Pilates for a Powerbuilder: Injury Prevention

Mia Parziale
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ABSTRACT

The quest for physical fitness has been a part of the human condition for millenia. The earliest evidence of weightlifting dates to China's Zhou Dynasty, from the 10th century B.C. until 256 B.C. (LiveStrong, 2018) It has evolved through the centuries and is now used by athletes, military, actors/actresses getting ready for a role, your average gym goer and more. It is used by both men and women, from adolescents to adults. Weightlifters and bodybuilders use a technique known as progressive overload to increase muscle size and power by increasing the amount of weight they lift on a regular basis. (Boly, 2019) Caution must be used when increasing the amount of weight because attempting to lift weights that are too heavy can result in muscle injuries and other health problems. (Girard, 2019) Sports Medicine specialists caution that, weight-training can cause significant musculoskeletal injuries such as fractures, dislocations, spondylolysis, spondylolisthesis, intervertebral disk herniation, and meniscal injuries of the knee. For the purpose of this paper we will focus on a powerbuilder who has lower back pain, tight hamstrings and an irritated knee joint.
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Lumbar Spine

Lower back pain is a common problem for many people at some point. The anatomical spine is made up of thirty-three bones also known as vertebrae. (Souza, 2016) These vertebrae are stacked on top of each other to form a column-like structure. These bones are separated by regions; Cervical vertebrae, Thoracic vertebrae, Lumbar vertebrae, Sacral vertebrae, and Coccygeal vertebrae. The Lumbar vertebrae carry the weight of the torso and are also important for movements of the lower back. The Lumbar section of the spine consists of five vertebrae and are stronger than the sections above them. These five segments are called L1, L2, L3, L4 and L5. Each one is separated by an intervertebral disc. Intervertebral discs are important for shock absorption and protection of the spine. They prevent the vertebrae from grinding into one another which commonly leads to back pain. (Hoppenfeld, 2019)

Powerlifters and weightlifters often have lower back injuries. These injuries can be caused by disc herniation. According to SPINE-Health.com, “A herniated disc is a condition in which the annulus fibrosus (outer portion) of the vertebral disc is torn, enabling the nucleus (inner portion) to herniate or extrude through the fibers.(Hartl. N.D.) The herniated material can compress the nerves around the disc and create pain that can radiate through the back and sometimes down the arms (if the herniation is in
the cervical spine) and legs (if the herniation is in the lumbar spine).” Generally, symptoms for people who have this injury heal over a short amount of time. However, powerbuilders often continue to put added weight onto their back while exercising which can lead to further injuries for a longer amount of time. This can also lead to pain in other areas of the body such as legs, arms and hips, which are all important when lifting weights.

(Robinson, 2004)

**Hamstring**

“The hamstrings (semitendinosus, semimembranosus and biceps femoris) run down the back of the thigh and hip extensors as well as knee flexors. The hamstring located more toward the outside, the bicep femoris, can also assist with the hip external rotation when the knee is straight. The two hamstrings located more toward the inside, semitendinosus and semimembranosus, can help with internal rotation.” (Isacowitz, 2019)

Hamstring injuries are caused when a strain or tear happens to the tendons or muscles in the back of the thigh. (NHS) It’s a common injury for athletes who overload the hamstring suddenly. There are different levels of severity that may leave an athlete out of training for an extended period of time. Minor injuries may take a few days to heal, while major injuries could take weeks or months to recover. (Mendmeshop. N.D.)
“There is actually some evidence that the flexibility of your other thigh muscles (quads) can play a role. One group of researchers found that athletes with more quad flexibility (as assessed with the Thomas Test) were 70% less likely to suffer a hamstring strain.” (Livestrong, 2018)
INTRO

Bar Bend explains, that the idea of powerbuilding revolves heavily around two key goals of the typical gym user. First, the desire to develop strength and power in compound movements. Second, the ability to still cater to and work on aesthetics. This type of programming style is a hybrid, and can be catered to match almost every type of athlete’s needs. (Boly, 2017)

Injury to the back or hamstring could leave the person out of training from weeks to months and sometimes forever. Preventing lower back pain and injury to the hamstring is crucial for powerbuilders. Helpful ways of doing this are through stretching and warm ups, strengthening the core, correcting posture, learning proper form, creating stability, improving muscle balance and improving overall health. (Sciosa, 2017)

This can be done through the art of Pilates. The Ten principles of BASI Pilates would greatly benefit any powerlifter or weightlifter. Awareness, Balance, Breath, Concentration, Center, Control, Efficiency, Flow, Precision and Harmony are all key elements in not only Pilates, but in the weight room as well.

CASE STUDY

For the purpose of this paper, we will focus on a powerbuilder. Paul has been powerbuilder for over fifteen years. He has competed in many competitions which he trains for four to five days a week for an hour to two hours. Paul works as a personal trainer so he is still consistently on his feet and using his body for long hours during the day.

Paul’s hamstrings are very tight and his lower back mobility is limited, his pelvis naturally rests in a posterior tilt and his knee is often irritated. This has gradually gotten worse over time due to performing weighted squats and deadlifts. During these types of exercises, your pelvis is in an exaggerated posterior tilt position. Deadlifts engage the hamstrings and squats engage the quads. They both require a strong core to alleviate pressure on the lumbar spine. They also put a lot of stress on the knee joints.

The program created for Paul focuses on core strength, lengthening of the spine, stretching of the hamstrings and building knee strength using BASI Pilates block system.
## CONDITIONING PROGRAM

(1-10 sessions)

<table>
<thead>
<tr>
<th>BLOCK / APPARATUS</th>
<th>EXERCISE(S)</th>
<th>OBJECTIVES</th>
<th>Notes</th>
</tr>
</thead>
</table>
| WARM UP (Mat)     | Pelvic Curl Chest Lift Chest Lift Rotation | Pelvic Curl - Spinal articulation, Hamstring control, Pelvic Lumbar Stabilization  
Chest Lift/Chest Lift Rotation - Use core and practice pelvic stability | Warming up the core, spine, hamstrings and pelvis is very important for everyone. For Paul, this is essential. |
| FOOT WORK (Reformer) | Parallel Heels Parallel Toes V Position Toes Open V Heels Open V Toes Calf Raises Prances | Parallel Heels/Open V Heels - Hip extensor strength, Knee Extensor Strength  
Parallel Toes/V position Toes/Open V Toes - Hip extensor strength, Knee extensor strength, ankle plantar flexor strength  
Calf Raises - Ankle plantar strength  
Prances - Ankle plantar flexor strength | Paul's legs are very strong, but it is important for him to build knee extensor strength and ankle strength for lifting weight. |
| ABS (Wunda Chair) | Standing Pike Standing Pike Reverse | Standing Pike - Lower back stretch, Abdominal control, Scapular Stabilization  
Standing Pike Reverse - Abdominal Control, Scapular Stabilization, Back Extensor Control | Paul does not stretch his back enough and this will feel great for him. It also makes him focus on abdominal strength in a completely new way. |
<p>| HIP WORK (Reformer) | Frog Hip Circles (down, up) | Frog - Strengthen hip adductors, develop pelvic lumbar stabilization | Most men are tight in the hips and Paul is no exception. This a great way |</p>
<table>
<thead>
<tr>
<th>Opening</th>
<th>Circles - Hip Adductor Strength, His Extensor Control, pelvic lumbar stabilization Opening - Strengthen hip adductors, develop hip adductor flexibility, develop pelvic lumbar stabilization</th>
<th>to loosen his tight hips. Also, pelvic lumbar stabilization is needed to enhance his lifting abilities.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPINAL ARTICULATION (Reformer)</td>
<td>Bottom Lift</td>
<td>Bottom Lift - Spinal Articulation, Hip Extensor Control</td>
</tr>
<tr>
<td>STRETCHES (Reformer)</td>
<td>Standing Lunge</td>
<td>Standing Lunge - Hip Flexor Stretch, Hamstring Stretch</td>
</tr>
<tr>
<td>FULL BODY (Reformer)</td>
<td>Up Stretch 1 and Elephant</td>
<td>Up Stretch 1 - Trunk Stabilization, Shoulder Stabilization, Hamstring Stretch, Shoulder Stretch Elephant - Trunk Stabilization, Shoulder Stabilization, Hamstring Stretch, Shoulder Stretch</td>
</tr>
<tr>
<td>ARMS (Reformer)</td>
<td>Extension Adduction Up Circles/Down Circles Triceps</td>
<td>Extension - Shoulder Extensor Strength, scapular stabilization Adduction - Scapular stabilization, Shoulder adductor strength Up Circles - Shoulder adductor strength, Shoulder extensor strength, Shoulder mobility</td>
</tr>
</tbody>
</table>
Triceps - Elbow Extensor Strength, Scapular Stabilization

LEG WORK (Reformer)

Skating

Skating - Strengthen Hip Abductors, Develop Pelvic Lumbar Stabilization

Developing pelvic lumbar stabilization will help with Paul’s posterior tilt relieving stress some stress from his lumbar spine.

LATERAL FLEXION/ROTATION (Mat)

Spine Twist

Spine Twist - Trunk Mobility, Back Extensor Control, Abdominal Oblique Control

Any way for Paul to increase his mobility is important.

BACK EXTENSION (Mat)

Swimming Cat Stretch

Swimming - Trunk Stabilization, Shoulder flexor control, Hip extensor control

Cat Stretch - Abdominal control, Back Extensor Strength, Lumbar Spine Stretch

I chose a lot of trunk stabilization exercises for Paul because it will help him perform.

The Cat Stretch is the perfect stretch for someone who needs to stretch their spine and control their abs.

CONDITIONING PROGRAM
(11-20 sessions)

<table>
<thead>
<tr>
<th>BLOCK /APPARATUS</th>
<th>EXERCISE(S)</th>
<th>OBJECTIVES</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>WARM UP (Mat)</td>
<td>Pelvic Curl Chest Lift Chest Lift Rotation Leg Circles</td>
<td>Pelvic Curl - Spinal articulation, Hamstring control, Pelvic Lumbar Stabilization Chest Lift/Chest Lift Rotation - Use core and practice pelvic stability Leg Circles - Lumbar stabilization and hip disassociation and mobilization</td>
<td>The warm up is getting easier for Paul. I added leg circles to challenge his stability and also warm up his hamstrings.</td>
</tr>
</tbody>
</table>
| FOOT WORK (Cadillac) | Parallel Heels/Toes | Parallel Heels/Toes - strengthen hip extensors and knee extensors, improve hamstring flexibility, develop pelvic lumbar stabilization  
V Position Toes - Hip extensor strength and stretch, knee extensor strength, pelvic lumbar stabilization, hip adductor control  
Open V Toes/Open V Heels - Hip Extensor strength/stretch, Knee Extensor Strength, Pelvic Lumbar Stabilization  
Calf Raises/Prances - Foot Plantar Flexor Strength, Foot Stabilizers, Correct Foot Alignment | Paul’s hamstring flexibility has improved where he now feels comfortable using the cadillac for footwork which I believe to be the most beneficial for him. |
| --- | --- | --- | --- |
| ABS (Cadillac) | Roll Up  
Mini Roll Up | Roll Up - Abdominal Control, Trunk Stabilization  
Mini Roll Up - Abdominal Strength, Pelvic Lumbar Stabilization | Building abdominal strength will relieve tension on his lumbar spine. |
| Hip Work (Reformer) | Frog  
Hip Circles (down, up)  
Opening  
Extended Frog/Extended Frog Reverse | Frog - Strengthen Hip Adductors, Develop Pelvic Lumbar Stabilization  
Circles - Hip Adductor Strength, His Extensor Control, Pelvic Lumbar Stabilization  
Opening - Strengthen Hip Adductors, Develop Hip Adductor Flexibility, Develop Pelvic Lumbar Stabilization | I’ve added Extended Frog and Extended From reverse for additional pelvic lumbar stabilization. |
<table>
<thead>
<tr>
<th><strong>SPINAL ARTICULATION (Reformer)</strong></th>
<th>Extended Frog/Extended Frog Reverse - Hip adductor stretch, Hip Adductor Strength, Pelvic Lumbar Stabilization</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPINAL ARTICULATION (Reformer)</strong></td>
<td>Bottom Lift Bottom Lift with Extension</td>
</tr>
<tr>
<td><strong>STRETCHES (Reformer)</strong></td>
<td>Bottom Lift - Spinal Articulation, Hip Extensor Control</td>
</tr>
<tr>
<td><strong>STRETCHES (Reformer)</strong></td>
<td>Bottom Lift With Extension - Develop Spinal Articulation, Develop Hip Extensor Control</td>
</tr>
<tr>
<td><strong>STRETCHES (Reformer)</strong></td>
<td>He enjoys the bottom lift because his hamstrings are strong, so I added the extension for an additional challenge.</td>
</tr>
<tr>
<td><strong>STRETCHES (Reformer)</strong></td>
<td>Standing Lunge or Kneeling Lunge if ready</td>
</tr>
<tr>
<td><strong>STRETCHES (Reformer)</strong></td>
<td>Standing Lunge - Hip Flexor Stretch, Hamstring Stretch</td>
</tr>
<tr>
<td><strong>FULL BODY (Reformer)</strong></td>
<td>Some days he is still too tight for kneeling lunge, but we have attempted to switch to this later in his sessions.</td>
</tr>
<tr>
<td><strong>FULL BODY (Reformer)</strong></td>
<td>Up Stretch 1</td>
</tr>
<tr>
<td><strong>FULL BODY (Reformer)</strong></td>
<td>Up Stretch 1 - Trunk Stabilization, Shoulder Stabilization, Hamstring Stretch, Shoulder Stretch</td>
</tr>
<tr>
<td><strong>FULL BODY (Reformer)</strong></td>
<td>Up Stretch 2 - Trunk Stabilization, Scapular Stabilization</td>
</tr>
<tr>
<td><strong>FULL BODY (Reformer)</strong></td>
<td>I switched elephant for Up Stretch 2 more for variety.</td>
</tr>
<tr>
<td><strong>ARMS (Reformer)</strong></td>
<td>Chest Expansion Biceps Rhomboids Hug A Tree Salute</td>
</tr>
<tr>
<td><strong>ARMS (Reformer)</strong></td>
<td>Chest Expansion - Shoulder Extensor Strength, Elbow Extensor Strength, Trunk Stabilization</td>
</tr>
<tr>
<td><strong>ARMS (Reformer)</strong></td>
<td>Biceps - Elbow Flexor Strength, Trunk Stabilization</td>
</tr>
<tr>
<td><strong>ARMS (Reformer)</strong></td>
<td>Rhomboids - Shoulder Horizontal Abductor Strength, Scapular Adductor Strength, Trunk Stabilization</td>
</tr>
<tr>
<td><strong>ARMS (Reformer)</strong></td>
<td>Hug-A-Tree - Shoulder Horizontal Adductor Strength, Trunk Stabilization</td>
</tr>
<tr>
<td><strong>ARMS (Reformer)</strong></td>
<td>Now that his Trunk Stabilization has improved, I feel like he is ready for the Arms Sitting Series.</td>
</tr>
</tbody>
</table>

11
<table>
<thead>
<tr>
<th></th>
<th>Salute - Elbow Extensor Strength, Trunk Stabilization</th>
<th>This will be beneficial for Paul’s knees. He needs to build Knee Flexor Strength without overloading.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leg Work (Reformer)</td>
<td>Hamstring Curl</td>
<td>Hamstring Curl - Knee Flexor Strength, Hip Extensor Strength</td>
</tr>
<tr>
<td>LATERAL FLEXION/ROTATION (Reformer)</td>
<td>Mermaid</td>
<td>Mermaid - Spinal Mobility, Scapular Stabilization</td>
</tr>
<tr>
<td>BACK EXTENSION (Reformer)</td>
<td>Pulling Straps 1 (Long Box Group)</td>
<td>Pulling Straps 1 - Back Extensor Strength, Shoulder Extensor Strength</td>
</tr>
<tr>
<td></td>
<td>Pulling Straps 2</td>
<td>Pulling Straps 2 - Back Extensor Strength, Shoulder Adductor Strength</td>
</tr>
</tbody>
</table>

**CONCLUSION**

Working with powerbuilders, weightlifters, bodybuilders and other strength training athletes can be challenging due to the occurrence of tight muscles and possible injuries. Paul’s tight hamstring muscles made it difficult to perform exercises in the beginning, but his range of motion has increased in response to the training program. After about 10 sessions, he was able to comfortably do footwork on the cadillac without modifications. He has reported that his lower back pain has decreased even after weightlifting sessions in the gym due to proper core engagement. He claimed that learning to control his breathing, has given him extra power in lifting as well. His knee still hurts after having a leg focused day, but it doesn’t hurt as much when performing daily tasks. Paul plans on continuing his Pilates practice as a form of maintenance.
References


