

## Background

Learning Disabilities (LD) are neurobiological disorders affecting the ability to acquire, organize, retain, understand and use information<sup>1</sup>. Attention-Deficit/Hyperactivity Disorder (ADHD), characterized by cognitive impairments and developmentally inappropriate or excessive behaviour<sup>2</sup>, frequently co-occurs with LD. Students with LD and ADHD often experience academic difficulties, social problems, and mental health issues. Traditional psychosocial treatments are often viewed as stigmatizing for adolescents, and pharmacological treatments are associated with negative side effects for some youth. There is a need for alternative interventions targeting the behavioural, social and mental health difficulties of youth with LD and ADHD.

A growing body of evidence supports the use of mindfulness meditation as a complementary or alternative treatment for a variety of health and mental health issues in adults.<sup>3</sup> Mindfulness is the non-evaluative, present-centered awareness that results from the deliberate focusing and refocusing of attention on sensations, thoughts and feelings as they arise on a moment-by-moment basis.<sup>4</sup> Recent research suggests that mindfulness training improves attention, executive control and psychological well-being in children and adolescents.<sup>5</sup>

## Mindfulness Martial Arts Program Description

MMA is a 20-week manualized program<sup>6</sup> designed to increase self-awareness, self-control, adaptability, and social skills in adolescents with LD. Each session combines elements of mindfulness, cognitive behavioural therapy (CBT), and mixed martial arts. Concepts and skills are introduced gradually through didactic teaching, modeling, role-playing and scaffolding by the therapist instructor. Progress is monitored by weekly logs and individual meetings with youth, parents and the therapist instructor. Effort and achievement of program goals are rewarded with points. When students reach predetermined point levels, they are promoted to the next belt level.

## Objective

To investigate whether the MMA program is an effective intervention for the behavioural, social, and mental health difficulties of adolescents with LD and co-occurring difficulties.

## Methods

### Participants

N = 65 (33 MMA, 32 WL) Age = 12-18 years ( $M=13.84$ ,  $SD=1.33$ ) Gender = male

### Measures

Wechsler Abbreviated Scale of Intelligence (WASI)  
Woodcock-Johnson Tests of Academic Achievement-3<sup>rd</sup> Edition (WJ-III)  
Conners' Parent Rating Scales-Revised (CPRS)  
Behavior Rating Inventory of Executive Function – Parent Form (BRIEF)  
Child Behaviour Checklist (CBCL)  
Youth Self-Report (YSR)  
Modified Mindful Attention Awareness Scale (MMAAS)

### Procedure

Participants with LD were recruited from Integra, a children's mental health agency serving children and adolescents with LD in Toronto, Ontario. Participants were assigned to the MMA group or the waitlist control (WL) group. Data was collected from participants and their parents at pre-test, post-test, and 3-month follow-up (follow-up conducted with MMA group only).

## Data Analyses

All analyses were conducted on the subscale T-scores of each measure, with the exception of the MMAAS, which yielded a total average score rather than T-scores. Independent *t*-tests were conducted to explore group differences on baseline scores at Time 1. Differences in change on outcome variables after the intervention period were assessed using a 2 (group: MMA vs. WL) by 2 (time: Pre-test vs. post-test) repeated measures analysis of variance (ANOVA).

## Results

Unless otherwise noted, there were no differences in baseline scores at pre-test. Only significant Group or Group x Time interaction effects are reported below.

### Total Sample

Although there were several significant time effects, indicating changes in both groups over the intervention period, no significant Group or Group x Time interactions were found for any of the measures.

### Subgroup: ADHD Diagnosis

A total of 14 MMA and 11 WL participants had comorbid LD and ADHD diagnoses. A significant Group x Time interaction effect was observed for CBCL externalizing problems  $F(1,19) = 5.97$ ,  $p < .05$ , partial  $\eta^2 = .24$ , oppositional defiant problems  $F(1,19) = 7.41$ ,  $p < .05$ , partial  $\eta^2 = .28$ , and conduct problems  $F(1,19) = 9.91$ ,  $p < .01$ , partial  $\eta^2 = .34$ . No significant Group or Group x Time effects were found on the BRIEF or YSR.

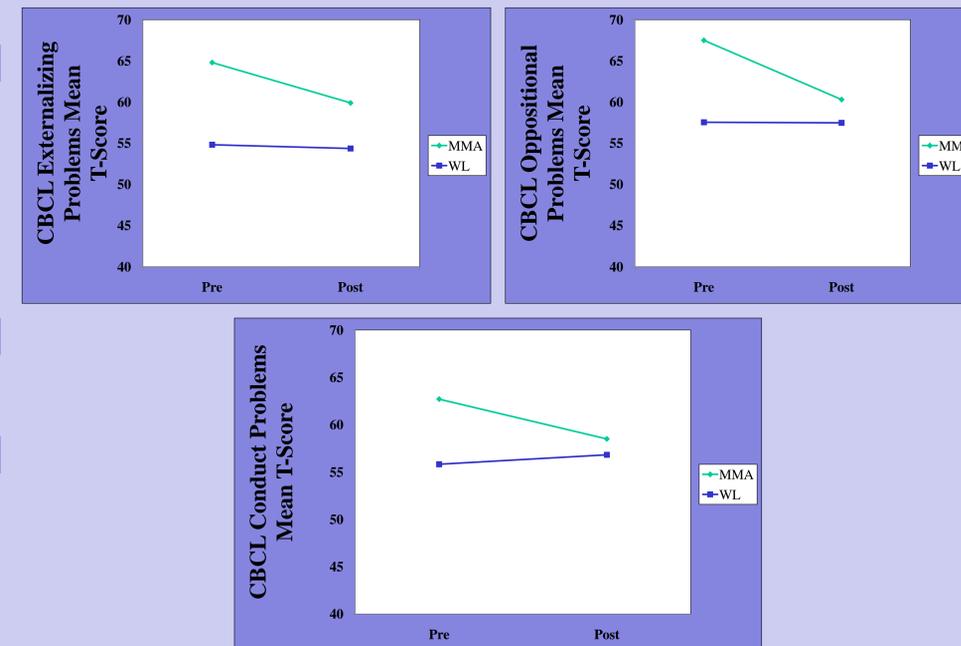


Figure 1. Changes in parent-rated externalizing symptoms (top left), oppositional defiant problems (top right), and conduct problems (bottom) in a sample of adolescents with comorbid LD/ADHD diagnoses.

### Subgroup: Hyperactive/ Impulsive Symptoms

A total of 29 (12 MMA, 17 WL) participants had a T-score of 65 or greater on the DSM H/I subscale of the CPRS. At pre-test, youth in the WL group reported significantly higher levels of CBCL externalizing problems ( $M=61.47$ ,  $SD=11.07$ ),  $t(27) = -2.30$ ,  $p < .05$ , and CBCL conduct problems ( $M=63.06$ ,  $SD=9.61$ ),  $t(27) = -2.56$ ,  $p < .05$ , than did youth in the MMA group ( $M=51.92$ ,  $SD=10.99$  and  $M=55.67$ ,  $SD=5.93$ , respectively). At post-test, a significant Group x Time interaction effect was observed for externalizing problems  $F(1,23) = 4.57$ ,  $p < .05$ , partial  $\eta^2 = .17$ , and conduct problems  $F(1,23) = 5.11$ ,  $p < .05$ , partial  $\eta^2 = .18$ , with the WL group showing a decrease in symptoms and the MMA group showing an increase in symptoms in both cases.

Repeated measures ANOVA revealed a significant Group x Time interaction for monitoring problems on the BRIEF,  $F(1,22) = 6.90$ ,  $p < .05$ , partial  $\eta^2 = .24$ . A significant Group x Time interaction effect was observed for social problems on the CBCL,  $F(1,22) = 10.20$ ,  $p < .01$ , partial  $\eta^2 = .32$ . These results are displayed in the following panel.

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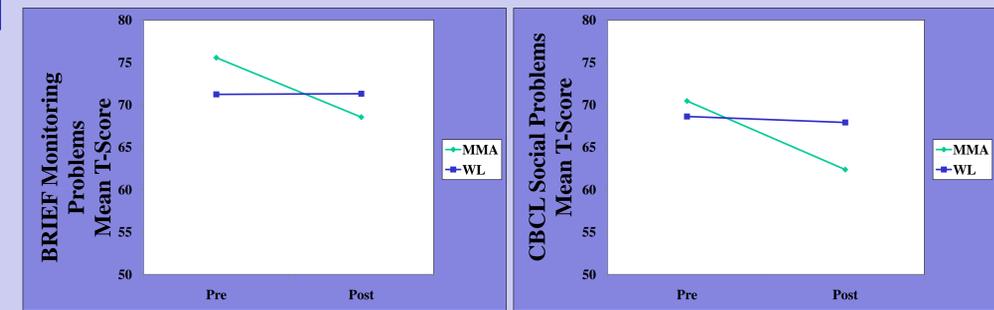


Figure 2. Changes in parent-rated monitoring difficulties (left) and social problems (right) in adolescents with hyperactive/impulsive symptoms.

### Subgroup: Inattentive Symptoms

A total of 33 participants (15 MMA, 18 WL) had a T-score of 65 or greater on the DSM Inattentive subscale of the CPRS. On the CBCL, the following Group x Time interaction effects approached significance: externalizing problems, social problems, and DSM oppositional defiant problems. No significant Group or Group x Time effects were found on the BRIEF or YSR.

### Subgroup: Anxiety

A total of 29 participants (12 MMA, 17 WL) had a T-score of 65 or greater on the anxious/shy subscale of the CPRS. At pre-test, parent ratings on the CBCL Syndrome Scale: Anxious/Depressed were significantly higher for the WL group ( $M=69.53$ ,  $SD=8.48$ ) than the MMA group ( $M=62.55$ ,  $SD=7.08$ ) at Time 1,  $t(26) = 2.27$ ,  $p < .05$ . Repeated measures ANOVA revealed a significant Group x Time interaction effect for DSM anxiety problems on the YSR ( $n=11$ MMA,  $15$ WL),  $F(1,24) = 7.65$ ,  $p < .05$ , partial  $\eta^2 = .24$ . No other significant Group or Group x Time effects were found.

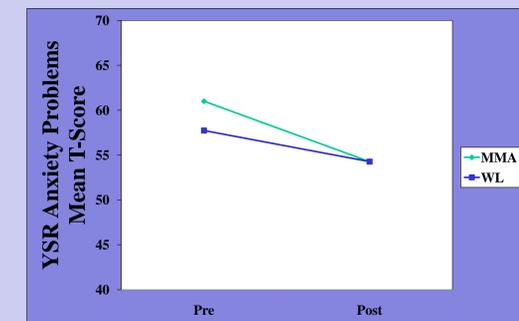


Figure 3. Changes in self-reported DSM anxiety symptoms in a sample of adolescents with high levels of parent-rated anxiety symptoms.

## Mindfulness Levels

The mindfulness questionnaire was piloted with 10 MMA participants. A paired samples *t*-test revealed no significant change in self-reported mindfulness from pre-test to post-test.

## Discussion

Mindfulness training shows promise for the management of behavioural, emotional and social difficulties experienced by youth with LD. The group format of MMA is cost-effective for agencies with large client loads and extensive waiting lists. Since results of the current study suggest that MMA has different impacts for clients with different clinical profiles, children should be screened for attention problems and anxiety prior to enrolment in MMA so agencies can offer their clients interventions with the most potential for impact.

## References

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