Why is Research Important to the Pilates Teacher?

Dr. Sherri Betz
PT, DPT, GCS, CEEAA, PMA-CPT

www.therapilates.com

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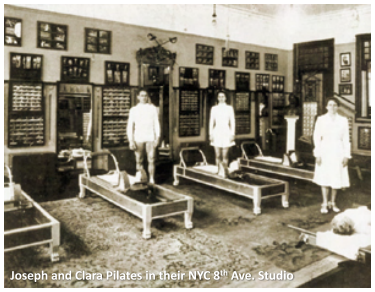
Download Handouts:
http://www.therapilates.com/pilatesmethod.html

with Sherri Betz, PT, DPT, GCS, CEEAA, PMA®-CPT

Contrology

Joseph and Clara Pilates developed the method, originally called *Contrology* from 1926-1971.



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Joseph Pilates

(PMA, 2005)

- Creator of Pilates(Contrology)
- Born HERE!!
- Suffered from asthma, rickets and rheumatic fever.
- He managed to overcome his physical limitations by developing his own program of exercise and bodybuilding.

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What attracted you to the Pilates Method?

von Sperling de Souza, M. and C. Brum Vieira (2006). "Who are the people looking for the Pilates method?" *Journal of Bodywork and Movement Therapies* 10(4): 328-334.

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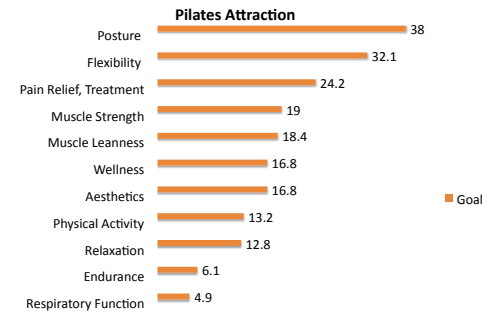

von Sperling de Souza, M. and C. Brum Vieira (2006). "Who are the people looking for the Pilates method?" *Journal of Bodywork and Movement Therapies* 10(4): 328-334.

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Joseph Pilates, 1945

(Pilates J, 1945)

- "***Contrology*** is complete coordination of body, mind and spirit."
- "Physical fitness is the first requisite of happiness. Our interpretation of physical fitness is the attainment and maintenance of a uniformly developed body with a sound mind, fully capable of naturally, easily and satisfactorily performing our many and varied ***daily tasks*** with spontaneous zest and pleasure"

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Why is research important to the Pilates industry?

- Pilates is no longer the novel approach to exercise
- Pilates has become more mainstream
- Pilates Industry needs more differentiation from other fitness methods in order to remain a viable and credible exercise approach
- Pilates has reached its peak in popularity and has begun to decline in the fitness industry (in urban markets)
- Studio owners can no longer just open their doors and expect a flood of clients to walk in the door
- We have to work hard at marketing and educating the public to understand that Pilates is not a passé fad
- Research is a way to do create this credible public perception.

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Pilates needs to be credible…

- To be a credible choice in the evidence-based medical rehabilitation community, the Pilates community needs to invest in research
- Pilates should not depend on anecdotal evidence to support its claims
- Pilates needs to be compared against other forms of exercise in randomized clinical trials with large numbers of subjects in order to be taken seriously by evidence-based medical practitioners
- Many practitioners make claims as to what Pilates can do for certain conditions, but how do they know that it is the Pilates method that is actually making that difference?

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Client measurable outcomes…

- The difference in the client's outcome could be that the instructor's expertise and intention changed the client's self-perception
- ANY exercise that a client began after being sedentary may have improved their strength, flexibility, posture, balance or decreased their pain
- If we don't compare Pilates side by side with other forms of exercise, controlling for as many variables as possible, we will never know if it is really Pilates that made the difference.

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Defining Pilates

- The Pilates Method needs to be clearly defined in medical literature for measurable changes to be attributed to Pilates exercise
- Lise Stolze, PT, and member of the PMA Research Committee ran into a roadblock when publishing her 2012 *Journal of Orthopedic & Sports Physical Therapy* paper: "Derivation of a Preliminary Clinical Prediction Rule for Identifying a Subgroup of Patients With Low Back Pain Likely to Benefit From Pilates-Based Exercise"
- Dr. Stolze polled many practitioners and consulted the PMA Board members to help define Pilates.
- She used the word Pilates-based to define the method in her study.
- She worked with renowned researcher, Dr. John Childs, who has been instrumental in establishing Clinical Prediction Rules for many pathologies treated in the field of physical therapy practice.
- The objective of the study was to derive a preliminary clinical prediction rule for identifying a subgroup of patients with low back pain (LBP) likely to benefit from Pilates-based exercise.

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Types of Research

Graphic From: Evidence-Based Practice in the Health Sciences: Evidence-Based Nursing Tutorial Information Services Department of the Library of the Health Sciences-Chicago, University of Illinois at Chicago. Contact lib-cref (at)uic.edu

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Systematic Reviews

- Summary of the medical literature
- Uses explicit methods to perform a comprehensive literature search
- Critical appraisal of individual studies
- Statistical techniques analyzed and interpreted
- Results and conclusions drawn from comparison of included studies

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Meta Analysis

- A particular type of systematic review that attempts to combine and summarize quantitative data from multiple studies using sophisticated statistical methodology.

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Randomized Controlled Trial

- An experimental, prospective study in which "participants are randomly allocated into an experimental group or a control group and followed over time for the variables/outcomes of interest."

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Cohort Study-Retrospective

- An observational study looking back on outcomes that have already happened or pre-existing data
- Involves identification of two groups (cohorts) of patients
  - Group that received the exposure of interest,
  - Group that did not receive any exposure
- The exposures are defined before looking at the existing outcome data to see whether exposure to a risk factor is associated with a statistically significant difference in the outcome development rate.

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Cohort Study-Prospective

- More commonly, people are recruited into cohort studies regardless of their exposure or outcome status. This is one of their important strengths.
- People are often recruited because of their geographical area or occupation, and researchers can then measure and analyze a range of exposures and outcomes.
- Involves identification of two groups (cohorts) of patients
  - Group that received the exposure of interest,
  - Group that did not receive any exposure
- The study then follows these participants for a defined period to assess the proportion that develop the outcome/ disease of interest.
- Cohort studies are good for assessing prognosis, risk factors and harm.
- The outcome measure in cohort studies is usually a risk ratio / relative risk (RR).

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Case-Controlled Study (Observational)

- An observational, *retrospective* study
- Involves identifying patients who have the outcome of interest (cases) and control patients without the same outcome
- Includes two clearly defined groups at the start: one *with* the outcome/disease and one *without* the outcome/disease
- They look *back* to assess whether there is a statistically significant difference in the rates of exposure to a defined risk factor between the groups.

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Case Study

- Prospective pre-planned intervention applied to a willing subject
- Case Studies require institutional review board approval for research on human subjects to be published
- Empirical inquiry that investigates a phenomenon within its real-life context
- Can mean single and multiple case studies
- Can include quantitative evidence
- Relies on multiple sources of evidence
- Case studies should not be confused with qualitative research
- Can be based on any mix of quantitative and qualitative evidence

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Case Series

- A descriptive, observational report on a series of patients with an outcome of interest
- generally small descriptive studies, tracking patients derived by a health care setting (i.e. register of cases) with a known exposure or receiving the same treatment and examine their outcome.
- Observes the experience of a group of patients with the same diagnosis
- No control group involved
- Can describe characteristics or outcomes in a particular group of people, but cannot determine how they compare with people who are treated differently or who do not have the condition.

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Case Report

- *Retrospective* detailed report of the management of an individual's single case or a group of subjects' unusual condition or a condition that is rare or poorly reported in the literature
- Often a practitioner finds that a particular intervention worked quite well in achieving the desired goals or outcomes and would like to share that information formally with colleagues
- May also describe a novel or unique therapeutic approach to a particular condition
- May be just a chart review or an anecdotal account
- Relatively low level of evidence
- Less scientifically rigorous due to its lack of control over confounding variables and small sample size
- Valuable as evidence to stimulate and share new ideas for further investigation

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Components of a Case Report

- TITLE
- PURPOSE & BACKGROUND (RELEVANCE TO PILATES TEACHERS OR CLIENTS)
- HUMAN SUBJECTS PROTECTION/ CONFIDENTIALITY & CONSENT
- SUBJECT/CLIENT HISTORY
- METHODS & MATERIALS
- ASSESSMENT/ANALYSIS
- INTERVENTION
- RESULTS & CONCLUSION
- FUNDING SOURCE
- REFERENCES

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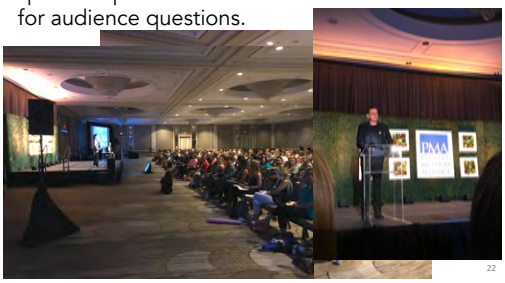
PMA Research Forum Oral Presentations

15-minute oral presentations to a seated audience, with 10 minutes devoted to the speaker's presentation and 5 minutes reserved for audience questions.



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PMA Research Forum: 2 Formats

- **Oral Presentations:** Conducted in a large amphitheater where 5-6 presenters have been selected by the PMA Research Committee to present their research projects in 10 min + 5 min devoted to Q & A.
- **Poster Presentations:** Reports in which information is summarized using brief written statements and graphic images printed and mounted on a poster board. The poster is on display throughout the entire conference with designated times to meet the authors.

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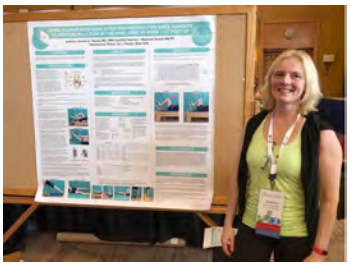
Research Posters

Joanna Telacka's excellent example of a research poster presentation at PMA Conference

Poster Format



Telacka J, Telacki W. (2017). "Using Pilates exercises after reconstructive knee surgery to restore full ROM in the knee joint in week 6 – 12 post op: Single Case Report. *Poster Presentation PMA Annual Conference 2017 Palm Springs, CA*

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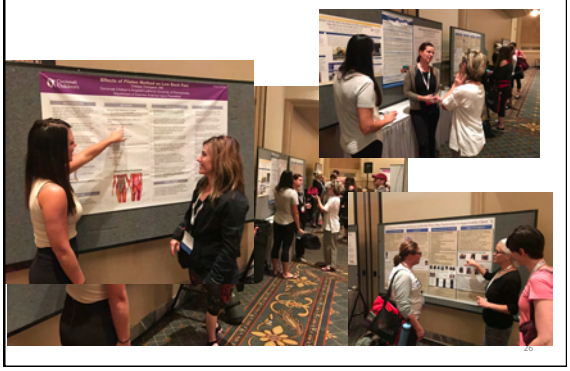
PMA Poster Presentations



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PMA Research Committee Members

- Sherri Betz, Chair
- Karyn Staples, Vice Chair
- Anne Bishop, Secretary
- Virgina Cowen
- Rebecca Hess
- Lise Stolze
- Craig Ruby
- Tom Welsh

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PMA Research Submissions

PMA PILATES METHOD ALLIANCE

Call for Research

Pilates Method Alliance
19th Annual Meeting
Research Oral and Poster Presentations
Monterey, CA October 23-26, 2019

Deadline for Submission: 12/30/2018

https://www.pilatesmethodalliance.org/research

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Important Systematic Reviews

Wells C et al. (2012) Defining Pilates exercise: A systematic review. *Complement Ther Med* Feb 2012.

Wells C, et al. (2013). Effectiveness of Pilates exercise in treating people with chronic low back pain: a systematic review of systematic reviews. *BMC Medical Research Methodology 13*(1), 7.

Aladro-Gonzalvo 2013, Costa 2012, La Touche 2008, Lim, 2011, Miyamoto 2013, Patti 2015, Pereira 2011, Posadzki 2011

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Pilates Defined in Literature

"Pilates is a mind-body exercise that targets core stability, strength, flexibility, posture, breathing and muscle control."
Wells, 2012

119 Papers fulfilled inclusion criteria. Quality varied.

5 Papers chosen: Aladro-Gonzalvo 2013, Costa 2012, La Touche 2008, Lim, 2011, Miyamoto 2013, Patti 2015, Pereira 2011, Posadzki 2011

Papers had to include assessment of the effectiveness of Pilates, where the term "Pilates" was used to describe the type of prescribed exercise being investigated.

Exercises described as "motor control" or "lumbar stabilisation" did NOT suffice for Pilates.

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Pilates Defined in Literature

Posture was discussed statistically significantly more often in papers with participants with low back pain compared to papers with healthy participants.

Traditional Pilates principles of centering, concentration, control, precision, flow, and breathing were in 23% of papers.

Apart from breathing, these principles were not mentioned in papers with low back pain participants.

There was general consensus in the literature on the definition of Pilates.

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Delphi Surveys

Giangregorio, L. M., et al. (2015). "Too Fit To Fracture: outcomes of a Delphi consensus process on physical activity and exercise recommendations for adults with osteoporosis with or without vertebral fractures." Osteoporos Int **26(3): 891-910.**

Giangregorio, L. M., et al. (2014). "Too Fit To Fracture: exercise recommendations for individuals with osteoporosis or osteoporotic vertebral fracture. **25(3): 821-835.**

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Delphi Surveys

Wells, C., et al. (2014). "The Definition and Application of Pilates Exercise to Treat People With Chronic Low Back Pain: A Delphi Survey of Australian Physical Therapists." *Physical Therapy* 94(6): 792-805.

Wells, C., et al. (2014). "Indications, Benefits, and Risks of Pilates Exercise for People With Chronic Low Back Pain: A Delphi Survey of Pilates-Trained Physical Therapists." *Physical Therapy* 94(6): 806-817.

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Quinn, 2011

Quinn, K., et al. (2011). "Do patients with chronic low back pain benefit from attending Pilates classes after completing conventional physiotherapy treatment?" Physiotherapy Practice and Research **32(1): 5-12.**

- Single blinded RCT
- Inclusion Criteria
  - Age 18-60 years
  - No radiating pain below the knee
  - Willing to attend 8 weeks of Pilates classes
  - Some residual LBP
  - Failed SAT (Sahrmann Abdominal Test) for core stability

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Quinn 2011

- Outcome Measures:
  - Visual Analog Pain Scale
  - Roland Morris Disability Questionnaire
  - Sahrmann Abdominal Test for Lumbopelvic Control

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How do we measure lumbopelvic stability?

- SAT Sahrmann Abdominal Test: a pressure biofeedback unit (PBU) inflated to 40mmHG placed under the lumbar spine of the subject.
- Subject lifts one foot off the floor raising the hip to 90deg flexion and is requested to keep the lumbar spine stable during movement of the leg
- Fails test if pressure reading on the PBU increases by more than 2 mmHg during the upward movement of the leg.

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Quinn 2011

Conclusions:

- Some evidence to show that Pilates classes may benefit subjects with LBP
  - reduction of pain
  - improvement of disability
  - lumbopelvic control

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PILATES FOR LBP:
ALADRO-GONZALEZ, 2013

Systematic Review on Pilates and Low Back Pain
This systematic review provides evidence that Pilates-based exercise is moderately superior to minimal intervention for pain relief in subjects with persistent, non-specific LBP. This finding was based on pooled data from4 different trials (i.e., therapeutic massage, traditional dynamic lumbar stabilisation exercises, back school and standard physiotherapy) where Pilates was not superior to these particularly prescribed treatments.

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PILATES FOR LBP:
ANDERSON 2005

Randomized clinical trial comparing active versus passive approaches to the treatment of recurrent and chronic low back pain. Dissertation, University of Miami. (Included in Lim, 2011 and Aladro-Gonzalvo, 2013)
Subjects: Age 38-58
Inclusion Criteria: Subjects suffered from CLBP: Chronic LBP or RLBP: Recurrent Low Back Pain lasting from 18-58 months
N= 21 (10 Female, 11 Male)
Experimental Group: Pilates Apparatus Reformers; 50 min 2xW, 12 sessions
Comparison Group: Therapeutic Massage, 30 min, 2xW, 12 sessions

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PILATES FOR LBP:
ANDERSON 2005

Outcome Measures:
- Pilates:
  - MBI: Miami Back Index Pain Scale: pre 33.5; post 24.2
  - ODQ: Oswestry Disability Questionnaire-Quality of Life, pre16.7 (4.2); post 13.9 (5.7)
  - SF-36, Trunk Strength (Back Extensor Strength) greater in Pilates subjects
- Therapeutic massage:
  - MBI-pain, pre: 39.3; post 35
  - ODQ pre: 18.5; post 17.9

Exercises: Polestar Pilates Reformer basic to intermediate level exercises with modifications as needed. 10-12 participants per session.

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PILATES FOR LBP:
DA FONSECA 2009

Randomized Controlled Trial
Subjects: Age 21-47
Inclusion Criteria: Subjects with LBP >/= 6 months
N=28 (No gender specified)
Experimental Group:
- Low Back Pain Group N=17 (F-12, M-5)
  - Pilates Group N=9, Pilates Mat 60 min, 2xW, 15 Sessions
  - No Pilates N= 8

Control/Comparison Group: N=9 Maintenance of normal ADL's, no drugs.

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PILATES FOR LBP:
DA FONSECA 2009

Outcome Measures:
- VAS (Visual Analog Scale) Pain:
  - Pilates: pre: 5.9, post: 3.0
  - Control: pre: 6.1, post: 4.9
- Gait Analysis:
  - Weight Acceptance Rate R LE:
    - Control: 549%
    - Pilates: 460%
  - Push Off Rate R LE:
    - Control: 727%
    - Pilates: 612%

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PILATES FOR LBP:
DA FONSECA 2009

Exercises:
- Participants instructed to recruit core muscles during exercises and avoid global muscle substitution.
- Basic-level Pilates exercises taught progressing from positions with low loads (supine position. prone position, and side-lying) to more functional body positions with gradually increasing external loads (box and sitting positions).
- Participants were instructed to maintain spine neutral and aligned and symmetrical posture of limbs.
- Until 7th session, homework was to be performed 1x daily for automatic and efficient co-contraction of core muscles.
- From 8th session on, participants encouraged to activate these muscles regularly during daily activities

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PILATES FOR LBP:
DA FONSECA 2009

Conclusions:
- Pilates group showed a significant decrease in pain as compared to the control group.
- Suggests that Pilates can be beneficial for back pain treatment through pain relief and improving weight discharge during gait.
- The mechanism for the improvement of weight discharge is believed to be through enhanced stability of the lumbar-spine segments and pain relief.

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PILATES FOR LBP:
DONZELLI, 2006

DONZELLI (2006) *Two different techniques in the rehabilitation treatment of low back pain: a randomized controlled trial. Eura Medicophys* ***42****(3): 205-210.*

Subjects: Ages: 26-65.
Inclusion Criteria: Duration of LBP >3months without peripheral radiation
N= 40, F-26, M-14
Experimental Group: Pilates CovaTech Matwork 60 min, 10.5 Consecutive Sessions
Control/Comparison Group: Back School 60 min, 10.5 Consecutive Sessions

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PILATES FOR LBP:
DONZELLI, 2006

Outcome Measures:
- Pilates CovaTech Matwork:
  - VAS, pre: 7.3, post: 4.5
  - ODQ, pre: 13.6, post: 6.9
- Back School:
  - VAS (Visual Analog Scale) pre: 6.8, post: 4.3
  - ODQ pre: 10.0, post: 7.7

CovaTech Pilates Exercises: Postural education, search for neutral position, sitting exercises, antalgic exercises, stretching exercises, proprioceptivity improvement exercises, breathing education, and mobilization of the cervical spine and the scapula–humeral joint.

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PILATES FOR LBP:
DONZELLI, 2006

Outcome Measures:
- Pilates CovaTech Matwork:
  - VAS, pre: 7.3, post: 4.5
  - ODQ, pre: 13.6, post: 6.9
- Back School:
  - VAS (Visual Analog Scale) pre: 6.8, post: 4.3
  - ODQ pre: 10.0, post: 7.7

Conclusions: Both Back School and Pilates interventions were effective in decreasing pain and disability. Subjects reported greater satisfaction and compliance with Pilates indicating that Pilates may be a viable alternative to the treatment of chronic LBP.

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PILATES FOR LBP:
GLADWELL, 2006

GLADWELL (2006) *Does a program of Pilates improve chronic non-specific low back pain? J. Sport Rehabil. 15, 338-350.*
Subjects: Age 29-54 **Randomized Controlled Trial**
Inclusion Criteria: Between 18-60 years of age. Low back pain chronic for at least 12 weeks not attributable to any specific pathology located below scapulae and above the gluteal fold.
N= 34 (F-26, M-8)
Experimental Group: N=20 (17-F, 3-M,) Pilates: 6 sessions, 1 h each, over 6 wk, Pilates exercises (posture check, recruitment of "core muscles," etc)
Control/Comparison Group: N=14 (10-F, 4-M) 6 weeks, continue with normal activities and pain relief

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PILATES FOR LBP:
GLADWELL, 2006

Outcome Measures:

Pilates:

RMVAS (Roland Morris Visual Analog Scale) pre: 2.7, post: 2.2

ODQ (Oswestry Disability Questionnaire) pre: 19.7, post: 18.1

Control:

RMVAS pre: 2.4, post: 2.4

ODQ pre: 24.1, post: 18.1

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PILATES FOR LBP:
GLADWELL, 2006

Conclusions:

- Significant decrease in pain, but no significant decrease in disability, from pre-intervention to post-intervention.
- Improvements seen in the Pilates group post- intervention period with increases in general health, sports functioning, flexibility, proprioception, and a decrease in pain.
- Control group showed no significant differences in the same measures post- intervention.
- Authors suggest that Pilates method used as a specific core stability exercise incorporating functional movements can improve nonspecific CLBP in active populations.

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PILATES FOR LBP:
O'BRIEN, 2006

O'BRIEN (2006) *Randomized controlled trial comparing physiotherapy and Pilates in the treatment of ordinary low back pain. Phys. Ther. Rev. 11, 224e225.*

Subjects: Age 25-65, **Randomized Controlled Trial**

Inclusion Criteria: Avg 10.9 months LBP

N= 28 (F-9, M-19)

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PILATES FOR LBP:
O'BRIEN, 2006

3 Groups:

Experimental Group: N=8 (7-M, 2-F) Pilates Matwork and Apparatus 60 min 2xW, 8 sessions based on the official body control Pilates manual by Robinson et al. Home exercises prescribed after 4th session.

Comparison Group: N=9 (6-M, 3-F)Standard physiotherapy 8 sessions ½ hour each over 4-6 wks. (i.e., manual therapy, education, core stability exercises, stretches, McKenzie, interferential, orthotics, taping and/or laser). 30 min., 2xW, 8 sessions

Control Group: N=10 (6-F, 4-M), No Intervention, but it was offered at completion of study.

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PILATES FOR LBP:
O'BRIEN, 2006

Pilates Exercises:

Modified side kick: Side lying legs straight, one hand in front Progression: remove support hand, lift legs, move top leg forward and back to centre.

Modified one leg stretch: Crook lying, slide one leg away as far as possible and then return to start position.

Modified shoulder bridge: Crook lying, "peeling" the bottom off the mat.

Progression: Increase ROM(more spine away from the mat).

The hundred (base level modification): Crook lying, lifting one leg with knee above the hip and shin parallel to the floor. Repeat on other leg.

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PILATES FOR LBP:
O'BRIEN, 2006

Pilates Exercises:

Swimming (a modification from a four point base): Box position, slide one foot along the floor behind, return to the start position. Repeat on other leg.

Modified swan dive: Prone position (keep hands and forearms in contact with the floor). Gently lengthen the thoracic spine allowing the upper part of the chest to lift off the floor.

Modified roll up: Starting in a seated position with knees bent with hands behind thighs. Begin with a pelvic tilt and small ROM, gradually increasing the range of movement of back.

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PILATES FOR LBP:
O'BRIEN, 2006

Pilates Exercises:
Modified spine twist: Sitting position, individual comfortable position, arms folded,
trunk turning while pelvis is kept square and forward facing. Alternate direction.
Double arm stretch: Crook lying, raise both arms toward the ceiling and with both arms make small circles, reverse the circle. Progression: increase circle size.
Modified one leg circle: Crook lying, lift knee over hip. Hand on knee to guide, small
circle motion from the hip. Reverse circling. Repeat on other leg. Progression: increase circle size.

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PILATES FOR LBP:
O'BRIEN, 2006

Outcome Measures:
Pilates Matwork/Apparatus:
VAS (Visual Analog Scale), pre: 61.6, post: 17.2
RMDQ, (Roland Morris Disability Questionnaire) pre: 10.7 , post: 1.72
Standard Physiotherapy:
VAS pre: 54.7, post: 17.8
RMDQ pre: 9.5, post: 4.2
Control:
VAS: pre: 48.7, post: 52.0
RMDQ: pre: 7.0, post: 6.2

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PILATES FOR LBP:
O'BRIEN, 2006

Conclusions: Significant difference between combined treated groups (ie. Pilates and Standard Physiotherapy) and control group. But no significant difference between Pilates and Standard physiotherapy group. Suggests that Pilates may be as effective as standard physiotherapy intervention and significantly better than no intervention.
Comments: Gladwell gradually used more dynamic movements to increase the complexity of the Pilates-based exercises. Gladwell reported a high compliance rate with 90% (18/20) of the participants in the Pilates group per-forming home exercises twice per week and 100% performing home exercises at least once a week.

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PILATES FOR LBP:
RYDEARD, 2006

RYDEARD (2006) *Pilates-based therapeutic exercise: effect on subjects with nonspecific chronic low back pain and functional disability: a randomized controlled trial. J Orthop. Sports Phys. Ther. 36 (7), 472-484.*
Subjects: Age 20-55. **Randomized Controlled Trial**
Inclusion Criteria: LBP > 6 wks with at least two painful episodes per year "of sufficient intensity to restrict functional activity. Physically active, participating in a minimum of three moderately intense 30 min sessions of activity per week. Strength 4/5 or less on manual muscle testing of the gluteus maximus as well as altered recruitment of this muscle as determined by visual and manual inspection during a prone leg extension test.

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PILATES FOR LBP:
RYDEARD, 2006

N= 39 (F-25, M-14)
Pilates Group: N=21 Pilates Mat and Reformer exercises designed to train the activation of specific muscles thought to stabilize the lumbar-pelvic region. PT's taught the 60min, 3xW, 12 sessions +15 min Pilates Mat home program performed 6xW.
Control/Comparison Group: N=18 Received usual care (consultation with physicians and other health care professionals as necessary.) Health usual care, analgesics, PT as needed and no exercise. Instructed to continue participating in their usual physical activity.

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PILATES FOR LBP:
RYDEARD, 2006

Outcome Measures:
Pilates:
NRS-101 (Pain): pre: 23.0, post: 18.3 ↓
RMDQ-HK (Roland Morris Disability Questionnaire-Hong Kong): pre: 3.1, post: 2.0 ↓
Control:
NRS-101 (Pain): pre: 30.4, post: 33.9 ↑
RMDQ-HK: pre: 4.2, post: 3.2 ↓

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PILATES FOR LBP:
RYDEARD, 2006

Conclusions: Main finding was that a program of specific exercise directed at retraining neuromuscular control, provided by a physiotherapist, and ***based*** on the Pilates method was more efficacious in reducing pain intensity and functional disability levels when compared to usual care. Changes were maintained over a 12 month period in the Pilates group.

Pilates Exercise: Pilates subjects recruited the pelvic floor and lumbar multifidus and then activated the gluteus maximus during a variety of movement patterns involving hip extension. Movements were initially performed in supine with the lumbar spine in neutral and then progressed to more upright postures with movement out of neutral postures.

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PILATES FOR LBP
SCHENCK, 2017

Schenck E. (2017) The Pilates Method of Exercise: Effectiveness in the Treatment of Chronic Low Back Pain and Intervention Limitations. *Presented at PMA Research Forum* 2017, Las Vegas.

Objective

Introduces several articles on low back pain, revealing limitations often encountered in Pilates research.

Goal of article: Assess effectiveness of the Pilates method in treatment of chronic low back pain by reviewing scientific studies in which the Pilates Method was used as treatment.

Critical look at studies' limitations and types of exercises used.

Studies required to meet scholarly standards, be peer reviewed and be randomized and controlled trials.

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PILATES FOR LBP
SCHENCK, 2017

Study inclusion criteria

A Boolean search for randomized controlled and clinical trials using (Pilates) AND "low back pain" on PubMed (including MEDLINE) returned 24 results.

1 study was excluded because it was not available as full text.

1 study was only the protocol of a randomized control without results.

11 studies were excluded because they were reviews or not randomized controlled or clinical trials or because they showed up in the results without actually incorporating both keywords.

11 studies were selected.

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PILATES FOR LBP
SCHENCK, 2017

The effectiveness of Pilates in treatment of low back pain:

Regardless of the limitations of the selected studies described below, the success of Pilates-based exercise in the rehabilitation of low back pain is undeniable:

Author	Results
Borges et al., 2014	There was significant reduction in pain intensity and quality of life after the Pilates exercise protocol. In the control group, the parameters remained the same or deteriorated. When the groups switched, a significant response in almost all parameters was seen during the second evaluation.
Cruz-Díaz et al., 2015	There were significant differences between groups after 6 weeks of treatment, with better results in the Pilates group. After 1-year follow-up, only the Pilates group showed better results compared with baseline.
Cruz-Díaz et al., 2015	Only the Pilates group showed improvement in fear of falling and functional mobility and balance after treatment, and also had better results in pain than the physiotherapy-only group.

PILATES FOR LBP
SCHENCK, 2017

Author	Results
da Fonseca et al., 2009	The Pilates method can improve weight discharge in gait and reduce pain compared with no intervention.
da Luz et al., 2014	Equipment-based Pilates showed a significant improvement in all measures after 6 weeks as well as after 6 months. Mat-Pilates showed a significant improvement in all measures after 6 weeks and all but 1 measure after 6 months.
Gladwell et al., 2006	Pilates can improve non-specific chronic low back pain compared to no intervention. Pilates can improve general health, pain level, sports functioning, flexibility, and proprioception in individuals with chronic low back pain.
Lee et al., 2014	Balance and pain decreases significantly for the mat and the equipment Pilates groups.
Miyamoto et al., 2013	Improvements were observed in pain, disability and global impression of recovery in favor of the Pilates group, but these differences were no longer statistically significant at 6 months.

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PILATES FOR LBP
SCHENCK, 2017

Author	Results
Natour et al., 2015	Statistical differences favoring the Pilates group were found with regard to pain, function and quality of life. Statistical differences were also found between groups regarding the use of pain medication at T45, T90 and T180, with the Pilates group taking fewer NSAIDs than the CG.
Rydeard et al., 2006	The individuals in the specific-exercise-training group reported a significant decrease in pain and disability, which was maintained over a 12-month follow-up period. Treatment with a modified Pilates-based approach was more efficacious than usual care in a population with chronic, unresolved LBP.
Wajswelner et al., 2012	An individualized clinical Pilates program produced similar beneficial effects as a general exercise program in community volunteers with chronic low back pain.

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PILATES FOR LBP
SCHENCK, 2017

Due to the different measurements and intervention ranges, there is no statistical data analysis possible.

Following a comparative result list:
• 10 studies demonstrate greater beneficial effects compared to other exercise therapies or the control group.
• 1 study demonstrates similar beneficial effects compared to other exercise therapies or the control group.
• All 10 studies measure pain intensity (among other measures), which decreases post-Pilates intervention in all studies.

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PILATES FOR LBP
SCHENCK, 2017

General limitations in Pilates research

Pilates exercises are being used by physical therapists to support rehabilitation programs for various musculoskeletal conditions, sports injuries, and neurological disorders, focusing especially on the spine and its stabilization.

The increased use of Pilates-based exercises makes it imperative to understand, among other characteristics, its applications, its contraindications, and how to use it appropriately.

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PILATES FOR LBP
SCHENCK, 2017

General limitations in Pilates research on Pilates & LBP

Scholarly standards: Some studies don't meet scholarly standards; studies not randomized controlled trials or clinical trials or are not peer reviewed.
Measurements: Some studies use only subjective data analysis tools (scales and questionnaires) that evaluate parameters (pain intensity and disability); others also use functional tests, such as balance and flexibility.
Study methods: While subject numbers are generally >20, which is satisfactory, the most significant factors observed are the differences in intervention length and frequency, with 4 weeks being the shortest intervention time.

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PILATES FOR LBP
SCHENCK, 2017

General limitations in Pilates research

Following are inconsistencies related to movement standards that influence scientific evaluation and are further detailed in subsequent pages:

Pilates equipment: Most studies use only Mat exercises, but some studies use original Pilates equipment, which is a different biomechanical approach.
A few studies use equipment often associated with Pilates, but has its origin in fitness or rehabilitation, such as balls, therabands, and foam rollers.

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PILATES FOR LBP
SCHENCK, 2017

General limitations in Pilates research

Type of Pilates exercises: Even though all studies claim they utilize the Pilates method or Pilates-based exercise, applications vary widely. Most studies use contemporary Pilates, none use the original, classical Pilates. The type of Pilates also determines another important factor, which is the amount of exercises given.

Addition of non-Pilates-exercises: Some studies incorporate other types of exercises, such as movement protocols from physical therapy or yoga.

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PILATES FOR LBP
ENJA SCHENCK & HEATHER KING-SMITH, 2017

Classical Pilates, contemporary Pilates and therapeutic exercise similarities and differences:
Repetitions: <10x for classical Pilates, >10x for therapeutic exercise. Contemporary Pilates uses both approaches.
Focus area:
Classical Pilates: whole-body exercise, regardless of injury.
Contemporary Pilates: additional exercises from the fitness and rehabilitation fields may be incorporated into a session to enhance optimal muscle recruitment and address weaknesses or injuries.
Therapeutic exercise movements are mostly spot-specific and selected to strengthen the area of injury or weakness. The client is often asked to recruit certain muscles groups.

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PILATES FOR LBP
ENJA SCHENCK & HEATHER KING-SMITH, 2017

Classical Pilates, contemporary Pilates and therapeutic exercise similarities and differences:

Flow:

Classical Pilates the client moves through the exercise sequence with a maximum of 10 repetitions per exercise.

In **therapeutic exercise**, exercises are repeated until the desired muscle recruitment is achieved and the muscle is fatigued.

Contemporary Pilates may combine both approaches.

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PILATES FOR LBP
ENJA SCHENCK & HEATHER KING-SMITH, 2017

Limitations: Exercise protocol definition and challenges

Most of the exercises taught to physical therapists in the United States for low back pain patients fall into general categories of spinal range of motion and strengthening exercises that may be described as core stability, dynamic stabilization, lumbo-pelvic and spinal stabilization, co-contraction type mat or ball exercises, progressive resistive exercises with weights or elastic bands, and functional activities.

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PILATES FOR LBP
ENJA SCHENCK & HEATHER KING-SMITH, 2017

Limitations: Exercise protocol definition and challenges

Where is the boundary between such therapeutic exercise protocols and Pilates?

A comparison of the 11 selected studies shows that the Pilates protocol used is not always clearly defined and may not even be Pilates.

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PILATES FOR LBP
ENJA SCHENCK & HEATHER KING-SMITH, 2017

Author	Type of Pilates	Are there non-Pilates additions?
Borges et al., 2014	Contemporary	No
Cruz-Díaz Martínez-Amat, Osuna-Pérez, De la Torre-Cruz, & Hita-Contreras, 2015	Contemporary	No
Cruz-Díaz et al., 2015	No info, not identifiable	No info
da Fonseca Magini, de Freitas, 2009	No info, not identifiable	Only a description of required muscle recruitments.
da Luz et al., 2014	Contemporary	No
Gladwell, Head, Haggar, Beneke,	Contemporary	No

PILATES FOR LBP
ENJA SCHENCK & HEATHER KING-SMITH, 2017

Author	Type of Pilates	Are there non-Pilates additions?
Lee, Hyun, Kim, 2014	Contemporary	1/3 of the mat exercises are yoga based.
Miyamoto, Pena Costa, Galvanin, Nunes Cabral, 2013	Contemporary	Defined as "modified Pilates" in title.
Natour, de Araujo Cazotti, Ribeiro, Baptista, Jones, 2015	Contemporary	No
Rydeard, Leger, Smith, 2006	Not Pilates	No exercise names but muscle recruitments are emphasized.
Wajswelner, Metcalf, Bennell, 2012	Not Pilates	Therapeutic exercise on Pilates equipment.

PILATES FOR LBP
ENJA SCHENCK, 2017

Surprisingly, 2 studies do not provide any information about the exercises used (Cruz-Díaz et al., 2015 & da Fonseca et al., 2009).

Da Fonseca et al. only provide brief information about muscle recruitment concepts, which indicate that the protocol is more closely related to therapeutic exercise than to Pilates.

Rydeard et al. (2006) provide a more detailed description about the exercises used, but the protocol is also about muscle recruitment strategies and doesn't mention any Pilates exercises, in spite of the title of the study: "Pilates-based therapeutic exercise: effect on subjects with nonspecific chronic low back pain and functional disability".

PILATES FOR LBP
ENJA SCHENCK, 2017

Wajswelner et al. (2012) promise "clinical Pilates" in the study title, but they use therapeutic exercises which are performed on the Pilates equipment. It is questionable if the use of equipment makes the exercises Pilates exercises.

Lastly, about a third of the mat exercises that Lee at al. (2014) use are yoga based, such as "seated hip stretch" and "knee over knee twist stretch", not Pilates.

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PILATES FOR LBP
ENJA SCHENCK, 2017

Conclusion

- There is evidence that Pilates-based exercise in the rehabilitation of low back pain is effective.
- Additional peer-reviewed and randomized, controlled research is needed to produce scientifically reliable meta-analyses, preferably utilizing similar measurements, intervention durations, frequencies and equipment
- For further scientific evaluation and in order to achieve reproducible exercise protocols and results, a standardization of contemporary Pilates exercises would be desirable.
- Classical Pilates has not been scientifically analyzed.

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PILATES FOR SCOLIOSIS:
ALVES DE ARAUJO, 2011

ALVES DE ARAUJO (2011) *The effectiveness of the Pilates method: reducing the degree of non-structural scoliosis, and improving flexibility and pain in female college students. J Bodyw Mov Ther 16(2): 191-198.*
Subjects: Age 18-25 Female Sedentary PT Students
Inclusion Criteria: Presence of Non-Structural Dorso-Lumbar Scoliosis with SRC (Rightward convexity) or LRC, muscle shortening of the posterior chain, pain in a vertebral segment. Assessed by Adams Test (Forward Bending Rib Hump), Radiographs and Cobb Angle Measurement.
N= 31 (All Females) **Randomized Controlled Trial**

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PILATES FOR SCOLIOSIS:
ALVES DE ARAUJO, 2011

Experimental Group: N=20 Pilates exercise program of 60 min, 2xW, 12 weeks. All subjects taught by the same PT
Control/Comparison Group: N=11 No intervention
Outcome Measures:
BORG CR-10 Pain Scale:
Pilates: pre: 5.3, post: 1.8
Control: pre: 4.4, post: 3.8
Cobb Angle:
Pilates: pre: 7.6, post: 4.8
Control: pre: 7.1 , post: 6.9 (no significant difference)
Range of Motion:
Pilates: pre: 9.6, post: 17.6
Control: pre: 8.2, post: 7.8

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PILATES FOR SCOLIOSIS:
ALVES DE ARAUJO, 2011

Conclusion: 38% decrease in scoliosis in Pilates group. 80% increase in trunk flexion. Pilates group showed a significant decrease of 60% in pain.
Comments: Small sample, good study design. Strange and confusing description of typical Pilates Apparatus exercises.
Exercises:
Warm-Up: 8 min treadmill or elliptical walking
Stretching:
Pilates Spine Stretch Forward
Pilates Rollover
Child's Pose
Quadruped: while raising ipsilateral arm and leg to stretch the concave side of spine only

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PILATES FOR SCOLIOSIS:
ALVES DE ARAUJO, 2011

SPECIFIC EXERCISES:
Using 65cm Swiss Ball:

- Supine Legs on Ball Bridging with legs straight
- Supine Legs on Ball-bending knees, bringing the knees to chest, lift the ball off the floor to strengthen abdominals and hip flexors

Ladder Barrel: Supine Stretch position, feet on the back of a chair and performing sit ups to strengthen rectus abdominus
Wunda Chair: seated on long box performing Mermaid with heavy spring to stretch concave side
Ladder Barrel Ballet Stretch: Hip External Rotation Position-Perform lateral flexion to stretch concave side

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PILATES FOR SCOLIOSIS:
ALVES DE ARAUJO, 2011

SPECIFIC EXERCISES:

Using 65cm Swiss Ball:

- Supine Legs on Ball Bridging with legs straight
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Wunda Chair: seated on long box performing Mermaid with heavy spring to stretch concave side

Ladder Barrel Ballet Stretch: Hip External Rotation Position- Perform lateral flexion to stretch concave side

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PILATES FOR SCOLIOSIS:
ALVES DE ARAUJO, 2011

Wunda Chair: Standing on 10° inclined Ramp in plantarflexion performing Push Down/Washer Woman to mobilize the spine and stretch thoracic and lumbar regions

Trapeze Table:

- Long Spring Leg Series-(B) Plantar Flexion/Adduction, (B) Knee/Hip Extension
- Rolldown
- Standing Rolldown

Reformer: Arm Arcs and Triceps Press with 2 heavy springs

Relaxation using 75cm Swiss Ball (5min):

- Lie on side of ball with concave side up
- Lie prone on the ball supported by feet and hands
- Lie supine on the ball and stretch arms overhead

86

Pilates for MS

Sanchez-Lastra, M. A., et al. (2019). "Pilates for people with multiple sclerosis: A systematic review and meta-analysis." *Mult Scler Relat Disord* 28: 199-212.

14 studies selected

- 10 randomized controlled trials
- 4 quasi-experimental

87

Pilates for MS *Sanchez-Lastra 2019*

- Methodological quality low
- Further research is needed in order to consolidate the scientific evidence regarding the efficacy of for MS
- Samples usually consisted of people with a low to moderate level of disability (EDDS stages 1–4.5)
- Generalization of the findings to individuals with more severe disease is questionable
- Authors of the studies did not report whether the requisite 80% power for the selected sample size was met

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Pilates for MS *Sanchez-Lastra 2019*

- Pilates is a feasible therapy for people with MS that can lead to improvements on their physical function, and it might be helpful for reducing self-perceived fatigue.
- The potential beneficial effects of Pilates are not significantly greater than those derived from the performance of other physical therapies.
- Further high-quality RCTs are needed to consolidate the existing scientific evidence regarding the impact of Pilates on this population.

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Pilates and Balance RCT
Roller, 2006

Purpose:
Investigate the effects of a Pilates-based exercise intervention in improving balance and reducing fall risk with a population of adults over 65 who are known fallers or at risk for falls.

Roller, M., et al. (2018). "Pilates Reformer exercises for fall risk reduction in older adults: A randomized controlled trial." *Journal of Bodywork & Movement Therapies* 22(4): 983-998.

90

Pilates and Balance RCT

55 Subjects
- (27 Pilates experimental, 28 controls)
- 38 females, 17 males
- mean age 77.6 years, range 65-95)

Inclusion Criteria:
- Self-reported history of two or more falls or one injurious fall in the past year or
- Timed Up and Go (TUG) test of ≥13.5 seconds suggesting risk for falling

Exclusion Criteria:
- Mini-Mental State Examination (MMSE) score <24/30
- Impaired postural reaction time on NeuroCom® Motor Control Test (MCT)
- Presence of neurologic system pathology

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Pilates and Balance Study

- Subjects attended 10 sessions of a 45-minute Pilates-based Reformer exercise program 1xW
- Participant to instructor ratio was 4 or 5:1 with all subjects working on Reformers concurrently in a group class format
- Each subject performed 10 specific exercises, 10 repetitions each, using varying resistance of 2-4 springs progressed according to each participant's ability

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Outcome Measures

Pilates-based exercise group improved significantly at p<0.05 level:

- **ABC scores significantly improved from 69.3% to 76.3%** indicating **decreased fall risk** and improved balance confidence.
- **TUG times significantly decreased from 12.4 to 10.5 seconds** suggesting **reduced fall risk** and improved dynamic balance.
- **BBS scores significantly increased from 51.2 to 53.4/56** suggesting **reduced risk for falls** and **improved static and dynamic balance**.
- **10MWT time significantly improved from 9 seconds to 8 seconds** demonstrating **improved gait velocity**.
- **ADT scores significantly improved for toes down perturbations** suggesting improved stability during changes in surfaces.
- **AROM significantly increased in both legs** for straight leg raise, hip extension, and ankle DF resulting in improved range of LE motion.

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Outcome Measures

This study suggests that rehabilitation focusing on Pilates exercise using the Reformer once per week is an effective intervention to improve balance and mobility and decrease fall risk in older adults.

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PILATES AND BALANCE
BIRD, 2012, 2014

Bird, M. L. and J. Fell (2014). "Positive long-term effects of Pilates exercise on the aged-related decline in balance and strength in older, community-dwelling men and women." *J Aging Phys Act* 22(3): 342-347.

Bird, M. L., et al. (2012). "A randomized controlled study investigating static and dynamic balance in older adults after training with Pilates." *Arch Phys Med Rehabil* 93(1): 43-49.

Poor studies due to crossover design and no significant differences between groups.

95

Pilates and Osteoporosis

Subjects: 41 women randomised to Pilates or Control Group
Outcomes:
- BMD lumbar evaluated pre and post intervention showed increase in Pilates group and decrease in control group.
- Physical performance level improved.
- Visual Analogue Scale pain level decreased.
- QUALEFFO-41 QOL improved.

Angın, E., et al. (2015). "The effects of clinical Pilates exercises on bone mineral density, physical performance and quality of life of women with postmenopausal osteoporosis." Journal of Back & Musculoskeletal Rehabilitation 28(4): 849-858.

96

Pilates and Osteoporosis

Subjects: 70 women age 45-65 randomized to Pilates 2xw for 1 year or Home Exercise group performing thoracic extension exercises

Outcomes (improvements were shown in all areas in both groups, but moreso in the Pilates group):

- 6 min walk test
- 1 minute sit to stand test
- Visual Analogue Scale (VAS) pain level
- QUALEFFO-41 and SF-36 QOL measures

Kucukcakir, N., et al. (2013). "Effects of Pilates exercises on pain, functional status and quality of life in women with postmenopausal osteoporosis." *J Bodyw Mov Ther* 17(2): 204-211.

97

Pilates Effect on Bone Mineral Density

CASE REPORT: Female patient age 39

- History of 4 vertebral compression fractures
- Began TheraPilates® for Osteoporosis Video 3x per week at home
- 1 hr 1x per week using Pilates Equipment
- 4 x per week Walking Program

1st year: Spine BMD increased 15% : –1.15 to -1.00
2nd year: Spine BMD increased to -.9

Betz SR. "Modifying Pilates for Osteoporosis." *IDEA Fitness Journal* April 2005.

98

Strength Training: Muscle = Bone

As clients progress, weights and/or resistance may need to be added to stimulate muscle strength and bone building.

Chahal, J., et al. (2014), Mosti, M. P., et al. (2014). Multanen, J., et al. (2014).

99

Pilates Effect on Wellness in the Elderly

Roh, S. Y. (2016). "The effect of 12-week Pilates exercises on wellness in the elderly." *J Exerc Rehabil* 12(2): 119-123.

- 88 elderly (63 females, 25 males) completed a Wellness Scale.
- Elderly participated in Pilates exercises and completed the same scale afterwards.
- Results of paired t-test showed significant improvement in:
  - physical (t=2.762, P<0.01)
  - social (t=3.362, P<0.001)
  - spiritual (t=2.307, P<0.05)
  - emotional wellness (t=2.489, P<0.05)

100

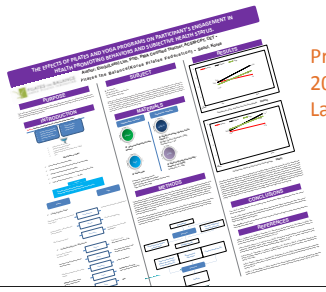
Improving Quality of Pilates Instructor Education Programs

Roh, SY (2016). An exploration of implications for the development of Pilates instructor system through identification of instructors' difficulties. *J Exerc Rehabil* 12(4): 355-362.

- Study aimed at exploring ideas for the development of Pilates instructor qualification system by identifying a range of difficulties Pilates instructors are experiencing.
- Open-ended questionnaires and semi-structured interviews were conducted to collect data before they were analyzed with inductive content analysis method.

101

Lim E, et al. (2018) THE EFFECTS OF PILATES AND YOGA PROGRAMS ON PARTICIPANT'S ENGAGEMENT IN HEALTH PROMOTING BEHAVIORS AND SUBJECTIVE HEALTH STATUS.



Presented at PMA 2018 Research Forum Las Vegas

102

Lim E, et al. (2019) SAFETY CONSIDERATION FOR THE DESIGN AND OPERATION OF A PILATES FITNESS CENTER

Accepted as a Literature Review for Presentation at PMA 2019 Research Forum Monterey, CA

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Let's Write a Case Report!

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Case Report

- *Retrospective* detailed report of the management of an individual's single case or a group of subjects' unusual condition or a condition that is rare or poorly reported in the literature
- Often a practitioner finds that a particular intervention worked quite well in achieving the desired goals or outcomes and would like to share that information formally with colleagues
- May also describe a novel or unique therapeutic approach to a particular condition
- May be just a chart review or an anecdotal account
- Relatively low level of evidence
- Less scientifically rigorous due to its lack of control over confounding variables and small sample size
- Valuable as evidence to stimulate and share new ideas for further investigation

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Components of a Case Report

- TITLE
- PURPOSE & BACKGROUND (RELEVANCE TO PILATES TEACHERS OR CLIENTS)
- HUMAN SUBJECTS PROTECTION/ CONFIDENTIALITY & CONSENT
- SUBJECT/CLIENT HISTORY
- METHODS & MATERIALS
- ASSESSMENT/ANALYSIS
- INTERVENTION
- RESULTS & CONCLUSION
- FUNDING SOURCE
- REFERENCES

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How to write a case report

- Ask a question.
- Gather current data on your question.
- Questionnaires: A simple questionnaire can be administered to each new client and administer the same questionnaire again periodically to see if the response to the questions changes over time after receiving Pilates lessons.
- Case Reports: Information gathered from a *past* client who did well with your intervention. Documenting exercises in lessons, pain-levels, and functional improvements for an individual client can be assembled into a case report.

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Where to find published research

- University Databases
- Pubmed
- PedRo (Australian Database)
- Published Texts
- Pro-Quest (not peer-reviewed, unpublished dissertations are listed here)

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Writing a Case Report

Questions to consider:

- Has this information been published before?
- Would this case report inform Pilates professionals and enhance or change the practice of teaching Pilates?
- Would this case report include practical and repeatable applications?
- Why is this particular client intervention suitable for a case report?

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Title

The title must include the words Case Report, i.e.

"Case Report: Using Pilates as an Intervention for Total Shoulder Replacement"

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Purpose and Background

- A literature review must be conducted to provide the rationale for sharing the information from the case report.
- If other articles have been published on this same topic, then the report may not be needed.
- If randomized controlled trials have been published, a case report on the same or similar topic would not be necessary and would unlikely be accepted for publication in a peer-reviewed journal.

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Purpose and Background

- A literature review must be conducted to provide the rationale for sharing the information from the case report.
- If other articles have been published on this same topic, then the report may not be needed.
- If randomized controlled trials have been published, a case report on the same or similar topic would not be necessary and would unlikely be accepted for publication in a peer-reviewed journal.
- Provide a scholarly discussion of the importance and necessity of the topic, noting what has been published on the topic.
- Summarize the assessment, findings and exercise interventions. State the main purpose of the report that is supported with background information.

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Human Subjects Protection/ Confidentiality and Consent:

- Case reports that involve retrospective analysis do not require an Institutional Review Board review
- Must have approval from the research subject and be reported confidentially (with names and unique indentifying characteristics removed)
- Be sure to follow HIPPA (Health Insurance Portability and Accountability Act) guidelines, keeping all personal information confidential and avoiding use of first or last name of the client
- Obtain signed consent forms informing the client of his/her participation and permission to use the information and any photos from their interventions and outcomes in the case report

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Subject/Client History

- Clients are usually referred to as "Subject" in most research reports.
- Report client's age, gender, weight, height, ethnicity and other pertinent characteristics.
- Do not include the client's name or identifying characteristics and be sure to maintain confidentiality.
- Include the reason why the client sought the intervention, relevant medical history, co-morbidities (all known diagnoses), chief complaints, prior services received related to the condition or episode, and client goals.
- Use relative dates instead of calendar dates) (e.g. years, months or days since onset of injury or start of intervention.)
- Explain the primary problem and any other conflicting variables that may confound the interventions and outcomes.

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Methods & Materials

- Describe the overall plan of intervention (frequency of sessions, length of sessions, and general focus of exercises)
- Explain why this particular client is a good candidate for a case report
- Include techniques used to collect the data
- Include materials and equipment incorporated within the study
- Briefly summarize the Pilates intervention including a description of the exercises (Apparatus and/or Mat) and comparison interventions (where applicable).

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Assessment/Analysis

- Clearly describe the tests and measures that will be performed to obtain baseline or objective information to be used to select appropriate exercises as interventions.
- These same tests and measures will be used at the end of the intervention to determine progress and outcomes.
- All tests and measures must be described in detail so that others could replicate them.
- State the rationale for the selection of tests and measures. Cite available studies on reliability and validity of measurements.
- If not available, acknowledge this fact, and provide a presumptive argument for the selection of the test.
- Quality of life measures can also be included as pre and post assessments.

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Intervention

- Describe the exercise intervention
  - Include how intervention was selected and developed
  - how it was taught to the client in sufficient detail that others could replicate the exercises
- Add tables, figures, and appendixes to enhance the detailed description
- Provide the parameters of the intervention (ie, intensity, frequency, and duration) and rules for progression
- State changes in exercises over time, along with the rationale for the changes
- List any co-interventions that the patient may have received but that are not directly related to the purpose of the case.

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Results

- Briefly summarize the results of the case.
- Describe any factors that accounted for the results.
- Clearly report the major findings.
- Include outcome measures at the person level (e.g. outcomes related to activity or participation) in addition to any other relevant outcome measures.
- Priority is given to validated outcome measures (meaning the measures have been tested for inter-rater reliability).
- Compare follow-up outcomes to baseline.
- Use tables and figures to enhance the description.
- Discuss whether or not the client met their own goals.

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Funding Sources

- State any source of funding or support for the research and indicate whether any of the authors have any conflict of interest or potential for material gain as a result of the study.
- Avoid stating:
  - "sales of products"
  - "gain more clients"
  - "increased referrals."
- If none, state none.

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References

- Include at least 5 references from peer-reviewed research publications that directly informed the development of your research methods.
- Include at least 2 references published less than 5 years ago.
- Use the following formatting for your peer-reviewed references:

Dos Santos AN, et al. (2016). "Pilates improves lower limb strength and postural control during quiet standing in a child with hemiparetic cerebral palsy: A case report." *Dev Neurorehabil* 19(4): 226-230.

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Thank you!

TheraPilates® Physical Therapy Clinic
920-A 41st Avenue Santa Cruz, CA 95062
www.therapilates.com 831-476-3100 sherri@therapilates.com