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## Designing a spinal stability program to break the recurrent pain cycle

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## Muscular System - A Major Dynamic Support.

- Hides, 1997.
- Hodges, 2000; 2004.
- O'Sullivan, 1997; 2000, 2001.
- Panjabi, 1994; 1995.
- Richardson et al, 1992; 1999; 2002.
- Holmich, 1999, 2007.
- Stuge, 2004
- Vleeming, 2000
- McGill, 2004



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## What do muscles have to do with sport/work pain?


- Muscles are the main structures that provide stability to the spine when we move.



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## Muscle stability of the spine occurs at 2 levels


- Control of your spinal posture against large forces/loads (bigger muscles-surface) e.g. lifting boxes.
- Control of the individual spinal and pelvic joints (deeper smaller muscles) e.g. to help you sit in a chair or maintain standing.
- Both levels of stability are needed.



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## The neural system

selects those muscles most easily activated and well positioned to perform a task.



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## What muscles are we talking about?

- The deeper muscles include:
  - Transverse abdominals( deep lower abdominals).
  - Multifidous (deep back muscles)
- When Multifidous fatigues quickly, normal activities cause abnormal strain on passive structures e.g. ligaments, discs, joints and this may aggravate pain.
- As demonstrated in the next slide together these muscles act like a corset:

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**Inter-relationship of muscles and fascia for spinal stability**  
(Richardson et al, 1999)

Oblique abdominis internus

Transversus abdominis

Thoraco-lumbar fascia

Erector spinae

Multifidus

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**Multifidus attachment**

Multifidus

attaches as low as S4, and has connections with the posterior SI and sacrotuberous ligaments, and posterior z-joint capsule in lumbar spine (DeRosa, 2001)

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**Posterior longitudinal sling**  
(Lee, 1999)

Erector spinae

Sacrotuberous ligament

Biceps femoris

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**Posterior oblique sling**

latissimus dorsi

thoraco-lumbar fascia

gluteus maximus

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**Pelvic/hip muscles need to be strong for dynamic movement.**

- Reprogramming the CNS via proprioceptive cues retrains the brain and body to effectively coordinate muscles of the spine, legs, neck and shoulders to both help and prevent injuries.

Deep back muscles

Gluteus maximus

Iliotibial band

Hamstring muscles

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**hip joint muscles deep anterior view**

Psoas

Iliacus

Glut Med

Glut Min

Piriformis

Coxxygeus


Pectineus

Add longus

Add Brevis

## BOUNCE b.a.c.k Stabilising the Hip joint


- Lets now try to visualise and attempt to gently draw your hips into their sockets and than draw your two hips together.
- These hip stabilising muscles help hip pain, gluteal pain and standing /lifting activities.



The Ball of the Hip joint

## BOUNCE b.a.c.k Gluteus medius for dynamic side to side movement

- Practice activating this muscle with proprioceptive cues to stabilise the pelvis and hip when standing on one leg.
- Important in shifting weight side to side, walking, lifting and running



Gluteus maximus  
Gluteus medius  
Quadriceps  
Hamstrings  
Knee Cap

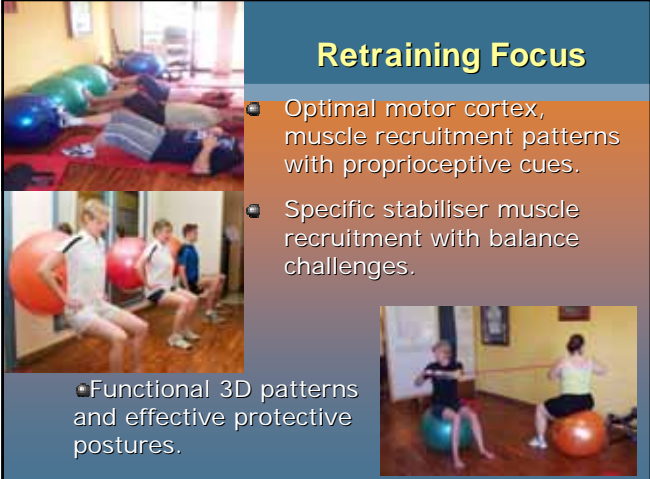
## BOUNCE b.a.c.k Active Rehabilitation System

with confidence + control  
favourite activities, sports

### Temporal outcomes and prognostic indicators of "Bounce Back" group stability exercise classes in subjects with low back pain (LBP).

## Retraining Focus


- Optimal motor cortex, muscle recruitment patterns with proprioceptive cues.
- Specific stabiliser muscle recruitment with balance challenges.



- Functional 3D patterns and effective protective postures.

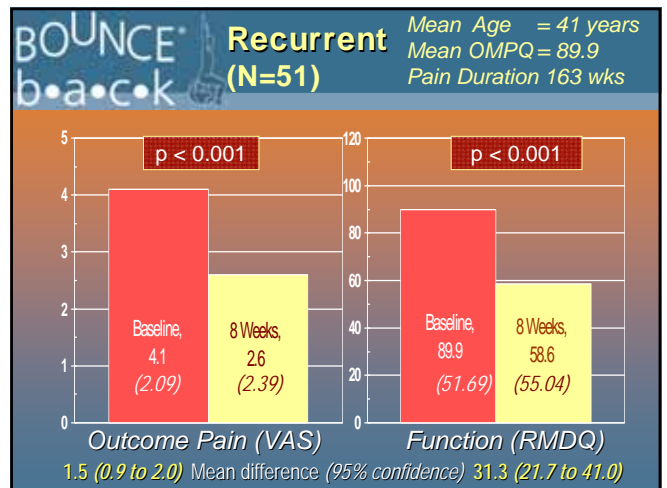
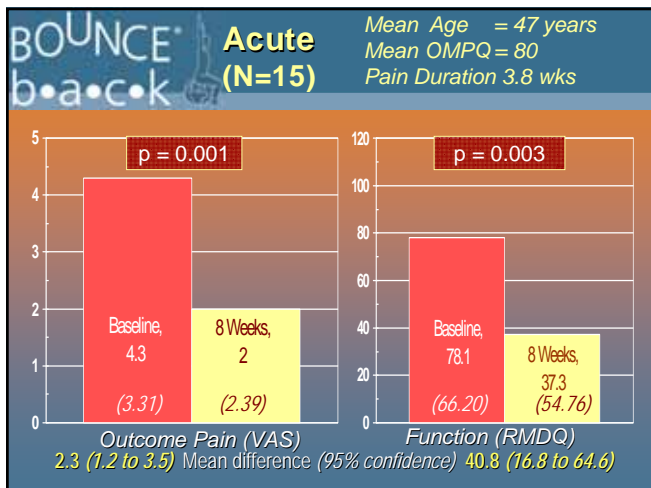
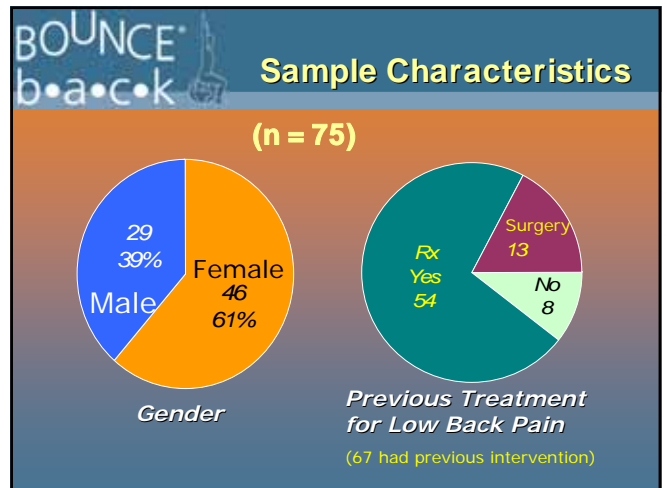
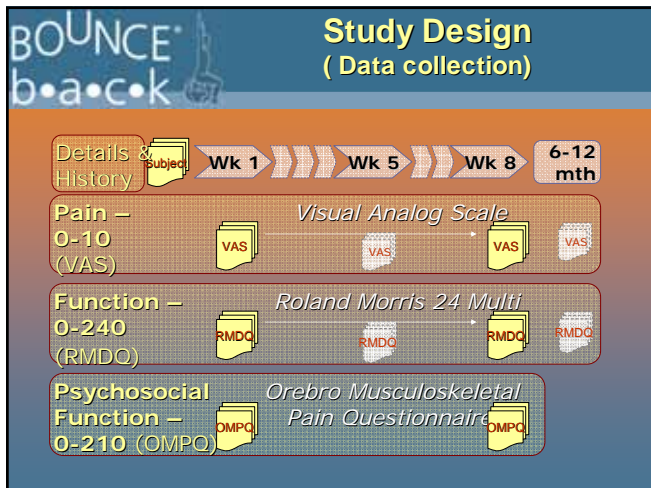
## BOUNCE b.a.c.k 30 Agents & growing

State	Business Name	Town
VIC	Rebound Sports Physiotherapy P/L	KEW
ACT	Phillip Physiotherapy Clinic	PHILLIP
ACT	The Sports Medicine Centre	TURNER
NSW	Bankstown Physiotherapy & Sports Injury Centre	BANKSTOWN
NSW	Country Physiotherapy	MUDGEE
NSW	Dapto Physiotherapy	DAPTO
NSW	Hoys Physiotherapy	COFFS HARBOUR
NSW	Inner West Spinal & Sports Injury Centre	STANMORE
NSW	LINDY RADMANN	WOY WOY
NSW	Macarthur Sports Injury Centre	CAMPBELLTOWN
NSW	Physio Health Classes	EAST GOSFORD
NSW	TAKE CONTROL Active Rehab	OATLEY
NT	Alice Springs Physiotherapy & Sports Injury Clinic	ALICE SPRINGS
QLD	Calms Total Physiotherapy	WESTCOURT
QLD	Marina Crichton Physiotherapist	GATTON
QLD	Maxima Rehab	IPSWICH
QLD	Proactive Physiotherapy	CAIRNS
QLD	Sports & Spinal Physiotherapy Centres	BUDERIM
NZ	Bodyworks	NEW ZEALAND



## BOUNCE b.a.c.k Class Structure

- **Functional progression** Based on the Wisbey-Roth functional core stability grading system.
- **Research based** Exercise programs regularly adjusted with research findings and Instructor feedback.
- **Exercise Handouts** Exercises handout from session becomes home program for the week.
- **Alternative to Pilates** Alternative to gym setting or Pilates classes.



### BOUNCE<sup>®</sup> b.a.c.k Discussion Summary of findings

- Case series of LBP patients, classes effective in reducing pain and improving function in acute and recurrent (chronic) participants.
- Pain and function at baseline were strong predictors of response to treatment.
- The higher the level of pain (VAS) and disability (RMDQ), the higher the predicted improvement after 8 sessions of Bounce Back exercise classes.

### BOUNCE<sup>®</sup> b.a.c.k Wisbey-Roth Core Stability Grading System ( T Wisbey-Roth, 1996)

Grade 1

**Able** to maintain an isometric contraction (min 10 sec) without compensatory movement of the core, in a position aimed to facilitate the stabilising role of key muscles.

Grade 1 Virtual exercises

- Long, gentle contraction of key stabilising muscles to retrain effective injury prevention muscle patterns.
- Exercises performed in static and stable postures so can be commenced early in rehab



Grade 1 Virtual exercises

4 point kneeling



Sitting



Grade 2

Able to maintain an isometric contraction (for min 10-20 seconds) without compensatory movement of the core, with superimposed slow movement of the limbs.

Grade 2

- Progress balance and functional control of core/spinal stabilisers.
- Building endurance of stabilising muscles while slowly moving arms or legs.



Grade 2 lower body

Lifting one leg with sitting posture. Building 1 Legged control



Retraining effective weight transference

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### Grade 2 upper body

lifting one arm with stabilising shoulder blade, upper body and neck posture




Movement of arms with ideal standing posture, to unload upper body nerves and neck and shoulder joints.

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### Grade 3

*Able to maintain control of the core without compensatory or inappropriate movement, while performing slow movements of the trunk itself.*

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### Grade 3

- Injury prevention: dynamic stability of the spine and limbs while limb muscles are lengthening and shortening repetitively.
- Retrain stabilisers of spine and upper /lower body to control and protect in functional work/ADL movements.





Teaching control of twisting movements

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### Grade 3



Teaching injury prevention muscle control for the spine, hips, neck and shoulders with twisting activities with weights in standing

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### Grade 3

Retraining weight shift under load, to challenge balance and spinal/core control for manual work

Weight shift and good spinal muscle control in squatting positions.

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### Grade 4

*Able to control movement but minimise excessive movement of the core, while performing joint angle specific movements of the limbs.*

(Incorporating concentric/eccentric muscle activity)



**BOUNCE b.a.c.k** **Grade 4**

Lunges

**Injury Prevention:** Teaching muscles of the spine and limbs to work effectively, both when they are shortening but also when lengthening to prevent strains.

**BOUNCE b.a.c.k** **Grade 4**

1 Legged stability, with balance challenged and loaded to encourage dynamic, adaptable stability.



1 Leg loaded moves into squat than standing postures

**BOUNCE b.a.c.k** **Grade 5**

Dynamic whole body movements, controlling excessive core movement while performing: -

- a) fast movements of the trunk.
- b) fast movements of the limbs.
- c) against increased resistance, all involving work/activity specific postures.

**BOUNCE b.a.c.k** **Grade 5**

Dynamic and endurance under load. Good for Performance enhancement for work and recreational athletes

Ideal for injury prevention of leg, back, hip, shoulder for heavy manual workers

**BOUNCE b.a.c.k** **Grade 5**

Building balance and adaptable stability using small/unstable surfaces.




**BOUNCE b.a.c.k** **Conclusion**

Initially grading an individuals level of core stability allows the therapist to systematically decide on :-

- ⇒ a starting point,
- ⇒ plan of progression for stability retraining programs.

Such a systematic approach allows confident progression of a core stability program to the final goal of.....

