Martial Arts Training for Children with Attention-Deficit/ Hyperactivity Disorder

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Much attention has been paid to the reported increase in Attention-Deficit/Hyperactivity Disorder (ADHD) (Olfson, Gameroff, Marcus, & Jensen, 2003), which currently is estimated to be around 3-7 percent of the school-age population (DSM-IV-TR, 2000). Articles discussing ADHD or advertisements promoting medications are in many magazines; books on the disorder line numerous bookshelves in popular bookstores; and educators at all levels are offering opinions about the disorder and its reported increase. This publicity has created controversy with staunch advocates of support for children with ADHD and others who seriously doubt the very existence of the disorder.

Predominant among interventions for ADHD is the use of medication, primarily in the form of stimulant medications (Olfson et al., 2003; Pary, Lewis, Matuschka, & Lippmann, 2002; Swanson et al., 1998). Pharmacological interventions for ADHD have proven successful in most instances, but as many as a third of children treated do not respond to medications or experience such severe side effects that medication must be discontinued (Wilens, Biederman, & Spencer, 2002). Purdie, Hattie, and Carroll (2002) suggest medications alone do not provide the academic intervention that behavioral interventions provide. Combined treatment programs, behavioral with medication, are considered the most effective (DuPaul & Eckert, 1997; Joughin, Ramchandant, Zwi, 2003).

Several alternative interventions, such as dietary changes and exercise, have been offered in treating ADHD instead of or in addition to medication and behavioral components as part of a combined treatment program (Stubberfield, Wray, & Parry, 1999). Several recent studies (Etscheidt & Ayllon, 1987; Klein & Deffenbacher, 1977; O'Dell & Cook, 2004; Tantillo, Kesick, Hynd, & Dishman, 2002) have suggested the effects of exercise may help reduce the level of symptoms associated with ADHD. However, further research is necessary to determine the effectiveness of exercise with regards to the level, duration, and type.

One form of exercise cited in popular media sources and touted by many of its instructors as an intervention for ADHD is training in the martial arts. However, these popular sources of information [e.g., *Parenting a Child with Attention Deficit/Hyperactivity Disorder* (Boyles & Contadino, 1997), *ADD/ADHD Behavior-Change Resource Kit* (Flick, 1998), *Understanding ADHD* (Green & Chee, 1998) and *ADD and the College Student* (Quinn, 2001)] rely on anecdotal evidence from parents, children, and martial arts instructors and do not cite empirical evidence.

Therefore, I conducted a study to offer empirical evidence for martial arts training as an intervention for ADHD and to determine if further research in the area is warranted. A previous study conducted by Felmet (1998) found some supporting evidence that martial arts training may have positive merits as an intervention for ADHD. However, the outcomes of her hypotheses were statistically inconclusive. Further study was warranted based on the merits of clinical significance (basically, to what extent does the intervention benefit the individual, but which may not be apparent in statistical analysis) to determine if any important changes occurred that could not be readily observed with statistical analysis of small numbers of participants.

The symptoms of ADHD measured in this study were inattention, impulsivity, hyperactivity, and aggression. Inattention, impulsivity, and hyperactivity are the core symptoms of ADHD, while aggression was thought to be a possible problem related to the use of martial arts as an intervention. The martial arts style used was tae kwon

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do, a Korean martial art focusing on discipline, philosophy, health, and self-defense. Tae kwon do is one of the most popular martial arts in the world (Park & Gerrard, 2000) and is widely practiced in the United States. This style of martial arts was chosen since it can easily be found for future use in clinical application.

Method

This study (the author's dissertation) was approved by two institutional review boards and consent was obtained from parents, participants, and school systems. Based on research into the topic, the prevalence of the disorder, the number of children in the researcher's area, and the age requirements of the study, it was expected there would be few participants. These issues, along with the desire to track any possible changes deemed important for future treatment application, required a much different research method than typical methods using statistical analysis. According to a meta-analysis by DuPaul and Eckert (1997), a single-subject, multiple-baseline design was used in 59 percent of 63 ADHD studies conducted between 1971 and 1995 and was deemed appropriate for clinical investigation into the treatment of ADHD.

In single-subject designs, researchers first establish a baseline of the symptoms to later compare to the measures during and after the intervention (Hittleman & Simon, 1997; Zhan & Ottenbacher, 2001). The researcher established a seven-week baseline of the four variables: inattention, impulsivity, hyperactivity, and aggression. The duration of the intervention was set at twelve weeks and measures were obtained from multiple sources, including the participants' parents, their primary teachers in school, and from independent observers in the martial arts classes. A total of seven children participated, but one child dropped out due to lack of interest in the martial arts.

Most researchers agree graphical analysis and the use of statistical analyses, if possible, is appropriate for the single-subject design while suggesting visual analysis may be easiest for parents to understand (Heppner, Kivlighan, &Wampold; Hersen & Barlow, 1976; Kazdin, 1982; Nicol & Pexman, 2003; Zhan, & Ottenbacher, 2001).

Participants

Participants included six children (five boys and one girl) who had been diagnosed with Attention-Deficit/ Hyperactivity Disorder by an appropriate mental health practitioner or pediatrician. Participants were between the ages of six and eleven and were recruited through newspaper advertisements, mental health professionals, and a local school district. Combined diagnoses were allowed and included dyslexia, Asperger's syndrome, oppositional defiant disorder, phonological disorder, and anxiety disorder. Five children were taking some form of medication, which included Adderall, Concerta, and Celexa. Participants were allowed to remain on medication provided they remained consistent with the medication prescribed.

Intervention

The instructor of the tae kwon do school had been teaching a traditional form of tae kwon do for twenty-five years. This traditional form requires adherence to the rules and regulations of the training hall, a philosophical component of the martial arts, and respect of the instructor, advanced students, and the art of tae kwon do. The participants trained for twelve weeks as any typical first-time student would train at the school, which included wearing the traditional uniform, learning traditional punches and kicks, Korean terminology and traditional definitions, obeying the rules of the school, and showing proper respect to the instructors. Typical classes consisted of aerobic exercise, martial art technique training, history, philosophy, and team exercises. Any typical Tae Kwon Do class might consist of a combination of the following: beginning stretching exercises, multiple punches and kicks, combinations of techniques, traditional patterns (forms), traditional one-step sparring techniques, and various relay races and coordination-building games.

Measures

Measures of inattention, impulsivity, hyperactivity, and aggression were assessed by the parents, independent observers and teachers. The two measures used were the Connors' Rating Scale – Revised and the Peer Conflict Scale. The Connors' Rating Scale - Revised is one of the most commonly used ADHD scales (Kollins, Barkley, & DuPaul, 2001) and has been researched and validated (Angello et al., 2003). The CRS-R was used to measure levels of inattention, impulsivity, and hyperactivity in participants. The short form of the CRS-R was used to facilitate repeated measurements and minimize the time required of parents and teachers as much as possible.

In addition to levels of inattention, impulsivity, and hyperactivity, the researcher was interested in determining the effects of martial arts training on levels of aggression. Although aggression and the martial arts have been studied and research suggested martial arts training may actually reduce aggression over time (Daniels & Thornton, 1992; Lamarre & Nosanchuk, 1999; Nosanchuk, 1981; Nosanchuk & MacNeil, 1989; Trulson, 1986; Zivin et al., 2001), none of these researchers had studied the combination of martial arts, aggression, and children with ADHD. Since the CRS-R does not adequately measure aggression, the Peer Conflict Scale was completed by parents, observers, and teachers and used to measure levels of physical aggression.

Results

Data obtained from parents, observers, and school teachers suggest a positive effect of martial arts training for the participants. Results for levels of inattention, impulsivity, and hyperactivity as indicated by the parents for each participant are recorded in Table 1. The results for the same levels as reported by school teachers are offered in Table 2.

Table 1

Summary of Change for the Dependent Variables for Participants – Parent Report

Dependent Variable	Decrease in Scores (positive change)	No Change in Scores (only 1 point change in scores in either direction)	Increase in Scores (negative change)
Inattention	Three	One	Four
	Five Six	Two	
Impulsivity	Two Five Six	One Three	Four
Hyperactivity	Three Five Six	One Two	Four
Aggression	One Two Three	Five Six	Four

Table 2

Summary of Change for the Dependent Variables for Participants – Teacher Report

Dependent Variable	Decrease in Scores (positive change)	No Change in Scores (only 1 point change in scores in either direction)	Increase in Scores (negative change)
Inattention	Three	One	
	Five Six	Two Four	
Impulsivity	Three Six	One Two Five	Four
Hyperactivity	One Three Five Six	Two	Four
Aggression		One Two Three Four Five Six	

Participant One

Participant One was an eleven-year-old boy diagnosed with ADHD, predominately inattentive type, and Asperger's syndrome. He was taking Adderall during the study. As can be seen in Figure 1 and Table 1, he exhibited very little change in behaviors. Parent reports showed only slight changes after the intervention was introduced. Aggressive behavior had been on the increase during the baseline, but leveled out during the intervention. Observer reports during the martial arts classes showed consistent results and with the general curve trend discussed earlier. Teacher reports (Table 2) indicated little change in the school environment with the exception of a four-point drop in hyperactive behavior. Although Participant One had virtually no change in behaviors, his mother indicated she could see no drawbacks to his participation.

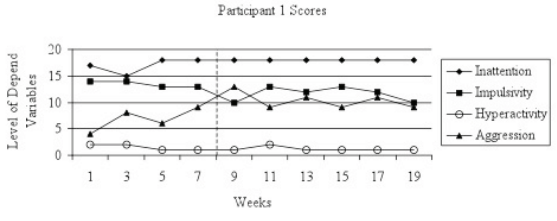

Figure 1. Participant 1 Scores – Parent Report

Participant Two

Participant Two was a seven-year-old boy diagnosed with ADHD, combined type. In addition, he was diagnosed with oppositional defiant disorder and phonological disorder and was taking Concerta. As can be seen in Figure 2 and Table 1, parent reports indicated he had reductions in all areas. Again, he followed the same trend in observer reports discussed earlier. However, his levels of inattention, impulsivity, and hyperactivity were reported by observers at higher levels than those reported by parents. Although changes occurred based on parent and observer reports, teacher reports (Table 2) indicated no change in behaviors in the school environment. Participant Two's mother stated she could see positive changes in impulse control and the training program was beneficial.

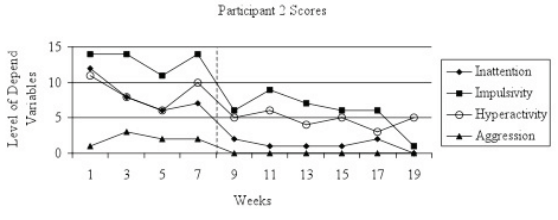

Figure 2. Participant 2 Scores – Parent Report

Participant Three

Participant Three, also seven years old, was diagnosed with ADHD, no specific type, and was taking Adderall. As can be seen in Figure 3 and Table 1, parent reports indicated he had reductions in all areas. Observer reports indicated the same trend in levels of inattention, impulsivity, and hyperactivity found in the other participants. In addition, teacher reports (Table 2) indicated reductions in inattention, impulsivity, and hyperactivity, but no change in level of aggression. His mother stated he loved going to tae kwon do classes and she had noticed obvious positive changes in his behaviors.

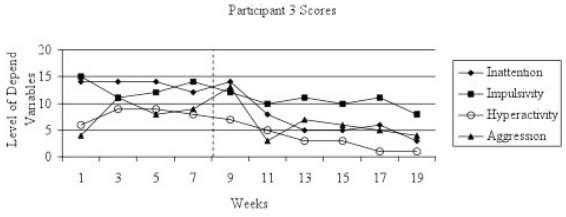

Figure 3. Participant 3 Scores – Parent Report

Participant Four

Participant Four was a nine-year-old boy diagnosed with ADHD, no specific type. He also was diagnosed with oppositional defiant disorder and was taking Concerta. As can be seen in Figure 4 and Table 1, parent reports indicated that his behaviors were consistent until weeks thirteen, fourteen, and fifteen (six, seven, and eight of the intervention) when levels began to increase. After the increase, levels began to decline again later during the intervention. Observer reports indicated the same trend in behaviors the other participants followed (low levels followed by an increase and then a reduction during the course of the intervention). However, teacher reports (Table 2) indicated slight increases in all four dependent variables. Participant Four was the only child in the study to have a negative change. Interestingly enough, his mother did not attribute the changes to martial arts training. She stated his change in behaviors was due to changes in events at home. This may be accurate, as the increases did not occur until almost half way through the intervention. As confirmed by parent reports on the CRS-R and highlighted in Table 1, his mother stated he was acting better near the end of the study.

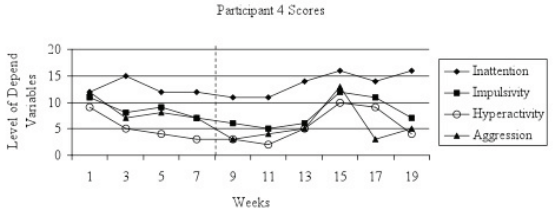

Figure 4. Participant 4 Scores – Parent Report

Participant Five

Participant Five was a nine-year-old girl diagnosed with ADHD, predominately inattentive type. She also was diagnosed with a anxiety disorder and was taking Celexa during the study. As can be seen in Figure 5 and Table 1, parent reports indicated she had reductions in all four areas. Observer reports indicated the same trend in levels of inattention, impulsivity, and hyperactivity found in the other participants and no change in levels of aggression. Teacher reports (Table 2) indicated little change. Her mother was excited by the results, stating this was the first sport her child had not quit. Her mother stated the girl's grades were better and she was more focused.

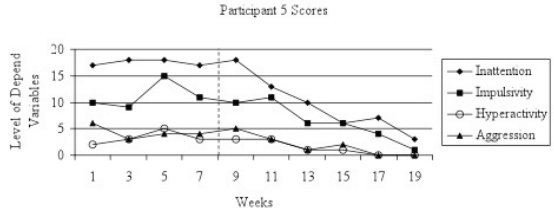

Figure 5. Participant 5 Scores – Parent Report

Participant Six

Participant Six was a nine-year-old boy diagnosed with ADHD, combined type. He also was diagnosed with dyslexia and a learning disability in math, but was not taking medication. As can be seen in Figure 6 and Table 1, parent reports indicated he had reductions in all four areas. Observer reports indicated the same trend in levels of inattention, impulsivity, and hyperactivity found in the other participants and no change in levels of aggression. Teacher reports (Table 2) indicated slight reductions in inattention, impulsivity, hyperactivity and no change in level of aggression. His mother also was enthusiastic about the martial arts training. She stated his energy had been redirected and believed the martial arts were good for discipline and control.

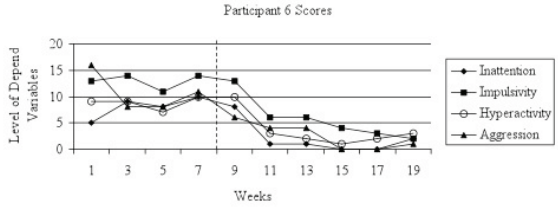

Figure 6. Participant 6 Scores – Parent Report

Discussion

Although the number of participants in this study was small, the results of this study, combined with the ample anecdotal evidence offered by martial arts participants and instructors, are encouraging and suggest additional study is warranted. Results certainly varied among individuals (see Table 1 and Table 2), but data from four of the six participants indicated tae kwon do training had a positive impact on common symptoms associated with ADHD. Although Felmet's (1998) initial research with martial arts offered little statistical significance, many of her hypotheses showed evidence that results were in a positive direction, which points to clinical significance not apparent with statistical analysis. These results support the idea that perhaps the intervention may be clinically helpful although not statistically significant. Interestingly, the children who attended martial arts classes most frequently exhibited the greatest changes in observed behaviors and those who attended the fewest classes showed the least amount of change.

Overall, observer reports showed little variation and indicated no change in behavior scores from the beginning of training to the end. However, most of the reports of the independent observers displayed an interesting trend. Nearly each of the participants started with no problem behaviors during the tae kwon do classes. It may be this should have been expected since the children were placed in a novel situation that resulted in greater levels of attention and lower levels of problem behaviors. However, levels of inattention, impulsivity, and hyperactivity increased during the third week and then returned to lower levels during the course of the training to indicate no differences in scores from beginning to end. These results possibly highlight the trend in a reduction of behaviors in novel situations, a return to more common problem behaviors upon familiarity with the situation, and then a reduction of behaviors based on the intervention. Furthermore, there were no changes in levels of aggression in any of the participants as indicated by independent observers.

Although this study included girls as participants, one withdrew from the study and only one girl remained in the classes. Few studies are conducted with girls as participants, possibly because the prevalence of the disorder is higher in boys (DSM-IV-TR, 2000). However, Brown (2000) and Green and Chee (1998) suggest girls could possibly be impacted more by ADHD than boys as girls have fewer signs of hyperactivity and may go untreated. The fact more women are becoming involved in the martial arts and the one female participant showed some evidence of improvement in symptomatology could lead to further research in the area of female participants.

Certainly, more research using the martial arts as an intervention for ADHD is warranted. Larger groups are required to offer statistical significance to the results, while additional studies could include more control for sex, diagnosis, age, martial arts style, and duration. In particular, one area that needs to be researched deals with the difference between martial arts and exercise as interventions. As there is limited research in the area of martial arts as an intervention for ADHD, much of the supporting evidence for this study came from exercise as an intervention. Since there is a strong commitment to discipline and dedication in the martial arts, certainly in the traditional martial arts styles, this may have an impact on the individual different from other forms of exercise. The philosophical and behavioral components of the martial arts, such as rules, regulations, demand for respect, and the philosophical nature of self-improvement and citizenship, were not controlled for in this study. It is unclear whether these components had any more effect than exercise alone.

The results offer initial empirical evidence to support the anecdotal information offered in the popular sources discussing interventions for ADHD. The initial findings are hopeful and point toward an area where additional research is necessary. Training in the martial arts may be an effective component of a treatment program for children with ADHD. However, it should be cautioned individual differences confound the effects and further studies with larger numbers of participants and other martial arts styles are required. The martial arts are not offered as a cure-all for ADHD, but as one component of a comprehensive treatment plan for children with ADHD.

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