two of the participants, they responded better to instruction when the mother was unable to be in the lessons, while the third participant's mother was always present. Due to the variability in each of the participants, we will discuss each of them individually.

"Frank" was the participant that was most obviously affected by outside factors. He is also the participant whose quantitative data and PI observation are not aligned. When lessons first started, "Frank" had multiple emotional outbursts during lessons and was unable to stand in one spot for longer than a few minutes before he began refusing every request, running

into the corner to cry because he did not want to do anything, and other disruptive behaviors. His mother was very despondent in lessons, until the PI began giving her more responsibility during the lessons (e.g., putting her in charge of watching for and correcting a technique fix from the previous week). This gradually led to longer periods of instruction before “Frank” began displaying disruptive behavior over the first 5 weeks. For “Frank”, week six was a turning point during the lessons. It was the first time that “Frank” was able to focus during a majority of the lessons, the first time the mother had to step out of the lesson, and the first time “Frank” showed genuine interest in participating in music lessons. When the mother stepped out of the lesson, the PI was able to get “Frank” to complete tasks without him needing frequent breaks or constant redirection. The mother noticed this as she was walking back in and decided to spend the remainder of the lesson listening from the hallway. Unfortunately, before the PI could address “Frank’s” behavior with his mom, the family suffered a housing emergency and there was a nearly two-month gap between lesson six and lesson seven. According to reports from his mom, “Frank” was suspended twice from school during this time and got into multiple fights with peers in his apartment building, most of which were with boys significantly larger in size than “Frank”. Upon resuming lessons, “Frank” was once again resistant to violin instruction. The quantitative data maps on with the qualitative data in that any progress that had been seen at the end of week six, was reset by the time the lessons were able to resume. It was not until the end of the intervention with “Frank” where decreases were beginning to be seen again, but at that point, the lessons were concluding and this was followed by another spike as he learned that the lessons were coming to an end. The trust that was built up over the first six weeks had to be rebuilt over the second six weeks due to the unavoidable gap in the middle. In spite of this, weekly reports showed overall decreases were seen in CDB related to inattention and aggression. It is worth noting that months after the intervention ended, upon seeing the PI again, “Frank” inquired as to his next lesson. The PI informed him that his lessons had ended months ago and “Frank” responded that he would like to continue with lessons. At the conclusion of the intervention, “Frank” expressed no small amount of joy to be done with lessons, so this was an unexpected turn of events.

“David’s” results showed a decrease in Hyperactivity and Impulsivity, and Defiance and Aggression. A majority of the reports that were received about “David” were from a combination of his mother and the social worker. Problematic behaviors were rarely seen during the intervention. “David”, from the beginning, was engaged in lessons. His mother missed his first lesson, but attended the next two. “David” did display inattention problems during these lessons, but was able to be redirected by the PI and brought back on task. “David’s” mother stopped attending after the third lesson, which also coincided with “David’s” need to be redirected. “David” practiced consistently throughout the intervention, by far outperforming the other participants in skill attained and repertoire learned. “David” was also the only participant that reportedly practiced at home on a consistent basis, according to his mother. This was confirmed by the PI purely by progress seen during the intervention. There

was only one incident noted during lessons, which was after the PI alerted “David” that he had one more lesson after that lesson left, “David” became visibly upset and distractible for parts of the lesson. Even after going back on task, “David” also stuck his violin bow near the PI’s face at one point when the PI looked away, causing the PI to hit the tip of the bow when turning his head back. “David” laughed, but all adverse behavior stopped once the PI alerted “David” that the lesson would have to stop for the day if anything else like that happened. The final lesson ended without incident. While “David” showed very few CDBs in lessons, he showed consistent defiance towards his mother outside of lessons. The PSI and the Conners-3 both show a decrease in CDB and CDB related parental stress, but by both PSI data and PI observational reports, “David” and his mom’s relationship appears to be a major source of stress, which may have contributed to his mom’s absence in his lessons. Overall, “David” showed the highest amount of in-lesson engagement and progress seen by the PI.

“Natalie” displayed inattention difficulties throughout lessons. She was difficult to redirect and consistently voiced her displeasure with having to learn an instrument. “Natalie” showed musical talent at various points during the intervention, but she showed a lack of interest in anything that she was not able to understand immediately. “Natalie’s” mother was present for every lesson, but their attendance was inconsistent, often missing 1 to 2 weeks at a time and very rarely having lessons on consecutive weeks after the midpoint of treatment. Throughout treatment “Natalie” required constant redirection and very little musical progress was seen. The best lesson was intervention week 11, where the PI created a game for “Natalie” to play in order to complete the piece that she had been working on since the start of the intervention. “Natalie” took to the game quickly and was able to win and make it through the whole piece for the first time since the beginning of the intervention. “Natalie” even reported that she attempted to play the game by herself, and she won against her self, during the week leading up to the final lesson. In spite of all of these, “Natalie” saw decreases in Inattention and Hyperactivity/Impulsiveness.

Looking at the CDB related results, it appears that lessons do decrease CDB regardless of whether musical progress is seen or not. All three children appeared to display less CDB symptoms when their parents were not in the room. While BASC data reports no change, weekly Conners-3 data, PSI disruptive behavior data, and PI observation all point towards a decrease in CDB for all three children.

While there was no average decrease in parental stress overall, there was a decrease in stress related to CDB, lending credence to the results from the first hypothesis. The idea behind parental stress being decreased was twofold: the assumption was that the parents would show decreased stress as their child’s CDB decreased along with the hope that the parents being actively involved with their child’s lessons would benefit their relationship. However, while there was indeed a decrease in CDB, the parents were, generally, either engaged very little in their child’s musical education, or absent completely.

“Frank’s” mom was present for every lesson, but reported that she could not get “Frank” to practice at home. The PI asked

that “Frank” and his mom practice together at least 5 minutes a day for 3 or 4 days a week. “Frank’s” mom reported that the first time she tried to get him to practice, “Frank” refused. She then reported that she did not attempt to get him to practice again, instead opting to warn him that he would get in trouble in his violin lessons if he did not practice. During lessons, “Frank’s” mom appeared despondent with low energy. She seemed very uninterested in the details of the lessons, but made sure to attend every lesson and was open to any requests by the PI. In an attempt to get her more engaged in lessons, the PI began to give her various tasks, such as having her watch for a technique either learned that lesson or the lesson before, and either voicing to “Frank” that he needed to fix it or fixing it herself. There was an increase in engagement when these tasks were first administered to “Frank’s” mom, but as with “Frank”, any progress was lost upon the continuation of lessons after the two-month housing crisis. Looking at her PSI scores, everything had dropped, especially CDB related stress, until lessons resumed in treatment week 7. It is worth noting that there was a downward trend in both weekly assessments before the mid-treatment crisis. This, along with the inability to develop a practice routine at home, may have contributed to the lack of efficacy on parental stress. It is also worth noting that at the beginning of the study, “Frank’s” mom expressed doubt that the intervention would decrease her stress, even if it did decrease CDB.

“David’s” mom showed no change in overall stress, but showed a decrease in parental stress related to CDB. That being said, “David’s” mom showed up to 2 out of 3 of the first lessons, then did not attend a lesson of “David’s” for the remainder of the study. “David’s” mom would only come in to fill out the forms. She was not involved with his lessons or his practice at home. That being said, “David’s” mom requested information about getting a violin and the availability of him continuing private music lessons at the conclusion of the intervention. This suggests that results were seen outside of lessons, as she did not attend the lessons herself.

Due to “Natalie’s” age, her mom did not miss any lessons due to the PI insisting that her mom be there for each lesson. While no lessons were missed, they were not kept on a weekly basis, often missing one or two weeks at a time due to “Natalie’s” mom being absent. While in lessons, “Natalie’s” mom spent the majority of the time either filling out forms or engaged in her mobile phone. She answered her phone in the middle of lessons on multiple occasions. She generally kept the phone calls brief, but “Natalie” because visibly distracted when this happened. “Natalie’s” mom had no involvement in the lessons, even preferring not to get involved when games were presented for her and “Natalie” to play at home, with “Natalie” reporting that she played the game against herself at home. At the conclusion of lessons, “Natalie’s” mother had a conversation with the PI about continuing lessons, but accounting for “Natalie’s” interest. The conversation concluded with it being decided that “Natalie” should continue lessons, but with an alternative instrument.

Looking at the PSI reports together, They suggest that a decrease in CDB alone is not enough to also cause a decrease in parental stress. Based on the above results, it is also suggested

that just attending the lessons is not enough to decrease parental stress. As no parent was able to attend all of the lessons and practice with their child at home during the week, it is still unclear if this can lead to any decrease in parental stress. That being said, the mom’s expressed satisfaction with the intervention and inquired about continuing lessons for their children.

Conclusion

While private music lessons seem to lead to a decrease in CDB, they do not appear to similarly affect parental stress. Parental involvement and attendance were inconsistent, which may have factored into the effect this study could have on the parents. A decrease in CDB alone does not seem to be sufficient to decrease parental stress, however the moms were satisfied with the intervention and requested extended time across the board.

Limitations

There were numerous limitations to this study. Arguably the biggest limitation of the study was the small sample size. With only three participants, it is not feasible to generalize the results of this study. This was mostly due to time constraints and only the PI providing the intervention. With each student getting twelve 30-minute lessons, that meant a minimum of three months per intervention cycle. In reality, interventions took anywhere from 4 to 6 months to complete. Available families willing to participate in the study were also in limited supply, with most families having children that were in their late teenage years, or displaying no symptoms of CDB. In the end, three participants were found that fit all of the prerequisites within the accepted time limit.

Another limitation was the population, which was taken from one community in the same building, which also complicates generalizability. Due to this, the families’ social circles overlapped. For example, two of the participants had the same mother, which was due to time constraints and a limited number of families in the prospective participant pool. This certainly presented a possible complication as their PSI data overlapped. That being said, their mother’s involvement in their lessons was vastly different, showing up to one child’s lessons while being unavailable for a majority of the other child’s lessons. Overall, the population for this study was not diverse and focused on a specific minority group, with race, clinical severity, and SES being identical for all participants. While it appears to show that there can be some positive change in CDB in the most severe cases, it does not generalize to any other population.

There were various incidents that were outside the scope of the intervention that may have contributed to the continued PSI severity. The timing between lessons was also a limitation that may have impacted the results of at least one of the participant dyads. While the lessons were planned to be 3-4 months, with a few weeks built in for complications, the complications ended up causing weeks to months in between lessons for some families. This made consistency difficult. Progress was disrupted and lessons were often having to teach the same material from previous lessons due to the gap in between lessons. Even had

the parents been practicing at home with their children, it is difficult to overcome, and keep any consistency in lessons, when there is a nearly two-month gap in between lessons. This also lead to the student/teacher relationship being reset, which led to an increased need of redirection during lessons after extended breaks between lessons. Even looking at the week-to-week results from the Conners-3, the inconsistency was clearly shown through the variances from one week to the next.

Directions for Future Research

The study shows promise in that it opens up the conversation about the vast number of uses that private music lessons can have. While it is widely accepted that music lessons can have a cognitive impact, this research provides a first step into the behavioral benefits of private music lessons. That being said, it would be interesting to see what effect parental involvement specifically has on CDB. For example, the two students that did not practice at home had their parents attend all lessons, while the child who did practice consistently attended his lessons alone. Looking at the data, it does not appear that how much a child practiced at home.

Another direction that future research could assess is the instances of disruptive behaviors in lessons. Parents agreed to have lessons, along with analog prompts that the parent completed with the child in order to establish a baseline for the interaction between the parent and child, video-recorded. Future research could focus on coding the videos, focusing on instances of disruptive behavior during lessons. These can then be analyzed to determine if instances of individual disruptive behaviors, such as how many time a child needs to be redirected during lessons, decreased over the course of the intervention.

Overall, the next logical step would be to replicate the study with more students, more teachers, and a more consistent intervention timeline. The study needs to include a more diverse population. This study included two boys and one girl, the participants were aged 7 and 9. The participants were all in the same SES and resided in the same housing facility. The participants also all had T-Scores above 70, putting them in the clinically significant range. Future research should focus on different severity ratings to determine what factor clinical severity plays in whether private music can decrease CDB. Future research also needs to include different demographics in the participant pool. Diversity of race, age, gender, and SES would make any findings more generalizable [29-37].

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