

# Can The Cognitive Parameters Of College Students With Learning Disabilities Benefit From Using Mahapraan, A Breathing Based Preksha Meditation?

Samani Unnata Pragya, Florida International University, USA

Gabriela Cordoba, Nova Southeastern University, USA

Joselin Chui, Florida International University, USA

Neelam D Mehta, University of Miami, USA

Paulette Johnson, Florida International University, USA

Devendra I Mehta, Florida State University, USA

Naina Mehta, Children's Medical Services, Florida, USA

## ABSTRACT

*The efficacy of meditation in cognitive improvement is inadequately studied in college students with learning disabilities. Mahapraan, a short technique taught in Preksha Dhyana, is a simple technique that involves repeated deep breathing followed by a long buzzing sound. In this pilot study, we compared cognitive and pulmonary function changes in college students with and without learning disabilities (LD and no-LD respectively).*


*Methods: Following IRB approval, we recruited 6 LD and 9 no-LD students. The students practiced Mahapraan with a trained instructor 3 times a week for 30 minutes. We assessed Connors Continuous Performance Test II, duration of buzzing sound during prolonged expiration, and peak flow using a Peak Flow meter at baseline and at 4 weeks.*

*Results: At baseline, the LD students had poorer cognitive function than the no-LD group. Discrimination power as measured by detectability, and the consistency of reaction showed improvement ( $p < 0.05$ ) in LD group. The no-LD students showed significant increase in speed of response. Both groups showed improvement in the duration of buzzing (10/13, 77%), by an average of 6.8 seconds as well as improvements in Peak Expiratory Flow (11/13, 85%), by an average of 107.5 mls (n.s.).*

*Conclusion: Except for better consistency and improved discrimination in LD from baseline, cognitive test changes were similar in both groups. We saw improvement in buzzing duration and Peak Expiratory Flow rates in both groups suggesting similar development of technique. Mahapraan shows promise as a simple technique for cognitive improvement and pulmonary function in both LD and no-LD groups.*

**Keywords:** Mahapraan; Meditation; Preksha Dhyana; Learning Disabled; Pulmonary Function; College Students; Cognitive; Yoga

## INTRODUCTION

editation is being increasingly adopted in higher education for measurable benefits, with studies showing increased focus and attention (Bush, 2006; Jha, Krompinger, & Baime, 2007), mirrored by studies in adolescents (Black, Milam, & Sussman, 2009). However, studies concerning students with learning disabilities in higher education are limited and have not shown efficacy consistently

(Krisanaprakornkit, Krisanaprakornkit, Piyavhatkul, & Laopaiboon, 2010). In addition, the studies had been poorly designed with few randomized controlled trials (Serwacki & Cook-Cottone, 2012). Recently, *Mahapraan* and yoga as part of a multimodal approach was found effective in a longitudinal study in children with attention deficit hyperactivity disorder (ADHD) (Mehta et al., 2011; Mehta et al., 2012), suggesting that a possible benefit in college-age students may also be determined. *Mahapraan* is a form of Naad (Suriji Maharaja, 1997), or sound-based meditation, taught by Acharya Mahapragya as part of his Jain yoga system called *Preksha Dhyana* or *Preksha* Meditation (Mahapragya, 1994). Naad means sound, and can be either inner bodily or ambient sounds, or, as used in this study, basic universal sounds. *Mahapraan* is a bee-like buzzing sound made with closed lips during exhalation. This is done with multiple deep breaths for several seconds at a time, while focusing on the vibrations created in order to achieve intense concentration. Indeed, such sounds or mantras centered around specific vibrations are often incorporated as the initiation of common meditation techniques. The advantages of using *Mahapraan* as the main method include its simplicity in practice and ability to measure progress, as well as its adherence to prescribed frequency based on changes in physiological parameters, such as increasing length of expiration or improved pulmonary function, which have proved to be a result of its consistent use (Mehta et al., 2011). Simplicity not only increases the likelihood of students with learning disabilities being able to adopt the technique, but also enables the technique to spread readily, with minimal cost incurred for training. Conversely, the variety of methods, including sitting meditation, breathing techniques, and yoga used (Black et al., 2009; Jha et al., 2007), required trained teachers and substantial initial investment of time and money to instruct. Our goals for this pilot study are (a) to compare how well students with learning disabilities learn relative to their peers in terms of their ability to adopt the *Mahapraan* technique; and (b) to assess subsequent physiological changes, specifically the increase in the duration of expiration while buzzing, the increase in peak expiratory flow rate as biomarkers, and cognitive function/attention. This would allow us to plan prospective controlled studies.

#### **METHOD:**

We enrolled a total of 15 Florida International University (FIU) student volunteers after obtaining Institutional Review Board (IRB) approved consents. Of these, 6 had learning disabilities (LD) and 9 had no learning disabilities (no-LD). Both the LD and No-LD groups were undergraduate students aged between 18 and 26.

Subjects: At FIU, a learning disability is defined according to the National Joint Committee on Learning Disabilities as a “heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning, or mathematical abilities,” but not primarily due to other handicapping conditions, environmental influences, or cultural influences (“Definition of learning,” 2010). It is not a form of mental retardation or emotional disorder. These students’ disabilities had associated conditions, which included Attention Deficit Disorder (3 students), Asperger’s syndrome (1 student), head injury (1 student), and anxiety and depression (1 student). The specific disabilities were diagnosed based on the personal data submitted by the students, and reaffirmed by the Disability Resource Center at FIU.

#### **Intervention**

The students were assembled together in sessions and were taught Mahapraan. Three trained practitioners supervised the sessions.

#### **PROCEDURE:**

##### **First session plan:**

- Introduction to *Preksha Dhyana* history, meaning and approach was presented.
- Meditation: Total duration of 21 mins
- 2 mins. relaxation
- 7 mins. buzzing
- 3 mins. yellow color
- 7 mins. buzzing
- 2 mins. relaxation
- Q and A: 5 minutes

**Subsequent sessions:**

- Meditation: Total duration of 30 mins
- 3 mins. relaxation
- 11 mins. buzzing (with a different hand posture moving but eyes closed)
- 3 mins. yellow color
- 11 mins. buzzing (with stable static position)
- 2 mins. relaxation
- Q and A: 5 minutes

At baseline and at 4 weeks respectively, we collected Connors CPT II test (Homack & Riccio, 2009) Version 5.2 for Windows®, Peak flow (MicroDirect Microlife Digital Peak Flow Meter) in triplicate, (maximum value used) and length of Buzzing (measured in seconds, in triplicate, maximum used) data.

**DATA management:**

Data was retrieved from CPT II software or directly entered into an Excel spreadsheet. The data entry team members and statistician were unbiased, as the identity of the participants was not revealed. SPSS™ (Armonk, NY) was used for data analysis. Crosstabs, Box Plots, Paired samples *t*-tests on all the variables, and the independent samples *t*-tests by LD status were used.

**RESULTS:**

**CPT II: (Table 1)**

After 4 weeks, the detectability as measured by ability to discriminate between signal and noise and the consistency of reaction to the stimulus as determined by standard error in performance over the duration of the test showed a significant improvement ( $p < 0.05$ ) in LD group. At baseline, the students with LD had poorer discriminating power, higher commission errors and omission errors, and had more inconsistent reaction time scores to the stimulus than did the control group. Inattention, vigilance, and impulsivity showed small but not significant improvements. The no-LD students showed significant increases in the rate of response while maintaining accuracy.

**Table 1.** Connors' Continuous Performance Test II T-Scores In LD And No-LD Groups

Test parameter <sup>a</sup>	No-LD		LD	
	Baseline	4 Weeks	Baseline	4 Weeks
Commissions	48.3	47.6	58.7	55.2
Omissions	46.4	47.0	52.4	48.9
Detectability	47.9	46.9	59.6*	55.3*
Consistency	49.7	50.0	56.5*	48.9*

Note. No-LD = no learning disabled; LD = learning disabled

<sup>a</sup>Lower value is better

\* $p < 0.05$

**BUZZING and PEAK FLOW: (Table 2)**

Both groups showed improvements in the duration of buzzing (10/13, 77%). In addition, both groups showed improvements in Peak Flow (11/13, 85%). There was no difference between the groups in terms of magnitude of improvement. Mean maximum Peak Flow of three attempts (with standard deviation in parenthesis) increased from 311 (84) to 384 (96)  $p > 0.1$ ; similarly, maximum duration of buzzing increased from 13.3 (5.3) to 20.0 (5.9) in the LD group, and from 268 (114) to 397 (90) and 13 (5.7) to 20.1 (4.9)  $p > 0.1$  respectively in the no-LD group.

Table 2. Length Of Buzzing And Peak Flow In No-LD And LD Groups

Test Parameter	No-LD			LD		
	Baseline	4 Weeks	Increase	Baseline	Week 4	Increase
Buzzing <sup>a</sup>	13.3	20.0*	6.7	13.0	20.1	7.1
Peak Flow <sup>b</sup>	268	397*	128	311	384	73

Note. No-LD = no learning disabled; LD = learning disabled

<sup>a</sup>Maximum duration of buzzing in seconds out of three attempts

<sup>b</sup>Maximum Peak Flow in milliliters out of three attempts

\* $p < 0.05$

## DISCUSSION:

*Preksha Dhyana* is a complete multistep Jain meditation, with one specific technique being *Mahapraan*. Indeed *Mahapraan*, a form of *Naad*, is used to begin meditation sessions as it allows the mind to calm down. In this pilot study, LD students while being compared to the non-LD successfully learned *Mahapraan*.

*Mahapraan* practice was associated with significant improvement in pulmonary function based on the duration of the buzzing sound made during expiration, as well as the Peak Flow in control students. The ability to increase the length of their buzzing sound in students with learning disabilities was remarkably similar to that of the group without learning disabilities. This increase was greater than 50% over baseline, and statistically significant in the no-LD group. In addition, the peak flow also improved with 30-minute sessions only three times a week. This increase was statistically significant only in the no-LD group, though a similar trend was noted in the LD group. These improvements were an indicator of adherence to the technique irrespective of the student's learning disability status. Though we postulated improvements if pulmonary function was a marker of adherence to training, others have suggested a potential mediating role of improved ventilation and concentration. Kulkarni et al (2010) reported improvement in calmness potentially related to improved pulmonary function as assessed by spirometry in an uncontrolled study. They used deep breathing over a 12 week period in 25 volunteers and saw a significant decrease in respiratory rate, tidal volume, and in the minute volume. These techniques were implemented in sessions longer than 60 minutes, daily. This potential association needs further study.

Both groups demonstrated small improvements in cognitive performance. The group with learning disabilities became more consistent as determined by reduced error in response to stimuli over the duration of the test and showed improved detectability, as determined by better ability to discriminate between signal and noise, from the baseline data. Consistency and detectability are good measures of attention and the degree of improvement seen would be expected to be of real-life benefit. The small sample size, however, limits firm conclusions. In college students, other longer duration meditation techniques including Transcendental Meditation have proven to be helpful in stress management and improving overall performance (Travis et al., 2009; Rizzolo, Zipp, Stiskal, & Simpkins, 2009).

Another limitation of the study is the composition of the group with learning disabilities, as it was also diverse in the underlying conditions of the students. Half of the students with learning disabilities in the study had Attention Deficit Hyperactivity Disorder (ADHD) as an underlying diagnosis. With regard to these students, it is possible that the recorded improvement may have been a result of beneficial effects specifically on their ADHD rather than a result of an effect specifically on their learning disability mentioned. In a prospective uncontrolled study, improvement in ADHD status as well as overall performance was shown in the majority of the 70 children enrolled in the twice weekly, one hour intervention protocol (Mehta et al., 2011). Long-term follow up demonstrated a sustained benefit (Mehta et al., 2013). However, the intervention included yoga and play therapy in addition to *Mahapraan* techniques, and thus the specific role of *Mahapraan* alone was not ascertained. There is limited evidence to show that other, longer duration forms of yoga and meditation better focus and attention in people with learning disabilities. Pilot studies in ADHD have been administered and reported on- including a study using this technique in family-based therapy for ADHD in 8 boys. This study showed promising preliminary results (Jensen et al., 2004); however, benefits have not been clearly demonstrated in a meta-analysis of the relatively few studies available (Krisanaprakornkit et al., 2010).

The purpose of this pilot study however, was to see if students with learning disabilities can efficiently learn *Mahapraan* as well as control students (without learning disability) attending college, so that a larger study could be executed. This study confirms the potential of students with learning disabilities to effectively learn *Mahapraan* due to the promising findings in both pulmonary function and cognitive measures over a few weeks, thus justifying a larger prospective randomized study. Long term, we also hope to study the additive effects of additional components of *Preksha Dhyana* in an incremental manner in prospective randomized studies.

#### **AUTHOR INFORMATION**

**Samani Unnata Pragya** MA, MPhil, Instructor, Department of Religious Studies at Florida International University, Miami, Fl. [upragya@fiu.edu](mailto:upragya@fiu.edu). Samani Unnata Pragya is a Jain Nun who has been teaching at FIU for several years in the Department of Religious Studies. She is an expert in *Preksha Dhyana*. She presented this work at the Society of Behavioral Medicine in San Francisco in Mar 2013. Her goal is to apply various meditation techniques to learning disabilities and in chronic disorders.

**Gabriela Cordoba** BA (psychology), [gcord006@fiu.edu](mailto:gcord006@fiu.edu), is a graduate student in marriage and family therapy at Nova Southeastern University, and has worked on this project as part of her thesis.

**Joselin Chui** BS, [josc486@gmail.com](mailto:josc486@gmail.com), is a graduate student at FIU, and has worked on this project as part of her thesis. Her work includes research conducted in the FIU Center for Anxiety and Phobias in children and families in an NIMH funded study. She also studied the dynamics of early childhood attachment styles and their influences on later adult, romantic relationships.

**Neelam D Mehta**, [n.mehta2@umiami.edu](mailto:n.mehta2@umiami.edu). Neelam is a premedical student at the University of Miami, and has been an instructor in meditation for several years. She has also been involved in instructional videos for schoolchildren. She has helped with data management and manuscript writing formatting and editing.

**Paulette Johnson** PhD, [paulet37@bellsouth.net](mailto:paulet37@bellsouth.net), Department of Mathematics and Statistics. Statistical Consultant, College of Arts and Sciences, FIU. Dr. Johnson is a biostatistician and now a retired professor at FIU. She has worked on similar projects including psychology and education extensively. She has extensive consulting experience and numerous publications. She has worked in all colleges of the university including those of Education, Psychology, and Biological Sciences.

**Devendra I Mehta** MD, MS, [devendra.mehta@orlandohealth.com](mailto:devendra.mehta@orlandohealth.com), Corresponding Author. Associate Professor, Florida State University. Dr. Mehta is a Pediatrician at Arnold Palmer Hospital for Children, Orlando, Fl, and Head of the GI Research Laboratory. He teaches Nurses, Residents, Fellows, as well as medical students at UCF and FSU, and has published research using meditation and yoga in schoolchildren with ADHD.

**Naina Mehta** MD, DCH, [mehtade@gmail.com](mailto:mehtade@gmail.com), Neurodevelopmental Pediatrician at Children's Medical Services, Orlando, Fl. Dr. Naina Mehta manages children and young adults with cognitive disorders and has also published papers in the field.

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