



**Research Platform Presentations  
15th Annual Meeting Denver, CO  
Friday November 6, 2015  
2:30-4:30pm**

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**PRESENTERS:**

- 1. Andrea Borgman-Quist, PMA®-CPT**  
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- 2. Marylee Bussard, PMA®-CPT, CMT, KMI, IMS**  
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- 3. Lanette Gavran, PMA®-CPT, PAA, AdvDip PilatesITC**  
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- 4. Heather King-Smith, MPH, PMA®-CPT**  
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- 5. Trent McEntire, BFA, PMA®-CPT**  
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- 6. Mary Lee Pratt, PT, MAA, OCS**  
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- 7. Lise Stolze, MPT, DSc PMA-CPT**  
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## **CAN PILATES EXERCISES IMPACT PARKINSON'S DISEASE?**

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**PURPOSE:** To determine if Pilates exercises can maintain or improve neuromuscular movement potential for a person who has Parkinson's disease. Many medications are currently available for treating the signs and symptoms of Parkinson's disease, but none has yet been proven to slow or stop the progression of the disease. Since there is a "mind-body" connection controlling the symptoms of Parkinson's, my assumption was that Pilates methodology would demonstrate verifiable physical changes in Gait, Motor Function, Balance, and Activities of Daily Living for clients who have Parkinson's disease.

**SUBJECT:** 1 Subject (Female); 66 years old.

**METHODS AND MATERIALS:** Subject was instructed in Pilates exercises and given education regarding Parkinson's disease and its physical consequences in order to improve function in activities of daily living, posture, body awareness, and motor function.

### **SPECIFIC TESTS:**

Balance  
Posture Grid  
Gait  
Proprioception  
Hand/Eye Coordination

**ANALYSIS:** Written notes, photographs, and videos were used to record changes in balance, posture, gait, proprioception, and hand/eye coordination.

**RESULTS:** The results were, the Pilates Methodology did in fact maintain or improve neuromuscular movement potential as measured by the following tests: Posture Grid, Balance, Gait, Proprioception, and Hand/Eye Coordination. Eight months after starting the program the subject reported an increase in strength and balance. Subject transitioned on and off of Pilates equipment with ease, and reported improved gait. Subject could swing opposite arm with opposite leg when walking.

**CONCLUSION:** It appears that this type of program may provide PMA® Certified Pilates Teachers with specific tools for working safely and effectively with clients with Parkinson's disease, while maintaining or increasing their neuromuscular movement potential. More research is recommended and warranted in looking at the benefits of Pilates for clients with Parkinson's disease.

**FUNDING SOURCE:** Peninsula Pilates Project

## **FUNCTION FOLLOWS FORM: ENHANCING PRECISION IN THE PILATES ENVIRONMENT**

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**PURPOSE:** The recent appearance of movement assessments (such as those by Sarhmann, Cook, and Mottram & Comerford) represents progress towards scientific understanding of movement precision and how faulty or uncontrolled movements can be corrected in rehabilitative and athletic training realms. In contrast scored tests, measurements, and diagnostic tools found in the sources cited above, in Pilates assessment is organic—the focus on observing movement *quality* (e.g. fluidity) and, to varying degrees, movement *building blocks* (e.g. neutral pelvis). To provide sustained movement health and avoid unnecessary injury, Pilates exercises should be adapted to facilitate learning of foundation patterns (vs. the other way around) (Osar & Bussard, 2015). This paper suggests a systematic approach to assess, teach, and track motor learning in Pilates, offering a possible solution to the criticism that Pilates' benefits, while self-evident to many, are nonetheless “difficult to quantify and perhaps delivered with minimal long term planning and progression” (McNeil & Blanford 2015).

**FOUNDATION:** The Kinesthetic Milestones™ (KM) approach synthesizes practical experience with information from core-strengthening research (McGill), Motor-control learning (Hodges, Richardson), Neurodynamics (Butler & Mosely), Movement assessment (Sarhmann, Cook, Comerford & Mottram), Fascial Fitness (Schliep & Muller), Neurofitness (Baniel), Integrative Movement Systems (Osar), and Structural Bodywork (Myers, Earls).

**DESCRIPTION:** Eight KMs—Release Gripping Patterns, Neutral Pelvis/Hip Hinging, Appropriate Core Control, Breathing, Long Spine, Thoracic Mobility, Coordination & Flow, Alignment & Symmetry—each containing specific learning objectives, are monitored in Pilates sessions. This approach focuses instruction and appropriate exercise selection, and facilitates simple, yet accurate, record-keeping. It provides clients with meaningful “routes of progression” (McNeill, 2013) based on evidence-based motor-control objectives and promotes short-term memory retention and skills application.

**OBSERVATIONS:** During weekly private sessions, 15 clients learned about their individual “headline issue(s),” observed within the KM framework. 100% learned to execute at least one Pilates exercise adopting awareness of a KM (where they could not before), 86% adopted this awareness over multiple sessions, and 74% applied it across multiple exercises.

**CONCLUSIONS:** The KM tool formalizes Pilates' unique approach to assessment without sacrificing its organic nature or requiring skills outside the scope of practice of the average Pilates instructor. The strength of this tool is its simplicity documenting what the educated eye already sees while observing a body doing Pilates.

**KEY WORDS:** Pilates-based exercise, motor control, physical education

**FUNDING:** None

## **PILOT STUDY: PILATES: EFFECTIVE FOR DEVELOPING CORE STABILITY, BUT LIMITED SESSIONS HAVE LIMITED GLOBAL BENEFITS**

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**PURPOSE:** A pilot study to achieve indications for a broad range study; to assess core stability, flexibility, body composition and foot strength in healthy individuals before and after 12 weeks of a single session per week of Pilates exercise, and compare them to aged matched controls.

**DESIGN** Observational cohort study.

**SETTING:** Exercise Physiology laboratory at a University, and local Pilates studio.

**SUBJECTS:** Healthy adults (4 males and 14 females), all naive to the Pilates method prior to the study's commencement.

**METHOD AND MATERIALS:** All participants participated in 12 weeks of studio and/or mat based Pilates classes once per week compared to age matched controls. All completed a Dual Energy X-Ray Absorptiometry scan to assess body composition and bone mineral density; completed the 5 stage Sahrman Core Stability assessment; were assessed for joint mobility at the shoulder, cervical and lumbar spine, hip and ankle using a goniometer; had their lower limb strength assessed using an isokinetic dynamometer at 30, 60, 90 and 105°·sec<sup>-1</sup>; and their energy expenditure and energy intake assessed utilising the SenseWear™ Armband Mini and a 5 day food record, before and after completing 12 weeks of Pilates classes.

**RESULTS:** There were no significant differences identified between the groups as baseline in relation to demographics (age, weight, height) and all aforementioned physiological characteristics, with the exception of cervical neck flexion. After an average of 11.38 Pilates sessions were completed over the 12-week period, positive changes in core stability among Pilates participants was evident, Pilates group mean 0.78 ±1.302, Control group mean -0.33 ± 1.118 (p=0.070). No other meaningful differences were identified.

**CONCLUSIONS:** Though 12 weeks of Pilates completed once per week was effective for enhancing core stability, it did not appear to elicit positive outcomes for range of motion, body composition and foot strength. As the majority of individuals reportedly complete one Pilates session per week, future research should test a minimum of two sessions required per week for possible positive changes in body composition, flexibility and foot strength.

**KEYWORDS:** Pilates training, Body composition, Range of Motion, Exercise, Muscle strength

**ACKNOWLEDGEMENT:** No financial support was received to conduct this study.

**CONFLICT OF INTEREST:** None

## **PILATES-BASED EXERCISE FOR DIASTASIS RECTUS ABDOMINIS AND STRESS URINARY INCONTINENCE: A CASE REPORT**

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**PURPOSE:** The purpose of this study is to investigate the use of Pilates-based exercise integrated with a systematic, evidence-based method for assessing breathing and training the deep core musculature in a subject with diastasis rectus abdominis and stress urinary incontinence.

**SUBJECT:** One multiparous female, age 43, who presented initially with diastasis rectus abdominis and stress urinary incontinence.

**MATERIALS/METHODS:** Subject participated in Pilates-based exercise on the mat, Arc Barrel, Reformer, Tower, and EXO Chair for 16 1-hour sessions in a 4-month period by a PMA® Certified Pilates Teacher. Subject was evaluated for diastasis rectus abdominis at initial session and again at 6 weeks and 4 months. Urinary incontinence was not reported by the subject at assessment. Self-report data regarding stress urinary incontinence was collected at 4 months. Breathing and postural assessments were included in the initial session and evaluated throughout the intervention. In addition to Pilates-based exercises, basic neuromuscular re-education was given based on current research in diastasis rectus abdominis and other core canister dysfunction.

**RESULTS:** After 16 sessions over a four month period, the inter-recti distance decreased by 2cm at its widest point. Her breathing pattern disorder was resolved, she was able to generate tension along her linea alba significantly enough to no longer feel any gap between her recti muscles, and she reported no longer experiencing stress urinary incontinence. Her posture improved from a posterior pelvic tilt and high lordosis, to a more neutral pelvic and rib cage or thoracic alignment.

**CONCLUSIONS:** Pilates-based exercise, in addition to a research-based intervention that assesses and corrects breathing pattern disorders and teaches coordination of breathing, pelvic floor muscle and transverse abdominal activation with movement, may be a viable intervention for persons experiencing diastasis rectus abdominis and stress urinary incontinence. The author will continue to use this method when working with clients who present with either of these conditions. Larger, randomized controlled trials using this method compared to the standard of care for each condition are needed to further investigate its efficacy.

**KEY WORDS:** Pilates-based exercise, core training, breathing patterns, diastasis rectus abdominis, stress urinary incontinence, women's health

**FUNDING:** None

# **A NOVEL APPROACH TO ASSESSING AND LEVERAGING PHYSICS, NEUROSCIENCE AND PSYCHOLOGY TO BUILD A MOVEMENT MAP FOR A CLIENT WITH HYPERTONIC CEREBRAL PALSY**

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**PURPOSE:** The purpose of this research is to discover movement possibilities in a Pilates environment that build a movement map in the brain and body. This research aims to demonstrate the effectiveness of a quantitative and qualitative assessment that leverages the principles of physics, neuroscience and psychology for a client with Hypertonic Cerebral Palsy (Gross Motor Function Classification System Level II). Goals include: improving gait speed, stride length, and heel strike, joint range and sequencing, improving posture, building self esteem, increasing proprioception.

**SUBJECT:** One female, currently 58 years of age with self described moderate Hypertonic Cerebral Palsy (GMFCS level II) that has experienced little positive results from various mainstream therapies and fitness programs. Starting movement abilities included walking on a flat surface, seated activities such as eating, reading, computer work, and driving.

**METHODS AND MATERIALS:** Client attended 55-minute sessions at a frequency of 2-3 times per week for 4 years. Sessions were conducted in a Pilates environment on the following equipment: Arcus™, Cadillac, Reformer, Chair, Barrels, Bands, Balls, rebounder and balance discs. Methods used included a 3-pronged approach to assessing and leveraging Physics, Neuroscience and Psychology.

## **ANALYSIS:**

1. Physics: gait analysis (speed, heel strike, stride length, pain), joint sequencing, breath endurance, posture
2. Neuroscience: Movement Map™, proprioception
3. Psychology: self esteem, trust, confidence

**RESULTS:** Gait analysis shows a 500% increase in speed (from .08 M/second to .48 M/second), visibly increased heel strike and stride length, as well as pain reduction as reported by client. Breathing endurance improved as client reported having less shortness of breath while walking longer distances at a greater speed. Posture visibly improved. Client described feeling and seeing self as more vertical. The client's Movement Map™ visibly improved in several areas: 1) 70° increase in knee flexion AROM. 2) Active pelvic tilt increased 20° posteriorly and 10° anteriorly. The visible improvement of the client's Movement Map is noted by the new ability to walk up hills, walk in the wind, carry large loads to and from the car, stooping to pick up items off the floor, opening and closing heavy doors, navigating stairs and walking on snow and ice. The client has also transitioned from a cane to Nordic walking sticks. Hypersensitivity in weightbearing has improved as noted by the new ability to walk pain-free without shoes. Proprioception improved as noted by client description of a new sense of feedback from the floor resulting in feeling grounded while standing and walking. Self-esteem, trust, and confidence has improved as noted by client's new willingness to join a gym for access to cardiovascular exercise, perform a home movement program, publicly share details about her condition, willingness to try new exercises and walk on new terrains without threat, and attending (and fully participating) in an educational summit for Pilates professionals.

**CONCLUSIONS:** Video documentation of this client demonstrates a measurable improvement in gait speed, joint sequencing and heel strike. The client's self esteem improved especially noted by describing herself as more comfortable being videotaped and by excitement in sharing her results with others. While Cerebral Palsy is a permanent condition, this case report demonstrates that a Pilates-based movement intervention has the possibility to make measurable improvements in gait quality, improve confidence in daily tasks and maintain or improve the ability to live independently. More research is needed in evaluating Pilates-based interventions for adults with CP or other neurological disorders.

**FUNDING SOURCE:** None

## **A RANDOMIZED CONTROLLED TRIAL OF THE EFFECTIVENESS OF PILATES ON BALANCE AND FALLS IN COMMUNITY DWELLING OLDER ADULTS**

**AUTHORS:** Josephs SD, Pratt M, Calk E, Thurmond S, Wagner A; The University of Incarnate Word San Antonio, TX [maryleepratt@sbcglobal.net](mailto:maryleepratt@sbcglobal.net)

**PURPOSE:** The purpose of this study was to determine whether Pilates is more effective than traditional strength and balance exercises for improving balance measures and reducing falls in community dwelling older adults with fall risk.

**SUBJECTS:** Community dwelling adults, aged 65 or older who either had a fall in the last year or met the inclusion criteria of Timed Up and Go (TUG) >13.5 seconds or a score of  $\leq 25$  on the Fullerton Advanced Balance Scale (FAB).

**METHOD:** Thirty-nine community dwelling adults, aged 65 or older, underwent evaluation by a blind assessor to assess balance and fall risk as measured by the TUG, FAB and balance confidence using the Activities Specific Balance Confidence Scale (ABC). Thirty-one subjects met the inclusion criteria. Subjects were randomly allocated to the Pilates group or the traditional exercise group. Subjects in both groups participated in 12 weeks of exercise, twice per week for 1 hour. Twenty-four subjects completed the 12-week exercise program and underwent re-evaluation by a blind assessor. The materials used in the traditional group included resistance bands, ankle weights, and foam cushions. The Pilates group used Pilates equipment and the foam cushions.

**ANALYSIS:** All data was analyzed at the .05 alpha level using SPSS software. The pre-test to post-test within group and between group data was analyzed with paired t-test, independent t-test and 2 x 2 factorial ANOVA.

**RESULTS:** In the traditional group, there was significant improvement in the FAB ( $p=0.01$ ; mean  $27.27 \pm 6.4$ ) from pre-test to post-test. In the Pilates group, there was significant improvement in the FAB ( $p < .05$ ; mean  $24.84 \pm 12.5$ ) and the ABC ( $p = .008$ ; mean  $73.65 \pm 22.47$ ) from pre-test to post-test. There were no between group differences on any of the selected tests.

**CONCLUSIONS:** Both the traditional and Pilates exercise groups showed significant improvement in the FAB scores following 12 weeks of exercise. Only the Pilates group showed improvement in the ABC following the exercise program. The results suggest that both programs are effective at improving balance measures in community dwelling older adults with fall risk, with neither program showing superior results, but only the Pilates group showed improvement in reduced fear of falling. This study shows equipment based Pilates can be used with confidence in an at risk population to improve balance measures and reduce fear of falling, a contributing factor in the decline of physical activity.

**FUNDING SOURCE:** None

# THE EFFECTIVENESS OF SCROTH BASED PHYSICAL THERAPY AND A MODIFIED PILATES PROGRAM ON AN ADULT WITH IDIOPATHIC SCOLIOSIS: A CASE REPORT

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**PURPOSE:** The purpose of this study was to explore the effects of Physiotherapeutic Scoliosis Specific Exercises (PSSE) based on the Schroth Method in conjunction with a modified Pilates program on an adult with Idiopathic Scoliosis (IS).

**SUBJECT:** The subject is a 42 year old woman with IS who experiences pain in her thoraco-lumbar convexity limiting her activities of daily living and recreation.

**METHODS AND MATERIALS:** The subject volunteered to enter a 12 week study utilizing PSSE based on the Schroth Method in conjunction with a Pilates program, modified for her scoliosis. Sessions took place 2x per week and lasted 60 minutes. The treating therapist is a Schroth trained physical therapist through the Barcelona Scoliosis Physical Therapy School and is a certified Pilates instructor through the Pilates Method Alliance. A full spine X-ray was obtained confirming a double curve: left lumbar Cobb angle 30 degrees and right thoracic Cobb angle 19 degrees. The subject received the following pre-tests and post-tests at 12 weeks:

**Scoliosis Special Test:** Angle of Trunk Rotation (ATR) using Scoliometer

**Functional Tests:** Chest Wall Expansion, Diaphragmatic Excursion, Forced Vital Capacity (FVC), Timed Single Limb Stance

**Subjective Tests:** Quality of Life score using SRS 22r Questionnaire; Pain score using the Visual Analog Scale (VAS)

**Strength/Endurance Test:** Side Support Test

**ROM:** Shoulder Flexion AROM (Supine); Hip Passive Rotation ROM Test (Prone)

**RESULTS:** Post test results at 12 weeks showed improvement in the following areas:  
ATR: -2 degrees at thoracic curve apex and -3 degrees at Lumbar curve apex; Chest Wall Expansion: (subaxillary +1.5 cm, xyphoid +2 cm); Diaphragmatic Excursion: +1.5 cm; FVC +.4 liters; Timed Single Leg Stance left +19 seconds; VAS: -2 points; SRS 22r Questionnaire: +2 points. ROM and strength/endurance tests were unchanged.

**CONCLUSIONS:** PSSE based on the Schroth Method in conjunction with a modified Pilates program appears to reduce pain in an adult with IS while improving balance, respiration and overall quality of life parameters. Physical therapy using PSSE has demonstrated positive results in adolescent and adult patients with IS. Since adult patients with IS frequently choose a Pilates-based exercise program as their fitness option, more research is needed to study the effects of a modified Pilates program in conjunction with PSSE as part of a comprehensive physical therapy approach to the adult patient with IS.

**KEY WORDS:** Physiotherapeutic Scoliosis Specific Exercise, the Schroth Method, Schroth Based Physical Therapy, Pilates-based Exercise Program, Modified Pilates Program, Idiopathic Scoliosis

**FUNDING:** None