Attention Deficit Hyperactivity Disorder: benefits from Tai Chi

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Thirteen adolescents with Attention Deficit Hyperactivity Disorder (ADHD) participated in Tai Chi classes twice a week for 5 weeks. Teachers rated the children's behaviour on the Conners Scale during the baseline period, after the 5 week Tai Chi session period and 2 weeks later. After the 10 Tai Chi sessions the adolescents displayed less anxiety, improved conduct, less daydreaming behaviours, less inappropriate emotions, and less hyperactivity. These improved scores persisted over the 2-week follow up (no Tai Chi period).

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Attention Deficit Hyperactivity Disorder (ADHD) is characterized by cognitive and behavioural deficits including inattention, impulsivity and hyperactivity levels inappropriate for age and gender (DSM-IV, American Psychiatric Association 1994). Although shortterm improvements have been reported in behavioural, academic and social functioning with stimulant drug therapy, such as methylphenidate or Ritalin (Tannock, et al. 1989; Swanson et al. 1995), side-effects such as motor tics, insomnia, headaches and social withdrawal make this treatment controversial (Handen et al. 1991; Parraga & Cochran 1992).

Other non-pharmacological treatments include counselling, parent/family training in behaviour modification techniques, relaxation and massage therapy. Counselling treatments have received little empirical attention, therefore observed effects are mostly anecdotal (Schwiebert et al. 1995).

In behaviour modification, the environment is structured to facilitate the child's performance (Blakemore, et al. 1993) and considerable efforts are taken to facilitate attention, including scheduling changes, rearranging home and classroom settings, and training teachers, parents and siblings differential reinforcement techniques. One study found that ADHD adolescents have a weak behavioural inhibition system (Iaboni et al. 1997), which makes them poor candidates for behavioural programs (e.g. fail to show increased skin conductance levels during extinction; show faster heart rate habituation following reward). Although relaxation therapy has alleviated depression in adolescents (Platania-Solazzo et al. 1992), it has had limited effects in treating ADHD (Field et al. 1998a), probably because depression is not a symptom associated with ADHD. Massage therapy, in contrast, has been effective in increasing time spent on task, reducing fidgeting, improving mood and lowering hyperactivity scores in adolescents with ADHD (Field et al. 1998a), perhaps because massage therapy enhances parasympathetic activity and reduces stress hormone levels (see Field 1998 for a review).

The Chinese martial art, Tai Chi, might be an alternate nonpharmacological therapy for ADHD children because of its documented health benefits for older age groups. Although no pediatric literature exists, adult and geriatric studies reveal that Tai Chi reduces symptoms associated with stress and stress hormone levels (Jin 1989), as well as anger and confusion, increases positive affect and improves mood (Brown et al. 1995; Jin 1992), reduces blood pressure (Charmer et al. 1996), improves balance (Wolfson et al. 1996) and psychosocial well-being (Wolf et al. 1996). The present study examined the effects of Tai Chi on anxiety, mood, hyperactivity and conduct in children with ADHD.

Method

Participants

Thirteen adolescents (11 males), with a mean age of 14.5 years, (R= 13-16) with a DSM-IV diagnosis of ADHD were recruited
from a remedial school for adolescents with develoynental problems. The parents provided written informed consent allowing their children to participate in the study and the children signed assent forms of their willingness to participate in the study. The adolescents came from middle class families (M = 2.2 on Hollingshead Two Index Factor) and were ethnically distributed 70% white anglo, 15% hispanic and 15% african american.

Procedure

An $A_1B_1A_2$ design was used consisting of a baseline phase (without Tai Chi) (A,), a 5-week Tai Chi phase (B), and a 2-week followup phase without Tai Chi (A_2). The teachers were asked to complete the Conners Teacher Rating Scale three times, (1) at baseline (2-weeks prior to Tai Chi phase), (2) at the end of the 5-week Tai Chi program and (3) 2-weeks later.

Tai Chi

The adolescents were taught Tai Chi postures twice a week over 5 weeks. Each class was 30-min long and occurred mid-afternoon. Each session began with slow raising and lowering of the arms in synchrony with breathing exercises for 5 min. The adolescents were then taught to
perform slow turning and twisting movements of the arms and legs, shifting body weight from one leg to the other, rotating from side to side and changing directions in a sequence of Tai Chi forms.

ConnersTeacher Rating ScaleRevised (CTRS-R; Goyette et a1.1978) This 28 item teacher rating scale yields a total hyperactivity score in addition to the subcategories of anxiety, asocial behavior, conduct, dreaming, emotion and hyperactivity. Test-retest reliability coefficients of 0.97 have been reported over a 1-week period for this scale (Goyette et al. 1978).

Results

Repeated measures analyses of variance and subsequent post hoc tests were performed on the subcategories and total hyperactivity score of the Conners. As can be seen in Table 1, repeated measures effects were obtained for all but the asocial scale.

Alpha corrected t-tests suggested the following baseline to Tai Chi therapy changes from teacher ratings: during Tai Chi the children displayed (1) less anxiety,
(2) improved conduct, (3) less daydreaming, (4) less inappropriate emotions, and (5) less hyperactivity. These improved scores persisted over the 2-week follow-up (no Tai Chi period).

Table 1 Means (and standard deviations in parentheses) on Conner's Teacher Rating Scale for baseline, Tai Chi and 2-week follow-up period

Variables	Baseline first day	Tai Chi last day No	Tai Chi2-weeks later	F=	P-value
Conner's					
Anxiety	56.7 (1 1.3)$_a$	43.5 (9.6)b^3	44.5(6.3)b^3	11.94	0.000
Asocial	52.3 (15.2)$_a$	46.5 (9.7)$_a$	48.7(10.9)$_a$	1.42	0.262
Conduct	56.2 (8.0)~	49.0 (11.8)b$^{'}$	50.5(11.9)b$^{'}$	5.18	0.013
Daydream	61.0 (6.4),	48.4 (11.6)b^3	50.5(7.0)b'	13.75	0.000
Emotion	60.4 (8.9),	50.2 (13.5)$_b$^{2}	52.0(12.3)b^2	9.04	0.001
Hyperactive	60.1 (7.9)$_a$	45.8 (10.1)b$^{\circ}$	51.7(8.2)b$^{\circ}$	23.25	0.000
Total hyperactivity	81.5 (11.6)$_a$	58.6 (17.8)b$^{\circ}$	66.2(13.9)$_b$$^{\circ}$	19.49	0.000

Lower score is optimal. Different letter subscriptindicates different means.

Different number superscript indicates level of significance (^{1}P=0.05, ^{z}P = 0.01, ^{3}P = 0.005, $^{\circ}$P = 0.001).

Discussion

The results of this study and our earlier massage therapy study (Field et al. 1998) provide encouraging support for two alternative therapies for treating adolescents with ADHD. These positive effects of Tai Chi on adolescents with ADHD parallel the effects reported for adults including reduced mental and emotional stress (Jin 1992) and improved mood (Jin 1989). Although stress hormone levels were not assayed in this study, the adolescents were perceived by their teachers as being less anxious, emotional and hyperactive following Tai Chi. The adult literature has reported reduced stress hormones

(cortisol) with Tai Chi (Jin 1992). Longer term effects of Tai Chi were also reported by the teachers, suggesting carry over Tai Chi effects for as long as 2 weeks.

Tai Chi research on adults has identified changes in cardiovascular, respiratory, electroencephalographic, and biochemical levels (e.g. lower cortisol stress hormone levels) (Brown et al. 1989; Jin 1989). Reduced sympathetic activity or enhanced parasympathetic activity has been considered a potential underlying mechanism (Hsu et al. 1985). This mechanism might also account for the marked behavioural changes observed in the adolescents in this study and our earlier ADHD massage study (Field et al. 1998a). Alternative hypotheses include that the positive findings in the present Tai Chi study might have resulted from the breathing exercises or from the children developing a relationship with their Tai Chi instructor. Future studies might include a breathing control group and two or more Tai Chi instructors to examine these potential confounding factors. However, the lower stress hormone levels (cortisol) observed following at least the massage therapy in our other studies (Field 1998; Field et al. 1998b; Ironson et al. 1996) is consistent with a mechanism of enhanced parasympathetic activity.

Future studies might also examine Tai Chi and massage th.rapy effects for reducing stress hormones (e.g. salivary cortisol or urinary catecholamines) in adolescents with ADHD. The comorbidity of ADHD with other psychiatric disorders, such as depression and anxiety, and the potential side effects of a multidrug therapy makes Tai Chi and massage therapy attractive complementary treatments. In addition to little or no side effects, especially appealing are the documented effects of Tai Chi and massage therapy for reducing anxiety and hyperactivity, the major and most difficult symptoms to manage in children with ADHD.

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REFERENCES

American Psychiatric Association 1994 Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition. American Psychiatric Association, Washington

Blakemore B, Shindler S, Conte R 1993

A problem solving trainir.r program for parents of children with attention deficit hyperactivity disorder. Canadian Journal of School Psychology 9(1): 65-85

Brown DD, Mucci WG, Hetzler RK, Knowlton RG 1989 Cardiovascular and ventilatory responses during formalized Tai Chi Chuan exercise. Res Q Exerc Sport 60: 246-250

Brown DR, Wang Y, Ward A et al. 1995 Chronic psychological effects of exercise and exercise plus cognitive strategies. Medicine, Science and Sports Exercise 27: 765-775

Charmer KS, Barrow D, Barrow R, Osborne M, Ives G 1996 Changes in haemodynamic parameters following Tai Chi Chuan and aerobic exercise in patients recovering from acute myocardial infarction. Postgraduate Medical Journal 72(848): 347-351

Field T 1998 Massage therapy effects. American Psychologist 53: 1270-1281 Field T, Quintino O, Hernandez-Reif M, Koslovsky G 1998a Adolescents with Attention Deficit Hyperactivity Disorder Adolescents Benefit from Massage Therapy. Adolescence 33: 103-108 Field T, Schanberg S, Kuhn C et al. 19986 Bulimic adolescents benefit from massage therapy. Adolescence 33: 555-563

Field T, Seligman S, Scafidi S, Schanberg S 1996 Alleviating Posttraumatic Stress in Children Following Hurricane Andrew. Journal of Applied Developmental Psychology 17: 37-50

Goyette CH, Conners CK, Ulrich RF 1978 Normative data on Revised Conners Parent and Teachers Rating Scales. Journal of Abnormal Child Psychology 6: 221-236

Handen BL, Feldman H, Gosling A, Breaux AM, McAuliffe S 1991. Adverse side effects of methylphenidate among mentally retarded children with ADHD. Journal of the American Academy of Child and Adolescent Psychiatry 30: 241-245

Hsu L, Wang S, Kappagoda CT 1985 Effect of Tai Chi Chua on the response to the treadmill exercise. In Stress and Heart Disease (Edited by Beamishm RE, Singal PK, Dhalla NS) Boston: Martinus Nijhoff

Iaboni F, Douglas V, Ditto B 1997 Psychophysiological response of ADHD children to reward and extinction. Psychophysiology 34: 116-123

Ironson G, Field T, Scafidi F et al. 1996 Massage therapy is associated with enhancement of the immune system's cytotoxic capacity, Inter J Neuroscience 84: 205-217

Jin P 1989 Changes in heart rate, noradrenaline, cortisol and mood during Tai Chi. Journal of Psychosomatic Research 33: 197-206

Jin P 1992 Efficacy of Tai Chi, brisk walking, meditation and reading in reducing mental and emotional stress. Journal of Psychosomatic Research 36: 361-370 Parraga HC, Cochran MK 1992 Emergence of motor and vocal tics during imipramine administration in two children. Journal of Child and Adolescent Psychopharmacology 2: 227-234

Platania-Solazzo A, Field T, Blank J, Seligman F, Kuhn C, Schanberg S, Saab P 1992 Relaxation therapy reduces anxiety in child and adolescent psychiatric patients. Acta Paedopsychiatrica 55: 115-120

Schwiebert V, Sealander K, Tollerud T 1995 Attention-deficit hyperactivity disorder: An overview for school counselors. Elementary School Guidance & Counseling 29: 249-259

Swanson JM, McBurnett K, Christian DL, Wigal T 1995 Stimulant medication and treatment of children with ADHD. In TH Ollendick & RZ Prinz (Eds.) Advances in clinical child psychology 17:265-322

Tannock R, Schachar R, Carr R, Logan G 1989 Dose-response effects of methylphenidate on academic performance and overt behavior in hyperactive children. Pediatrics 84: 648-657

Wolf SL, Barnhart HX, Kutner NG, McNeely E, Coogler C, Xu T 1996 Reducing frailty and falls in older persons: an investigation of Tai Chi and computerized balance training. Atlanta FICSIT Group. Frailty and Injuries: Cooperative studies on intervention techniques. Journal of the American Geriatrics Society 44(5): 489-497

Wolfson L, Whipple R, Derby C, Judge J, King M, Amerman P, Schmidt J, Smyers D 1996 Balance and strength training in older adults: intervention gains and Tai Chi maintenance. Journal of American Geriatrics Society 44(5): 498-506