The purpose of the Point/Counterpoint Column is to provide a respectful and balanced discussion in relation to controversial or current topics in the fields of strength and conditioning, nutrition, and human performance.

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Roman Chair Back Extension Is/Is Not a Safe and Effective Exercise?

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ABSTRACT

THE ROMAN CHAIR BACK EXTENSION EXERCISE IS PERFORMED WITH THE INTENT OF IMPROVING HIP AND SPINAL EXTENSOR MUSCLE PERFORMANCE. DESPITE EVIDENCE SUPPORTING THE AFOREMENTIONED BENEFITS, PERFORMANCE OF THIS EXERCISE MAY INCREASE THE RISK FOR LOW BACK PAIN AMONG CERTAIN POPULATION SUBGROUPS. ALTHOUGH A CLEAR VERDICT ON THE RISK-TO-BENEFIT RATIO REMAINS ELUSIVE, A DISCUSSION OF AVAILABLE SCIENTIFIC EVIDENCE (OR LACK THEREOF) SHOULD PROVIDE STRENGTH AND CONDITIONING PROFESSIONALS WITH INFORMATION NECESSARY FOR DECISION MAKING. WE WANT TO HEAR FROM YOU. VISIT **NSCA-SCJ.COM** TO WEIGH IN ON THE POINT/COUNTERPOINT QUICK POLL.

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POINT

The lumbar extensors are a group of posterior trunk muscles essential to human movement and posture. These muscles, which include the erector spinae, multifidi, and quadratus lumborum, are particularly important from the standpoint of spinal health, as they help provide stability in an area of the spine that is prone to injury (1). Indeed, a deconditioning of the lumbar extensor musculature has been implicated in lower back pain (3).

A wide array of exercises can be used to help strengthen the lumbar extensors. Compound movements such as the squat, deadlift, and good morning, among others, work these muscles isometrically as a result of their stabilizing function at the spine during exercise performance (7,11). However, because the larger hip extensor musculature must dynamically take on the brunt of the load in these exercises, activation of the lumbar muscles is necessarily reduced, and thus, they may not receive an adequate stimulus for adaptation. Thus, isolated dynamic lumbar extension exercises such as that performed on the Roman chair may be necessary to optimize strength- and functional-related adaptations of the associated musculature. In support of this contention, Fisher et al. (5) demonstrated that isolated lumbar training increases lumbar extension torque to a greater extent than the Romanian deadlift, and these improvements actually showed a positive transfer to performance of the Romanian deadlift.

Moreover, given the well-established association between muscle crosssectional area and the ability to produce force, hypertrophy of the spinal extensors would seem to be a desirable training outcome. Although isometric exercise can promote increases in muscle mass, dynamic muscular actions have been shown to produce distinctive responses in anabolic signaling, gene expression, and protein synthesis that may confer beneficial effects on hypertrophic adaptations (4,6,12,13). To this end, research indicates that concentric and eccentric actions elicit diverse morphological adaptations at the fiber fascicle level, including regional-specific differences in hypertrophy (6). The back extension exercise performed on the Roman chair would therefore potentially enhance the adaptive response to resistance training.

The basis of program design should always focus on the balance of risk and reward. Hence, although there appears to be a clear benefit to performing isolated lumbar extension exercise, it must be acknowledged that such movements may have detrimental effects on vertebral structures. Repetitive and forceful hyperextension of the lumbar spine can lead to facet syndrome, spondylolysis, or spondylolisthesis (2,8). There are strong genetic and anatomic components to hyperextension-related injuries; obviously, individuals who are predisposed to hyperextension-related back injuries and pain should exercise more caution with exercise selection, just as is the case with other joints in the body (i.e., hip conditions and deep squatting). However, tempo and the degree of hyperextension of the spine can be augmented to increase exercise safety. Using a controlled cadence and limiting spinal motion so that end-range spinal hyperextension is avoided, potential damage to the posterior elements of the spine can be minimized. Moreover, when considering hyperextension-based injuries experienced by athletes or highly competitive injuries, one must recognize that these individuals are often weight-bearing and axially loading the spine. The Roman chair exercise does not lend to direct axial loading, thus would seemingly be safer. Thus, we argue that performing a few sets of Roman chair back extensions per week allows most of the benefits, while providing ample time for the body to recuperate and adapt to the imposed demands.

Interestingly, a recent review of literature concluded that regular training with dynamic lumbar extension exercise may actually facilitate regeneration and healing in damaged vertebral discs (14). The authors point to evidence of improved functional outcomes and bone density changes from performance of targeted dynamic exercise for the lumbar extensors. Indeed, evidence suggests that nutrient delivery to the discs is enhanced by flexion-extension movement (9,10), conceivably mediated by a pumping action that facilitates transport and diffusion of molecules into the discs.

There are numerous techniques associated with the Roman chair apparatus that can be used to better target the gluteals, hamstrings, or erectors when performing back extensions. When aiming to strengthen the erectors, proper performance is essential for safety and to obtain the desired positive results. Specifically, the hip extensors should perform a stabilizing action while the erector spinae should perform a dynamic action (the opposite is true when seeking to strengthen the hip extensors). We recommend this be accomplished by (a) positioning the end of the pad in line with the navel; this requires spinal flexion and extension during execution of the exercise, (b) keeping a slight bend in the knees, (c) crossing the arms in the "mummy" position, (d) rounding the lumbar spine over the pad by performing eccentric spinal flexion, (e) extending the spine until hyperextension is reached, and (f) using a controlled cadence involving a 3 second lowering phase, a 1 second rising phase, and a 1 second isometric hold at the top of each repetition. Although evidence is lacking as to what constitutes a "safe" range of motion, it seems prudent to avoid end ranges of both flexion and extension. The exercise is likely contraindicated for those with degenerative conditions of the spine such as spinal stenosis and spondylolysis because of the potential for exacerbating symptoms in this population.

In conclusion, the Roman chair back extension can be considered a safe and viable movement provided performance is carried out with proper technique in consideration with the needs and abilities of the individual. Manipulation of program variables such as load, volume, and frequency will ultimately determine whether outcomes have a positive versus negative impact on spinal structures for a given individual. As a rule, exercises are neither "good" nor "bad," but rather tools to achieve a given outcome. The fitness professional must take into account all aspects of the risk-reward continuum when deciding on exercise selection in program design.

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COUNTER POINT

Back extension exercises comprise a heterogeneous group of activities that collectively share a common purpose of moving the thoracolumbar spine posteriorly in the sagittal plane. Back extension, hereafter called thoracolumbar extension, is performed on the Roman chair for the goal of improving muscle performance of the hip and spinal extensors. While any exercise, if appropriately selected and performed correctly, could be considered safe, an inherent risk may reside in any exercise that promotes "end-range" thoracolumbar movements while under a load. Thus, the relative safety of extension exercises using the Roman chair cannot be categorized into a safe versus not-safe dichotomy. Rather, safety must be determined based on one's individual risk profile and an understanding of normal biomechanical events that occur during the particular exercise of interest. For the purpose of this column, information presented in the counterpoint section will focus primarily on the risks associated with end-range thoracolumbar extension.

As a preface to the counterpoint, it is first necessary to establish what constitutes "end-range" thoracolumbar extension. This is of considerable importance, as the Roman chair offers the option of moving from the position of full flexion (end range of descent) to end-range extension (end range of ascent). The start position theoretically, for the purpose of this column, will be considered midrange between flexion and extension (trunk parallel to floor). In a healthy young adult, the lumbar spines neutral position (natural lordosis) would seemingly resemble the start position of the Roman chair. The angle of lordosis is essentially the relative extension of the lumbar spine when compared with a sagittal line. Evidence suggests that in the healthy lumbar spine, the natural lordosis is approximately 32° (8). Thus, in the neutral position, the lumbar spine is essentially in extension, despite the trunk appearing parallel to the floor. Furthermore, evidence suggests that in the young healthy spine, the average adult would be able to extend approximately 27° at the thoracolumbar spine from the neutral start position (natural lordosis) (5). End-range extension would then theoretically constitute an angle of 59° from the horizontal, and hyperextension would describe movement beyond what is anatomically normal. With this being stated, it would be reasonable to postulate that individuals who have degenerative changes in the spine would present with reduced thoracolumbar extension, whereas individuals who have congenital hyperlaxity would present with greater extension than the reference values presented.

Thus, in the healthy young adult, extension to an angle of approximately 60° from a straight sagittal line would be biomechanically permissible; however, there are medical conditions that would be a concern with respect to performing the Roman chair to or beyond end-range extension. Several conditions come to mind (e.g., sports hernia, spondylolysis, and spinal stenosis); however, the focus here will primarily be on degenerative spinal stenosis and pars interarticularis defects, hereafter called a spondylolysis (7,10).

Although there are different subtypes of spinal stenosis, foraminal stenosis (narrowing) of the intervertebral foramen (where the spinal nerve root exits the spine) is the primary concern that will be discussed. The reasoning for this concern is fairly straight forward with respect to the clinical and biomechanical evidence. From a clinical research perspective, there is no question that lumbar extension narrows this foramen, which may compress the spinal nerve root (4,10). Specifically, evidence suggests that lumbar extension may lead to an 11–30% reduction in the size of the intervertebral foramen (1,3,9). Although this may not be a problem for an individual with normal lumbar spine anatomy, an already narrowed foramen from spinal stenosis may not be able to afford further extension without experiencing nerve root compression (as a result of decreased intervertebral foramen space). A key point to recognize is that individuals with spinal stenosis will face this risk with end-range extension, as opposed to those with normal spinal anatomy who would seemingly have little risk exposure. For example, the average space of the intervertebral foramen in the lumbar spine is approximately 8.8 and 19.4 mm in the transverse and sagittal planes, respectively (11). The average nerve root size as it passes through the intervertebral foramen is 3.3–3.9 mm; thus, an anatomically normal lumbar spine would be able to experience a 50% or greater reduction in size during extension without resultant nerve root compression (11). However, among individuals with reduced intraforaminal space from a degenerative pathology such as spinal stenosis, this would seemingly present a risk. Certainly, it would be erroneous to assume that everyone with spinal stenosis who performs the Roman chair through full available extension would develop symptoms of spinal stenosis. One reason for this may be a loss of spinal extension that occurs naturally with age which technically limits the spine's ability to achieve end-range extension (10). Nevertheless, those with previously diagnosed spinal stenosis, other degenerative pathologies, or concurrent low back pain may indeed be at risk for an exacerbation of symptoms from performing the Roman chair back extension to or beyond end range. In addition to the risk for an exacerbation of symptoms from spinal stenosis, other diagnoses may share a similar risk with end-range extension (e.g., spondylolysis), which should be briefly discussed.

A spondylolysis is a condition whereby the boney arch of the spine has a congenital defect or experiences a fracture (7). Biomechanically, during the end range of lumbar extension, the inferior articular process from the vertebral level above (e.g., the fourth lumbar vertebrae) impinges on the pars interarticularis of the fifth lumbar vertebrae. In cases where there is a spondylolysis, repeated extension while under load would produce a microtraumatic or perhaps macrotraumatic effect also known as a spondylolysis. In cases where a spondylosis occurs or has already occurred, the risk resides in the potential for a spondylolisthesis (anterior subluxation of the affected vertebrae). This particular diagnosis is common among younger athletic individuals who would be more likely to perform the Roman chair. Thus, it seems reasonable to assert that the Roman chair performed to end-range extension would not be safe for an individual with a spondylolysis.

Regarding specific recommendations, a rule of avoiding end-range extension is not supported by the evidence. Certainly among individuals with a current or history of spinal stenosis or a spondylolysis, these exercises would be considered a precaution and left to the decision of a health care practitioner. Evidence does support the premise that repeated or sustained end-range extension is likely to produce or cause a worsening of symptoms among individuals with spinal stenosis (6,10) or a spondylolysis (7); thus, avoidance of end-range extension is recommended. Ultimately, what constitutes a safe range of extension for individuals with spinal stenosis or a spondylolysis has not been established. However, a recommendation to avoid ranges that produce symptoms and an effort to stop the extension movement before end-available range is recommended (2). In conclusion, the Roman chair back extension exercise should be performed within a range of movement that does not increase pain or symptoms among those who have a formal diagnosis of spinal stenosis or a spondylolysis. Furthermore, individuals who experience pain during or after any exercise should consider seeking consultation from a provider (health care professional or strength and conditioning specialist with an understanding of special populations) who has sufficient knowledge to appropriately modify or suggest an alternate exercise.

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