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INTRODUCTION

This thesis aims to review the literature and produce an exercise rehabilitation recommendation catalogue that matches the potential sagittal-plane thoracic, lumbar and sacral posture, mobility and stability findings from a non-radiographic spinal examination, with referenced general rehabilitation exercise suggestions. For this thesis, the Idiag M360/Spinal Mouse/Medi-Mouse, a non-radiographic goniometric measurement device that evaluates spinal angles and shape in the frontal and sagittal planes was considered.

BACKGROUND

The exercise prescription background for this topic expands on the theory of sagittal balance of the spine. In particular, as the sagittal spinal balance is influenced by the muscle balance of agonistic/antagonistic groups. Significantly, the concepts of Yanda's Crossed syndromes, Adjunctive Diagnostic Procedures (Chapter 21) of Phillip E Greenman's Osteopathic Principles of Manual Medicine (2nd ed.) influenced this chosen research topic. The scope of this study will include the sagittal balance of the spine and pelvis. Also, in the role of a Clinical Educator at Victoria University in 2019, discussions with 4th and 5th-year Osteopathic students revealed that some didn't feel confident yet in their "rehabilitation skills", despite their extensive training and knowledge base. This may be due to lack of exposure and awareness of how to apply the Osteopathic principle of structure/function inter-relationship.

The aim and benefits of this thesis are to expand the abovementioned concepts and to provide clinicians and students with an easily accessible catalogue of exercise recommendations explicitly based on the outcomes of commonly used spinal assessments. However, these osteokinematic concepts should not be considered the only considerations in exercise prescription.

The exercise rehabilitation recommendations follow a logical spinopelvic examination algorithm, and the rehabilitation principles underpinning the recommendations are referenced. Regional, segmental and inter-segmental vertebral postural osteo-kinematic considerations have been given.

The exercise types contained in the training recommendations are well-established exercise types, familiar across many health and exercise professions, e.g. physiotherapy, osteopathy, chiropractic, athletic training, exercise physiology, fitness training and wellness coaching and musculoskeletal medicine.

Visual estimation of regional spinal motion and posture is commonly used by clinicians but can be problematic due to multiple joint structures & functions. To overcome these problems, regional posture, mobility, inter-segmental harmony, and stability may be assessed radiographically, e.g. biomechanical X-ray study, as discussed in Chapter 21 of Greenman's Principles of Manual Medicine. The significant issue arising, of course, is radiation exposure. Therefore, several non-radiographic methods for quantifying regional and segmental spinal angles (spinal goniometry) have been developed (Roghani, et al., 2017).

One of these non-radiographic goniometric technologies is the Idiag M360/spinal mouse/medi-mouse. A study that used the Spinal Mouse to evaluate spinal curvatures in

Adolescent Idiopathic Scoliosis patients reported that although radiological measurement has been accepted as the gold standard in assessing scoliosis for many years, Spinal Mouse was a safe, practical and easy to use non-radiographic alternative for the measurement of curvature in scoliosis. They investigated the validity and reliability of Cobb angle and Spinal Mouse measurements in children with adolescent idiopathic scoliosis (AIS). They found a strong or very strong relationship between measurements made with the Cobb and Spinal Mouse methods (p\0.0001) (Livanelioglu, et al., 2016).

In another study measuring standing sagittal curvature and global mobility of the spine in older women with and without hyperkyphosis, the Spinal Mouse was found to have excellent intrarater reliability for the measurement of sagittal thoracic and lumbar curvature and mobility of the spine in older women (Roghani T, et. al., 2017).

CONCEPTS OF POSTURAL CORRECTION IN MANUAL AND EXERCISE THERAPY

Correction of muscle imbalance is taught in physical therapy education programs, including Osteopathic education, in particular muscular strength and flexibility imbalances. It forms a part of the exercise programs prescribed for patients.

Rather than considering restricted muscle length, or imbalance in muscle length, as being an absolute predisposition to injury, it may be more a predictive factor to injury by affecting posture and movement patterns. "Such examples could be the combination of short and strong protractor muscles and long and weak retractor muscles of the shoulder girdle. Such combination will increase the protraction of the scapula, affect the movement pattern and stability of the shoulder, and possibly increase the risk of impingement in throwing athletes like team handball players or pitchers in baseball. When conducting training programs, it is important to include exercises to correct such posture when present" (Liebenson, 2014, p.13).

Vladimir Yanda describes muscular imbalance as "the situation in which some muscles become inhibited and weak, while others become tight". Significant tightness may also result in a decrease in muscle strength. "The treatment of tightness is not in strengthening, which would increase tightness and possibly result in more pronounced weakness but in stretching" (Liebenson, 1996, p. 97).

Johnson (2016) advocates that postural correction may follow several steps.

"Step 1: Identify contributing factors to the posture and eliminate or reduce them. Take a medical history and note subjective feedback from the client.

Step 2: Increase range of motion in hypomobile joints; Lengthen shortened soft tissues specific to that joint using techniques such as active or passive stretching, traction, massage, deactivation of trigger points, myofascial release and repositioning. Joint mobilization or manipulation.

Step 3: Decrease the range of motion in hypermobile joints. Strengthening lengthened muscles specific to that joint by using simple home exercises or exercises performed under supervision. Taping and bracing.

Step 4: Maintain normal joint position. Avoiding habitually abnormal postures. Taping. Bracing and supports.

Step 5: Re-educate movement patterns".

In particular, steps 2 and 3 above informed the general exercise recommendations in response to the spinal examination findings.

CONCEPTS IN MOBILITY AND EXERCISE PRESCRIPTION

When considering mobility deficits and the prescription of remedial exercises, when mobility is inadequate, then stabilization exercises are often painful. Therefore, mobility must be addressed before stabilization exercises. As an example, "difficulty in activating the gluteal muscles is often related to Yanda's "lower-crossed syndrome" with tight anterior hip soft-tissues, e.g. hip flexors. Any attempt at hip extension exercises typically results in lumbar overstress and hamstring and erector spinae overactivation. In this example, the first line of treatment would be flexibility training, followed by gluteus maximus muscle facilitation and then exercise" (Liebensen, p. 296, 1996).

CONCEPTS IN STABILIZATION AND EXERCISE PRESCRIPTION

Spinal motion that is biomechanically sound should form the initial basis of "functional range" for the exercise program. Therefore, this is the range of motion that is identified during the patient examination as being osteokinematically correct, appropriate for the individual and pain-free. Initially, the stabilization exercises may be performed statically, as isometric contractions (Liebenson, 1996, p. 293).

At this stage, it is essential to review how this functional range concept, which is relevant to the following selection of exercise recommendations, can be identified as osteokinematically correct. This may be achieved by the patient performing pain-free active ROM during Matthiasss spinal postural competence/stability testing, and the clinician utilizing non-radiographic spinal goniometry, e.g., the Idiag M360, to quantify the stable joint range of motion.

As an example of performing static stabilization exercises, Vaičienė, et, al., reported a lack of data to date demonstrating spinal/trunk muscle activity performing static versus dynamic lumbar spine stabilization exercises. Therefore, their study specifically investigated the effects of abdominal hollowing and abdominal bracing exercises. These two exercises are examples of static exercises used in rehabilitation and training programs to stabilize the lumbar spine before applying dynamic loads, thus aiming to protect any spine with inadequate ROM or dynamic stability from injury (Vaičienė, et, al., 2018).

Additionally, Liebenson proposes passive pre-positioning, by utilizing body position or supports to place joints passively within the identified functional range, e.g., using a lumbar roll to pre-position the lumbar spine in extension during sitting (Liebenson, 1996, p.295).

These concepts were used in the exercise recommendations for stabilization based on the potential outcomes of an examination using the Idiag M360 spinal goniometer.

Considering these postural, mobility and stability concepts when formulating the exercise recommendation in this algorithm, the first step of identifying spinal posture, next addressing mobility deficits, and then addressing stability/instability was made, where applicable.

MATERIALS

No subjects were required for this thesis research; the recommendations are based on the potential outcomes of spinal examinations performed using the Idiag M360 spinal goniometer.

The Idiag M360 spinal goniometer(commonly referenced in published studies as "Spinal Mouse" and "Medi-Mouse") "is a computer-assisted Class 1 medical device that quantifies the curvature and mobility of the spinal column by gliding the device manually down the spine. From the posterior surface line, a recursive algorithm computes information concerning the relative position of the vertebral bodies of the thoracic and lumbar spine, while taking into account the local curvature in both the sagittal and frontal-planes (kyphotic, lordotic and scoliotic). The final result is the accurate segmental localization of all vertebral bodies as the projection of their midpoints on the superficial contour of the spine" (Idiag M360. n.d.. Retrieved December 9, 2020, from https://idiagm360.com.au/). Researchers and clinicians use this device to provide valid and reliable active range-of-motion and postural assessment of the thoracolumbar spine and sacrum (Cohen, et al., 2017; Livanelioglu, et al., 2015; Topalidou, et al., 2014; Barrett, et al., 2014; Russel, et al., 2012; Kellis, et al., 2008).

The following figures visually represent the potential spinal examination classifications utilizing the Idiag M360 Pro version 7.7.0 software, Copyright (2020) Idiag AG, Switzerland, in collaboration with Andrew Welsh:

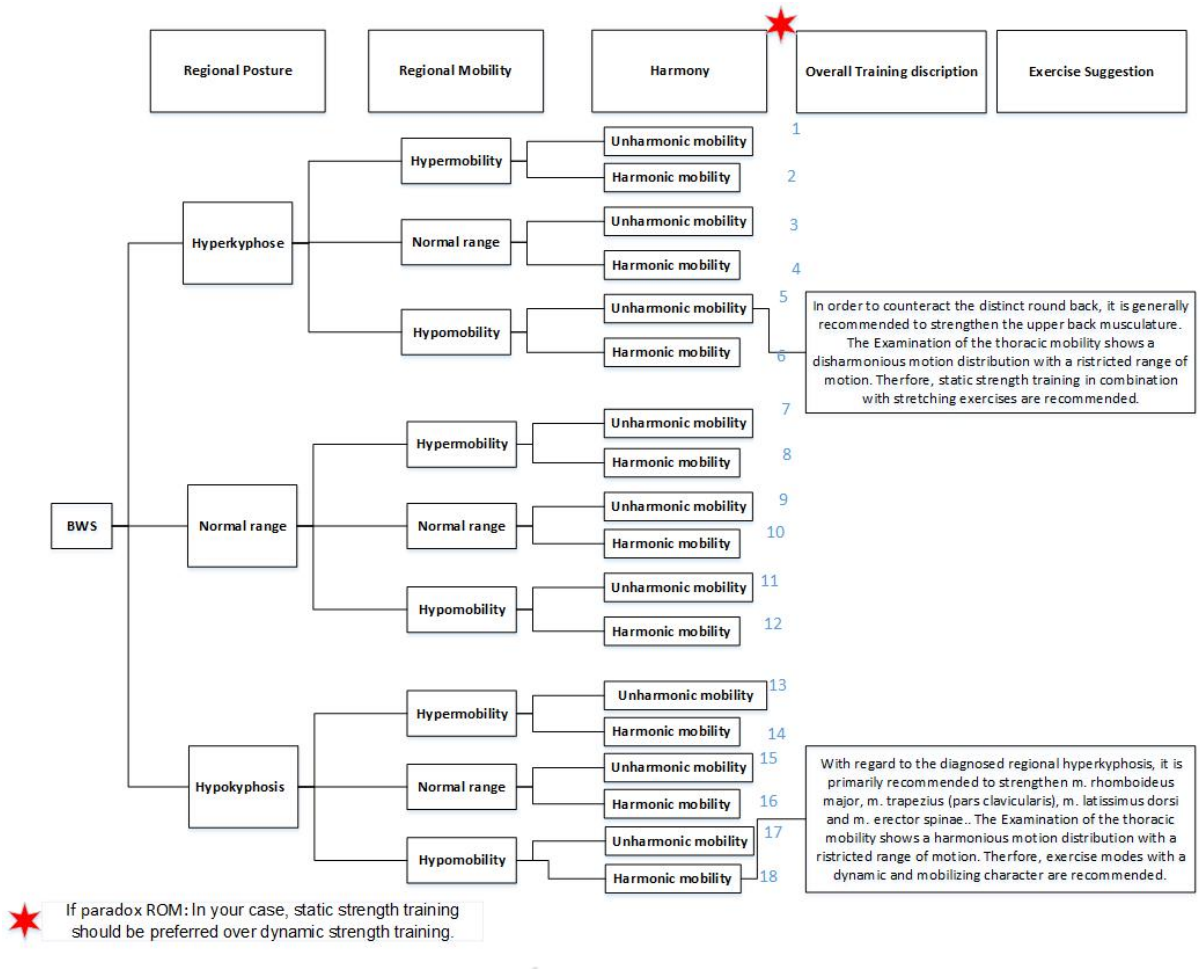


Figure 1: A classification of thoracic spinal examination findings that are possible in the Idiag M360 version 7.7.0 software (Copyright Idiag AG, 2020, in collaboration with Andrew Welsh).

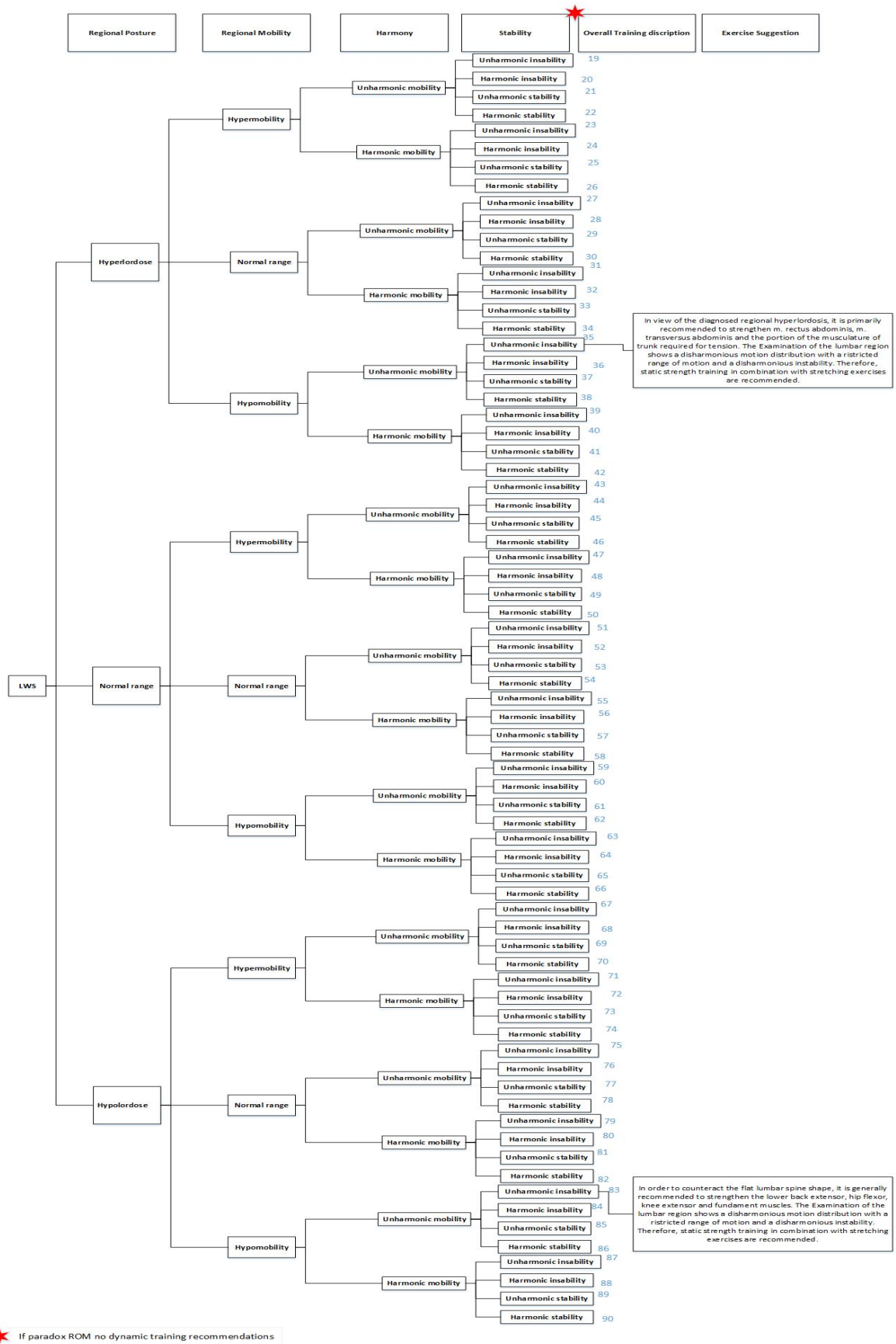


Figure 2: A classification of lumbar spinal examination findings that are possible in the Idiag M360 version 7.7.0 software (Copyright Idiag AG, 2020, in collaboration with Andrew Welsh).

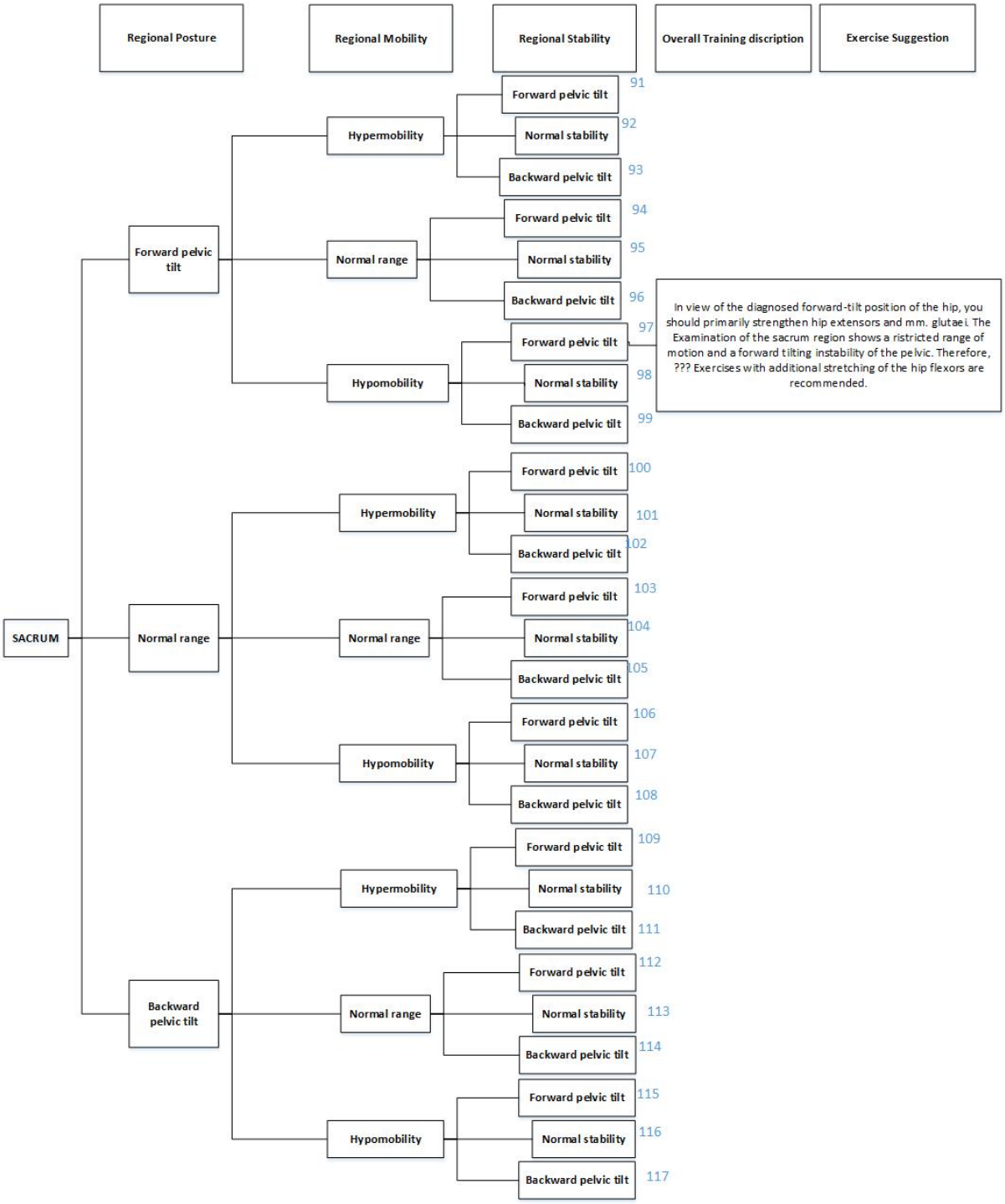


Figure 3: A classification of sacral/pelvic spinal examination findings that are possible in the Idiag M360 version 7.7.0 software (Copyright Idiag AG, 2020).

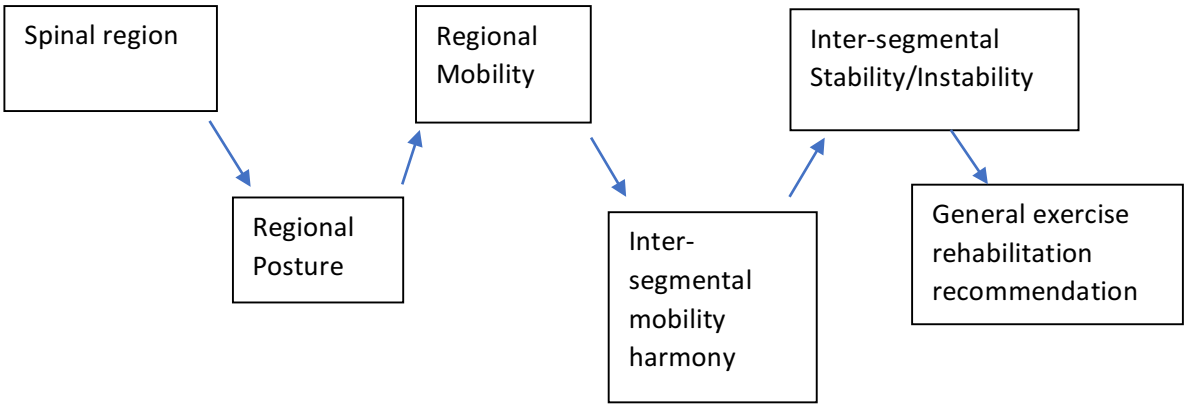
METHODOLOGY FOR DEVELOPING THE EXERCISE ALGORITHM

The 117 possible classifications of a spinopelvic examination sequence of standing neutral, full standing flexion and the Matthiass test (seen in figures 1,2 and 3 above) form the basis of the review of published exercise recommendations.

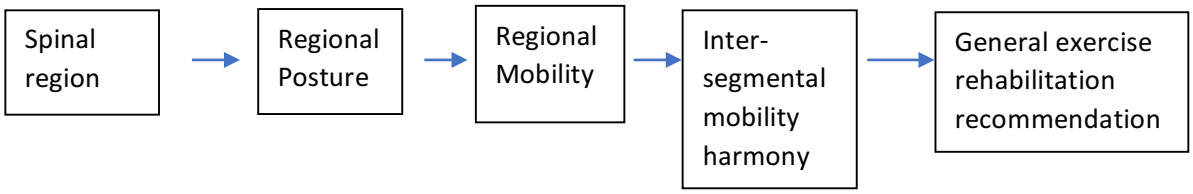
The exercise rehabilitation recommendations follow the algorithm, depending on the spinal region: determine the regional spinal posture → determine the regional spinal mobility → determine the inter-segmental mobility harmony (reported by Idiag AG as between 2-7 degrees of angular difference measured between adjacent segments) → inter-segmental stability/instability (e.g. Matthiass test- only the lumbar spine) → and then referenced exercise recommendations, based sequentially on each of these findings.

As mentioned, this form of goniometry can quantify the regional and inter-segmental angles (with neutral-zero/line-f-gravity), and then calculate the angular difference between testing positions. For example, Idiag M360 goniometer can quantify the change in lumbar spinal angle from standing to neutral, to standing in full flexion. This is accepted as the lumbar flexion range-of-motion. This is also possible for the angular change at each inter-vertebral segment for mobility testing, as well as the change in the inter-segmental angle under load (Matthiass test).

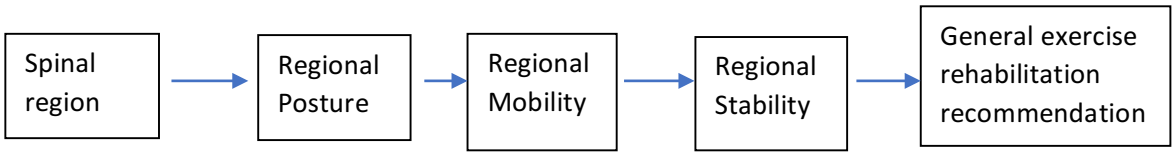
The rehabilitation exercise suggestions for the lumbar spine follows the algorithm:



The rehabilitation exercise suggestions for the thoracic spine follows the algorithm:



The rehabilitation exercise suggestions for the sacral region follows the algorithm:



As an example, following the algorithm for sacral regional assessment above, if we were considering findings from a non-radiographic spinal examination that included:

- a determination of a backward (rear) sacral tilt posture, with hypermobility of the sacrum, and a sacral posterior-tilt instability.

Then, following general postural correction advise, shortened muscles of the torso may include lower abdominals and gluteus maximus. In addition, shortened hip muscles may include the hamstrings. In this scenario, lengthened/weakened torso muscles may include lumbar erector spinae and psoas major, and the hip muscles iliacus and rectus femoris (Johnson, 2016). Moving to the next algorithm step, with hypermobility of the sacrum determined, then from a general exercise recommendations perspective, due to a hypermobility finding, often with flexibility at the expense of strength, the focus may be to strengthen weakened tissues, not to lengthen them. (Johnson, 2016).

Let's take this examination scenario a few steps further to provide stability and strength advice, assuming a posterior sacral-tilt instability during testing, in addition to the recommendation of strengthening exercises for weakened tissues. The chosen stability exercises may be appropriate and pain-free using a stable pelvic range of motion bias towards an anterior tilt, performed statically initially, due to the posterior-tilt instability (Liebenson, 1996).

RESULTS

Algorithm Path Number	Non-radiographic postural, mobility & stability findings	Exercise recommendation description (based on each examination finding)
1	Thoracic spine (sagittal): Hyperkyphosis; with regional hypermobility; and non-harmonic inter-segmental mobility.	For Hyperkyphotic Posture: General recommendations to lengthening shortened muscles, e.g. Pectoralis Major and minor, rectus abdominis and Latisimus Dorsi whilst strengthening middle and lower fibres of Trapezius and iliocostalis thoracis. Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. (Johnson, 2016). Due to the non-harmonic inter-segmental mobility, static strength and proprioception exercises are generally recommended (Liebenson, 1996; Vaičienė, et, al., 2018).
2	Thoracic spine (sagittal): Hyperkyphosis; with regional hypermobility; and harmonic inter-segmental mobility.	For Hyperkyphotic Posture: General recommendations to lengthening shortened muscles, e.g. Pectoralis Major and minor, rectus abdominis and Latisimus Dorsi whilst strengthening middle and lower fibres of Trapezius and iliocostalis thoracis. Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. (Johnson, 2016). Strength and proprioception exercise may be performed dynamically with harmonious inter-segmental mobility.

3	Thoracic spine (sagittal): Hyperkyphosis; normal range of regional mobility; non-harmonic inter-segmental mobility.	For Hyperkyphotic Posture: General recommendations may include lengthening shortened muscles, e.g. Pectoralis Major and minor, rectus abdominis and Latisimus Dorsi whilst strengthening middle and lower fibres of Trapezius and iliocostalis thoracis (Johnson, 2016). With normal mobility, exercise focus is strength, stability and positional awareness (proprioception), although may be performed statically due to non-harmonious inter-segmental mobility (Liebenson, 1996; Vaičienė, et, al., 2018).
4	Thoracic spine (sagittal): Hyperkyphosis; normal range of regional mobility; harmonic inter-segmental mobility.	For Hyperkyphotic Posture: General recommendations may include lengthening shortened muscles, e.g. Pectoralis Major and minor, rectus abdominis and Latisimus Dorsi whilst strengthening middle and lower fibres of Trapezius and iliocostalis thoracis (Johnson, 2016). With normal mobility, exercise focus is strength, stability and positional awareness (proprioception), and may be performed dynamically with harmonious inter-segmental mobility.
5	Thoracic spine (sagittal): Hyperkyphosis; regional hypomobility; non-harmonic inter-segmental mobility.	For Hyperkyphotic Posture: General recommendations may include lengthening shortened muscles, e.g. Pectoralis Major and minor, rectus abdominis and Latisimus Dorsi whilst strengthening middle and lower fibres of Trapezius and iliocostalis thoracis (Johnson, 2016). Due to hypomobility, flexibility exercises are recommended (Johnson, 2016), and strength and proprioception performed statically due to non-harmonious inter-segmental mobility (Liebenson, 1996; Vaičienė, et, al., 2018).

6	Thoracic spine (sagittal): Hyperkyphosis; regional hypomobility; harmonic inter-segmental mobility.	For Hyperkyphotic Posture: General recommendations may include lengthening shortened muscles, e.g. Pectoralis Major and minor, rectus abdominis and Latisimus Dorsi whilst strengthening middle and lower fibres of Trapezius and iliocostalis thoracis (Johnson, 2016). Due to hypomobility, flexibility exercises are recommended, and strength and proprioception may be performed dynamically with harmonious inter-segmental mobility.
7	Thoracic spine (sagittal): Normal range of kyphosis; regional hypermobility; non-harmonic inter-segmental mobility.	For normal Kyphosis: Generally, no postural correction is recommended. Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. (Johnson, 2016). Due to the non-harmonic inter-segmental mobility, static strength, stability and proprioception exercises are generally recommended (Liebenson, 1996; Vaičienė, et, al., 2018).
8	Thoracic spine (sagittal): Normal range of kyphosis; regional hypermobility; harmonic inter-segmental mobility.	For normal Kyphosis: Generally, no postural correction is recommended. Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. (Johnson, 2016). Strength, stability and proprioception exercise may be performed dynamically with harmonious inter-segmental mobility.
9	Thoracic spine (sagittal): Normal range of kyphosis; normal regional range of mobility; non-harmonic inter-segmental mobility.	For normal Kyphosis: Generally, no thoracic spinal postural correction is required. Generally, with normal mobility, flexibility exercises are not the main focus. Additionally, strength, stability and positional awareness (proprioception) may be performed statically due to the non-harmonious inter-segmental mobility (Liebenson, 1996; Vaičienė, et, al., 2018).

10	Thoracic spine (sagittal): Normal range of kyphosis; normal regional range of mobility; harmonic inter-segmental mobility.	For normal Kyphosis: Generally, no thoracic spinal postural correction is required. Generally, with normal mobility, flexibility exercises are not the main focus. Additionally, strength, stability and positional awareness (proprioception) may be performed dynamically with harmonious inter-segmental mobility.
11	Thoracic spine (sagittal): Normal range of kyphosis; regional hypomobility; non-harmonic inter-segmental mobility.	For normal Kyphosis: Generally, no postural correction is recommended. Due to hypomobility, flexibility exercises are recommended (Johnson, 2016), and strength and proprioception performed statically due to non-harmonious inter-segmental mobility (Liebenson, 1996; Vaičienė, et, al., 2018).
12	Thoracic spine (sagittal): Normal range of kyphosis; regional hypomobility; harmonic inter-segmental mobility.	For normal Kyphosis: Generally, no postural correction is recommended. Due to hypomobility, flexibility exercises are the focus (Johnson, 2016). Strength and proprioception may not be required, however, may be performed dynamically with harmonious inter-segmental mobility.
13	Thoracic spine (sagittal): Hypokyphosis; regional hypermobility; non-harmonic inter-segmental mobility.	For Hypokyphosis: Generally, muscles on the anterior thorax are lengthened/weakened, e.g. abdominals, and those on the posterior are shortened, e.g. iliocostalis thoracic (Johnson, 2016). Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them, e.g. abdominals (Johnson, 2016). Due to the non-harmonic inter-segmental mobility, static strength and proprioception exercises are generally recommended

		(Liebenson, 1996; Vaičienė, et, al., 2018).
14	Thoracic spine (sagittal): Hypokyphosis; regional hypermobility; harmonic inter-segmental mobility.	For Hypokyphosis: Generally, muscles on the anterior thorax are lengthened/weakened, e.g. abdominals, and those on the posterior are shortened, e.g. iliocostalis thoracic (Johnson, 2016). Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them, e.g. abdominals (Johnson, 2016). Strength and proprioception exercises may be performed dynamically, considering the harmonious inter-segmental mobility.
15	Thoracic spine (sagittal): Hypokyphosis; normal range of regional mobility; non-harmonic inter-segmental mobility.	For Hypokyphosis: Generally, muscles on the anterior thorax are lengthened/weakened, e.g. abdominals, and those on the posterior are shortened, e.g. iliocostalis thoracic (Johnson, 2016). With normal mobility, exercise focus is strength, stability and positional awareness (proprioception), although may be performed statically due to non-harmonious inter-segmental mobility (Liebenson, 1996; Vaičienė, et, al., 2018).

16	Thoracic spine (sagittal): Hypokyphosis; normal range of regional mobility; harmonic inter-segmental mobility.	For Hypokyphosis: Generally, muscles on the anterior thorax are lengthened/weakened, e.g. abdominals, and those on the posterior are shortened, e.g. iliocostalis thoracic (Johnson, 2016). With normal mobility, exercise focus is strength, stability and positional awareness (proprioception), and may be performed dynamically with harmonious inter-segmental mobility.
17	Thoracic spine (sagittal): Hypokyphosis; regional hypomobility; non-harmonic inter-segmental mobility.	For Hypokyphosis: Generally, muscles on the anterior thorax are lengthened/weakened, e.g. abdominals, and those on the posterior are shortened, e.g. iliocostalis thoracic (Johnson, 2016). Due to hypomobility, flexibility exercises are recommended (Johnson, 2016), e.g. iliocostalis thoracic, and strength and proprioception performed statically due to non-harmonious inter-segmental mobility (Liebenson, 1996; Vaičienė, et, al., 2018).
18	Thoracic spine (sagittal): Hypokyphosis; regional hypomobility; harmonic inter-segmental mobility.	For Hypokyphosis: Generally, muscles on the anterior thorax are lengthened/weakened, e.g. abdominals, and those on the posterior are shortened, e.g. iliocostalis thoracic (Johnson, 2016). Due to hypomobility, flexibility exercises are recommended (Johnson, 2016), e.g. iliocostalis thoracic, and strength and proprioception may be performed dynamically with harmonious inter-segmental mobility.

19	Lumbar spine (sagittal): Hyperlordosis; regional hypermobility; non-harmonic inter-segmental mobility; non-harmonic inter-segmental instability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. (Johnson, 2016). Due to the non-harmonic inter-segmental mobility with non-harmonic instability, static strength and proprioception exercises are generally recommended (Liebenson, 1996; Vaičienė, et, al., 2018).
20	Lumbar spine (sagittal): Hyperlordosis; regional hypermobility; non-harmonic inter-segmental mobility; harmonic inter-segmental instability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. (Johnson, 2016). Due to the non-harmonic inter-segmental mobility, despite harmonic instability, static strength and proprioception exercises are generally recommended (Liebenson, 1996; Vaičienė, et, al., 2018).
21	Lumbar spine (sagittal): Hyperlordosis; regional hypermobility; non-harmonic inter-segmental mobility; non-harmonic inter-segmental stability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. (Johnson, 2016). Due to the non-harmonic inter-segmental mobility with non-harmonic stability,

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22	Lumbar spine (sagittal): Hyperlordosis; regional hypermobility; non-harmonic inter-segmental mobility; harmonic inter-segmental stability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. (Johnson, 2016). Due to the non-harmonic inter-segmental mobility, despite harmonic stability, static strength and proprioception exercises are generally recommended (Liebenson, 1996; Vaičienė, et, al., 2018).
23	Lumbar spine (sagittal): Hyperlordosis; regional hypermobility; harmonic inter-segmental mobility; non-harmonic inter-segmental instability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. (Johnson, 2016). Due to the harmonic inter-segmental mobility with non-harmonic instability, static strength and proprioception exercises are generally recommended (Liebenson, 1996; Vaičienė, et, al., 2018).

24	Lumbar spine (sagittal): Hyperlordosis; regional hypermobility; harmonic inter-segmental mobility; harmonic inter-segmental instability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. (Johnson, 2016). Due to the harmonic inter-segmental mobility with harmonic instability, static strength and proprioception exercises are generally recommended (Liebenson, 1996; Vaičienė, et, al., 2018).
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26	Lumbar spine (sagittal): Hyperlordosis; regional hypermobility; harmonic inter-segmental mobility; harmonic inter-segmental stability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. (Johnson, 2016). Due to the harmonic inter-segmental mobility with harmonic stability, dynamic strength and proprioception exercises may be

		tolerated (Liebenson, 1996; Vaičienė, et, al., 2018).
27	Lumbar spine (sagittal): Hyperlordosis; normal range of regional mobility; non-harmonic inter-segmental mobility; non-harmonic inter-segmental instability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). With normal mobility, the exercise focus is strength, stability and positional awareness (proprioception), although may be performed statically due to non-harmonic inter-segmental mobility and non-harmonic instability (Liebenson, 1996; Vaičienė, et, al., 2018).
28	Lumbar spine (sagittal): Hyperlordosis; normal range of regional mobility; non-harmonic inter-segmental mobility; harmonic inter-segmental instability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). With normal mobility, the exercise focus is strength, stability and positional awareness (proprioception), although may be performed statically due to non-harmonic inter-segmental mobility and harmonic instability (Liebenson, 1996; Vaičienė, et, al., 2018).

29	Lumbar spine (sagittal): Hyperlordosis; normal range of regional mobility; non-harmonic inter-segmental mobility; non-harmonic inter-segmental stability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). With normal mobility, the exercise focus is strength, stability and positional awareness (proprioception), although may be performed statically due to non-harmonic inter-segmental mobility and non-harmonic stability (Liebenson, 1996; Vaičienė, et, al., 2018).
30	Lumbar spine (sagittal): Hyperlordosis; normal range of regional mobility; non-harmonic inter-segmental mobility; harmonic inter-segmental stability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). With normal mobility, the exercise focus is strength, stability and positional awareness (proprioception), although may be performed statically due to non-harmonic inter-segmental mobility and harmonic stability (Liebenson, 1996; Vaičienė, et, al., 2018).
31	Lumbar spine (sagittal): Hyperlordosis; normal range of regional mobility; harmonic inter-segmental mobility; non-harmonic inter-segmental instability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). With normal mobility, the exercise focus is strength, stability and positional awareness (proprioception), although may be performed statically due to harmonic inter-segmental mobility and non-harmonic instability (Liebenson, 1996; Vaičienė, et, al., 2018).

32	Lumbar spine (sagittal): Hyperlordosis; normal range of regional mobility; harmonic inter-segmental mobility; harmonic inter-segmental instability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). With normal mobility, the exercise focus is strength, stability and positional awareness (proprioception), although may be performed statically due to harmonic inter-segmental mobility and harmonic instability (Liebenson, 1996; Vaičienė, et, al., 2018).
33	Lumbar spine (sagittal): Hyperlordosis; normal range of regional mobility; harmonic inter-segmental mobility; non-harmonic inter-segmental stability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). With normal mobility, the exercise focus is strength, stability and positional awareness (proprioception), although may be performed statically due to harmonic inter-segmental mobility and non-harmonic stability (Liebenson, 1996; Vaičienė, et, al., 2018).
34	Lumbar spine (sagittal): Hyperlordosis; normal range of regional mobility; harmonic inter-segmental mobility; harmonic inter-segmental stability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). With normal mobility, the exercise focus is strength, stability and positional awareness (proprioception), however dynamic exercises may be tolerated in some cases due to harmonic inter-segmental mobility and harmonic stability (Liebenson, 1996; Vaičienė, et, al., 2018).

35	Lumbar spine (sagittal): Hyperlordosis; regional hypomobility; non-harmonic inter-segmental mobility; non-harmonic inter-segmental instability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Strength, stability and positional awareness (proprioception) exercises, however, may be performed statically due to non-harmonic inter-segmental mobility with non-harmonic instability (Liebenson, 1996; Vaičienė, et, al., 2018).
36	Lumbar spine (sagittal): Hyperlordosis; regional hypomobility; non-harmonic inter-segmental mobility; harmonic inter-segmental instability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Strength, stability and positional awareness (proprioception) exercises, however, may be performed statically due to non-harmonic inter-segmental mobility with harmonic instability (Liebenson, 1996; Vaičienė, et, al., 2018).
37	Lumbar spine (sagittal): Hyperlordosis; regional hypomobility; non-harmonic inter-segmental mobility; non-harmonic inter-segmental stability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Strength, stability and positional awareness (proprioception) exercises, however, may be performed statically due to non-harmonic inter-segmental mobility with non-harmonic stability (Liebenson, 1996; Vaičienė, et, al., 2018).

38	Lumbar spine (sagittal): Hyperlordosis; regional hypomobility; non-harmonic inter-segmental mobility; harmonic inter-segmental stability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Strength, stability and positional awareness (proprioception) exercises, however, may be performed statically due to non-harmonic inter-segmental mobility with harmonic stability (Liebenson, 1996; Vaičienė, et, al., 2018).
39	Lumbar spine (sagittal): Hyperlordosis; regional hypomobility; harmonic inter-segmental mobility; non-harmonic inter-segmental instability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Strength, stability and positional awareness (proprioception) exercises, however, may be performed statically due to harmonic inter-segmental mobility with non-harmonic instability (Liebenson, 1996; Vaičienė, et, al., 2018).
40	Lumbar spine (sagittal): Hyperlordosis; regional hypomobility; harmonic inter-segmental mobility; harmonic inter-segmental instability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Strength, stability and positional awareness (proprioception) exercises, however, may be performed statically due to harmonic inter-segmental mobility with harmonic instability (Liebenson, 1996; Vaičienė, et, al., 2018).

41	Lumbar spine (sagittal): Hyperlordosis; regional hypomobility; harmonic inter-segmental mobility; non-harmonic inter-segmental stability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Strength, stability and positional awareness (proprioception) exercises, however, may be performed statically due to harmonic inter-segmental mobility with non-harmonic stability (Liebenson, 1996; Vaičienė, et, al., 2018).
42	Lumbar spine (sagittal): Hyperlordosis; regional hypomobility; harmonic inter-segmental mobility; harmonic inter-segmental stability	For Hyperlordosis: Generally, shortened muscles include Lumbar Erector Spinae group and psoas major and lengthened/weakened muscles include abdominals, hamstrings and gluteus maximus (Johnson, 2016). Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Strength, stability and positional awareness (proprioception) exercises, however, may be tolerated dynamically in some cases due to harmonic inter-segmental mobility with harmonic stability.
43	Lumbar spine (sagittal): Normal range of lordosis; regional hypermobility; non-harmonic inter-segmental mobility; non-harmonic inter-segmental instability	For normal Lordosis: Generally, no postural correction is recommended. Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them (Johnson, 2016). Due to the non-harmonic inter-segmental mobility with non-harmonic instability, static strength and proprioception exercises are generally recommended (Liebenson, 1996; Vaičienė, et, al., 2018).

44	Lumbar spine (sagittal): Normal range of lordosis; regional hypermobility; non-harmonic inter-segmental mobility; harmonic inter-segmental instability	For normal Lordosis: Generally, no postural correction is recommended. Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them (Johnson, 2016). Due to the non-harmonic inter-segmental mobility with harmonic instability, static strength and proprioception exercises are generally recommended (Liebenson, 1996; Vaičienė, et, al., 2018).
45	Lumbar spine (sagittal): Normal range of lordosis; regional hypermobility; non-harmonic inter-segmental mobility; non-harmonic inter-segmental stability	For normal Lordosis: Generally, no postural correction is recommended. Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them (Johnson, 2016). Due to the non-harmonic inter-segmental mobility with non-harmonic stability, static strength and proprioception exercises are generally recommended (Liebenson, 1996; Vaičienė, et, al., 2018).
46	Lumbar spine (sagittal): Normal range of lordosis; regional hypermobility; non-harmonic inter-segmental mobility; harmonic inter-segmental stability	For normal Lordosis: Generally, no postural correction is recommended. Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them (Johnson, 2016). Due to the non-harmonic inter-segmental mobility with harmonic stability, static strength and proprioception exercises are generally recommended (Liebenson, 1996; Vaičienė, et, al., 2018).

47	Lumbar spine (sagittal): Normal range of lordosis; regional hypermobility; harmonic inter-segmental mobility; non-harmonic inter-segmental instability	For normal Lordosis: Generally, no postural correction is recommended. Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. (Johnson, 2016). Due to the harmonic inter-segmental mobility with non-harmonic instability, static strength and proprioception exercises are generally recommended (Liebenson, 1996; Vaičienė, et, al., 2018).
48	Lumbar spine (sagittal): Normal range of lordosis; regional hypermobility; harmonic inter-segmental mobility; harmonic inter-segmental instability	For normal Lordosis: Generally, no postural correction is recommended. Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them (Johnson, 2016). Due to the harmonic inter-segmental mobility with harmonic instability, dynamic strength and proprioception exercises may be recommended.
49	Lumbar spine (sagittal): Normal range of lordosis; regional hypermobility; harmonic inter-segmental mobility; non-harmonic inter-segmental stability	For normal Lordosis: Generally, no postural correction is recommended. Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them (Johnson, 2016). Due to the harmonic inter-segmental mobility with non-harmonic stability, static strength and proprioception exercises are generally recommended (Liebenson, 1996; Vaičienė, et, al., 2018).

50	Lumbar spine (sagittal): Normal range of lordosis; regional hypermobility; harmonic inter-segmental mobility; harmonic inter-segmental stability	For normal Lordosis: Generally, no postural correction is recommended. Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them (Johnson, 2016). Static strength, stability and proprioception exercises may be recommended with harmonic inter-segmental mobility with harmonic instability (Liebenson, 1996; Vaičienė, et, al., 2018).
51	Lumbar spine (sagittal): Normal range of lordosis; normal range of regional mobility; non-harmonic inter-segmental mobility; non-harmonic inter-segmental instability	For normal Lordosis: Generally, no postural correction is recommended. With normal mobility, the exercise focus is strength, stability and positional awareness (proprioception), although may be performed statically due to non-harmonic inter-segmental mobility and non-harmonic instability (Liebenson, 1996; Vaičienė, et, al., 2018).
52	Lumbar spine (sagittal): Normal range of lordosis; normal range of regional mobility; non-harmonic inter-segmental mobility; harmonic inter-segmental instability	For normal Lordosis: Generally, no postural correction is recommended. With normal mobility, the exercise focus is strength, stability and positional awareness (proprioception), although may be performed statically due to non-harmonic inter-segmental mobility and harmonic instability (Liebenson, 1996; Vaičienė, et, al., 2018).
53	Lumbar spine (sagittal): Normal range of lordosis; normal range of regional mobility; non-harmonic inter-segmental mobility; non-harmonic inter-segmental stability	For normal Lordosis: Generally, no postural correction is recommended. With normal mobility, the exercise focus is strength, stability and positional awareness (proprioception), although may be performed statically due to non-harmonic inter-segmental mobility and non-harmonic stability (Liebenson, 1996; Vaičienė, et, al., 2018).

54	Lumbar spine (sagittal): Normal range of lordosis; normal range of regional mobility; non-harmonic inter-segmental mobility; harmonic inter-segmental stability	For normal Lordosis: Generally, no postural correction is recommended. With normal mobility, the exercise focus is strength, stability and positional awareness (proprioception), although may be performed statically due to non-harmonic inter-segmental mobility and harmonic stability (Liebenson, 1996; Vaičienė, et, al., 2018).
55	Lumbar spine (sagittal): Normal range of lordosis; normal range of regional mobility; harmonic inter-segmental mobility; non-harmonic inter-segmental instability	For normal Lordosis: Generally, no postural correction is recommended. With normal mobility, the exercise focus is strength, stability and positional awareness (proprioception), although may be performed statically due to harmonic inter-segmental mobility and non-harmonic instability (Liebenson, 1996; Vaičienė, et, al., 2018).
56	Lumbar spine (sagittal): Normal range of lordosis; normal range of regional mobility; harmonic inter-segmental mobility; harmonic inter-segmental instability	For normal Lordosis: Generally, no postural correction is recommended. With normal mobility, the exercise focus is strength, stability and positional awareness (proprioception), and may be performed statically with harmonic inter-segmental mobility and harmonic instability (Liebenson, 1996; Vaičienė, et, al., 2018).
57	Lumbar spine (sagittal): Normal range of lordosis; normal range of regional mobility; harmonic inter-segmental mobility; non-harmonic inter-segmental stability	For normal Lordosis: Generally, no postural correction is recommended. With normal mobility, the exercise focus is strength, stability and positional awareness (proprioception), although may be performed statically due to harmonic inter-segmental mobility and non-harmonic stability (Liebenson, 1996; Vaičienė, et, al., 2018).

58	Lumbar spine (sagittal): Normal range of lordosis; normal range of regional mobility; harmonic inter-segmental mobility; harmonic inter-segmental stability	For normal Lordosis: Generally, no postural correction is recommended. With normal mobility, the exercise focus is strength, stability and positional awareness (proprioception), dynamic exercises may be tolerated in some cases with harmonic inter-segmental mobility with harmonic stability.
59	Lumbar spine (sagittal): Normal range of lordosis; regional hypomobility; non-harmonic inter-segmental mobility; non-harmonic inter-segmental instability	For normal Lordosis: Generally, no postural correction is recommended. Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Strength, stability and positional awareness (proprioception) exercises, however, may be performed statically due to non-harmonic inter-segmental mobility with non-harmonic instability (Liebenson, 1996; Vaičienė, et, al., 2018).
60	Lumbar spine (sagittal): Normal range of lordosis; regional hypomobility; non-harmonic inter-segmental mobility; harmonic inter-segmental instability	For normal Lordosis: Generally, no postural correction is recommended. Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Strength, stability and positional awareness (proprioception) exercises, however, may be performed statically due to non-harmonic inter-segmental mobility with harmonic instability (Liebenson, 1996; Vaičienė, et, al., 2018).
61	Lumbar spine (sagittal): Normal range of lordosis; regional hypomobility; non-harmonic inter-segmental mobility; non-harmonic inter-segmental stability	For normal Lordosis: Generally, no postural correction is recommended. Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Strength, stability and positional awareness (proprioception) exercises, however, may be performed statically due to non-harmonic inter-segmental mobility with non-harmonic stability (Liebenson, 1996; Vaičienė, et, al., 2018).

62	Lumbar spine (sagittal): Normal range of lordosis; regional hypomobility; non-harmonic inter-segmental mobility; harmonic inter-segmental stability	For normal Lordosis: Generally, no postural correction is recommended. Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Strength, stability and positional awareness (proprioception) exercises, however, may be performed statically due to non-harmonic inter-segmental mobility with harmonic stability (Liebenson, 1996; Vaičienė, et, al., 2018.
63	Lumbar spine (sagittal): Normal range of lordosis; regional hypomobility; harmonic inter-segmental mobility; non-harmonic inter-segmental instability	For normal Lordosis: Generally, no postural correction is recommended. Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Strength, stability and positional awareness (proprioception) exercises, however, may be performed statically due to harmonic inter-segmental mobility with non-harmonic instability (Liebenson, 1996; Vaičienė, et, al., 2018).
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65	Lumbar spine (sagittal): Normal range of lordosis; regional hypomobility; harmonic inter-segmental mobility; non-harmonic inter-segmental stability	For normal Lordosis: Generally, no postural correction is recommended. Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Strength, stability and positional awareness (proprioception) exercises, however, may be performed statically due to harmonic inter-segmental mobility with non-harmonic stability (Liebenson, 1996; Vaičienė, et, al., 2018).

66	Lumbar spine (sagittal): Normal range of lordosis; regional hypomobility; harmonic inter-segmental mobility; harmonic inter-segmental stability	For normal Lordosis: Generally, no postural correction is recommended. Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Strength, stability, and positional awareness (proprioception) exercises may be tolerated dynamically in some cases due to harmonic inter-segmental mobility with harmonic stability.
67	Lumbar spine (sagittal): Hypolordosis; regional hypermobility; non-harmonic inter-segmental mobility; non-harmonic inter-segmental instability	For Hypolordotic Posture: Generally, shortened muscles include lower abdominals, hamstrings and gluteus maximus, and lengthened/weakened muscles include the lumbar erector spinae and hip flexor groups (Johnson, 2016). Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. (Johnson, 2016). Due to the non-harmonic inter-segmental mobility with non-harmonic instability, static strength and proprioception exercises are generally recommended (Liebenson, 1996; Vaičienė, et, al., 2018).
68	Lumbar spine (sagittal): Hypolordosis; regional hypermobility; non-harmonic inter-segmental mobility; harmonic inter-segmental instability	For Hypolordotic Posture: Generally, shortened muscles include lower abdominals, hamstrings and gluteus maximus, and lengthened/weakened muscles include the lumbar erector spinae and hip flexor groups (Johnson, 2016). Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. (Johnson, 2016). Due to the non-harmonic inter-segmental mobility with harmonic instability, static strength and proprioception exercises are generally recommended (Liebenson, 1996; Vaičienė, et, al., 2018).

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71	Lumbar spine (sagittal): Hypolordosis; regional hypermobility; harmonic inter-segmental mobility; non-harmonic inter-segmental instability	For Hypolordotic Posture: Generally, shortened muscles include lower abdominals, hamstrings and gluteus maximus, and lengthened/weakened muscles include the lumbar erector spinae and hip flexor groups (Johnson, 2016). Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. (Johnson, 2016). Due to the harmonic inter-segmental mobility with non-harmonic instability, static strength and proprioception exercises

		are generally recommended (Liebenson, 1996; Vaičienė, et, al., 2018).
72	Lumbar spine (sagittal): Hypolordosis; regional hypermobility; harmonic inter-segmental mobility; harmonic inter-segmental instability	For Hypolordotic Posture: Generally, shortened muscles include lower abdominals, hamstrings and gluteus maximus, and lengthened/weakened muscles include the lumbar erector spinae and hip flexor groups (Johnson, 2016). Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. (Johnson, 2016). Due to the harmonic inter-segmental mobility with harmonic instability, dynamic strength and proprioception exercises may be generally recommended.
73	Lumbar spine (sagittal): Hypolordosis; regional hypermobility; harmonic inter-segmental mobility; non-harmonic inter-segmental stability	For Hypolordotic Posture: Generally, shortened muscles include lower abdominals, hamstrings and gluteus maximus, and lengthened/weakened muscles include the lumbar erector spinae and hip flexor groups (Johnson, 2016). Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. (Johnson, 2016). Due to the harmonic inter-segmental mobility with non-harmonic stability, static strength and proprioception exercises are generally recommended (Liebenson, 1996; Vaičienė, et, al., 2018).

74	Lumbar spine (sagittal): Hypolordosis; regional hypermobility; harmonic inter-segmental mobility; harmonic inter-segmental stability	For Hypolordotic Posture: Generally, shortened muscles include lower abdominals, hamstrings and gluteus maximus, and lengthened/weakened muscles include the lumbar erector spinae and hip flexor groups (Johnson, 2016). Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. (Johnson, 2016). Due to the harmonic inter-segmental mobility with harmonic stability, dynamic strength, dynamic stability and proprioception exercises may be tolerated in some cases.
75	Lumbar spine (sagittal): Hypolordosis; normal range of regional mobility; non-harmonic inter-segmental mobility; non-harmonic inter-segmental instability	For Hypolordotic Posture: Generally, shortened muscles include lower abdominals, hamstrings and gluteus maximus, and lengthened/weakened muscles include the lumbar erector spinae and hip flexor groups (Johnson, 2016). With normal mobility, the exercise focus is strength, stability and positional awareness (proprioception), although may be performed statically due to non-harmonic inter-segmental mobility and non-harmonic instability (Liebenson, 1996; Vaičienė, et, al., 2018).
76	Lumbar spine (sagittal): Hypolordosis; normal range of regional mobility; non-harmonic inter-segmental mobility; harmonic inter-segmental instability	For Hypolordotic Posture: Generally, shortened muscles include lower abdominals, hamstrings and gluteus maximus, and lengthened/weakened muscles include the lumbar erector spinae and hip flexor groups (Johnson, 2016). With normal mobility, the exercise focus is strength, stability and positional awareness (proprioception), although may be performed statically due to non-harmonic inter-segmental mobility and harmonic instability (Liebenson, 1996; Vaičienė, et, al., 2018).

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81	Lumbar spine (sagittal): Hypolordosis; normal range of regional mobility; harmonic inter-segmental mobility; non-harmonic inter-segmental stability	For Hypolordotic Posture: Generally, shortened muscles include lower abdominals, hamstrings and gluteus maximus, and lengthened/weakened muscles include the lumbar erector spinae and hip flexor groups (Johnson, 2016). With normal mobility, the exercise focus is strength, stability and positional awareness (proprioception), although may be performed statically due to harmonic inter-segmental mobility and non-harmonic stability (Liebenson, 1996; Vaičienė, et, al., 2018).
82	Lumbar spine (sagittal): Hypolordosis; normal range of regional mobility; harmonic inter-segmental mobility; harmonic inter-segmental stability	For Hypolordotic Posture: Generally, shortened muscles include lower abdominals, hamstrings and gluteus maximus, and lengthened/weakened muscles include the lumbar erector spinae and hip flexor groups (Johnson, 2016). With normal mobility, the exercise focus is strength, stability and positional awareness (proprioception); however, this may be performed dynamically with to harmonic inter-segmental mobility and harmonic stability.

83	Lumbar spine (sagittal): Hypolordosis; regional hypomobility; non-harmonic inter-segmental mobility; non-harmonic inter-segmental instability	For Hypolordotic Posture: Generally, shortened muscles include lower abdominals, hamstrings and gluteus maximus, and lengthened/weakened muscles include the lumbar erector spinae and hip flexor groups (Johnson, 2016). Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Strength, stability and positional awareness (proprioception) exercises, however, may be performed statically due to non-harmonic inter-segmental mobility with non-harmonic instability (Liebenson, 1996; Vaičienė, et, al., 2018).
84	Lumbar spine (sagittal): Hypolordosis; regional hypomobility; non-harmonic inter-segmental mobility; harmonic inter-segmental instability	For Hypolordotic Posture: Generally, shortened muscles include lower abdominals, hamstrings and gluteus maximus, and lengthened/weakened muscles include the lumbar erector spinae and hip flexor groups (Johnson, 2016). Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Strength, stability and positional awareness (proprioception) exercises, however, may be performed statically due to non-harmonic inter-segmental mobility with harmonic instability (Liebenson, 1996; Vaičienė, et, al., 2018).
85	Lumbar spine (sagittal): Hypolordosis; regional hypomobility; non-harmonic inter-segmental mobility; non-harmonic inter-segmental stability	For Hypolordotic Posture: Generally, shortened muscles include lower abdominals, hamstrings and gluteus maximus, and lengthened/weakened muscles include the lumbar erector spinae and hip flexor groups (Johnson, 2016). Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Strength, stability and positional awareness (proprioception) exercises, however, may be performed statically due to non-harmonic inter-segmental mobility with non-harmonic stability (Liebenson, 1996; Vaičienė, et, al., 2018).

86	Lumbar spine (sagittal): Hypolordosis; regional hypomobility; non-harmonic inter-segmental mobility; harmonic inter-segmental stability	For Hypolordotic Posture: Generally, shortened muscles include lower abdominals, hamstrings and gluteus maximus, and lengthened/weakened muscles include the lumbar erector spinae and hip flexor groups (Johnson, 2016). Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Strength, stability and positional awareness (proprioception) exercises, however, may be performed statically due to non-harmonic inter-segmental mobility with harmonic stability (Liebenson, 1996; Vaičienė, et, al., 2018).
87	Lumbar spine (sagittal): Hypolordosis; regional hypomobility; harmonic inter-segmental mobility; non-harmonic inter-segmental instability	For Hypolordotic Posture: Generally, shortened muscles include lower abdominals, hamstrings and gluteus maximus, and lengthened/weakened muscles include the lumbar erector spinae and hip flexor groups (Johnson, 2016). Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Strength, stability and positional awareness (proprioception) exercises, however, may be performed statically due to harmonic inter-segmental mobility with non-harmonic instability (Liebenson, 1996; Vaičienė, et, al., 2018).
88	Lumbar spine (sagittal): Hypolordosis; regional hypomobility; harmonic inter-segmental mobility; harmonic inter-segmental instability	For Hypolordotic Posture: Generally, shortened muscles include lower abdominals, hamstrings and gluteus maximus, and lengthened/weakened muscles include the lumbar erector spinae and hip flexor groups (Johnson, 2016). Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Strength, stability and positional awareness (proprioception) exercises, however, may be performed dynamically with harmonic inter-segmental mobility with harmonic instability.

89	Lumbar spine (sagittal): Hypolordosis; regional hypomobility; harmonic inter-segmental mobility; non-harmonic inter-segmental stability	For Hypolordotic Posture: Generally, shortened muscles include lower abdominals, hamstrings and gluteus maximus, and lengthened/weakened muscles include the lumbar erector spinae and hip flexor groups (Johnson, 2016). Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Strength, stability and positional awareness (proprioception) exercises, however, may be performed statically due to harmonic inter-segmental mobility with non-harmonic stability (Liebenson, 1996; Vaičienė, et, al., 2018).
90	Lumbar spine (sagittal): Hypolordosis; regional hypomobility; harmonic inter-segmental mobility; harmonic inter-segmental stability	For Hypolordotic Posture: Generally, shortened muscles include lower abdominals, hamstrings and gluteus maximus, and lengthened/weakened muscles include the lumbar erector spinae and hip flexor groups (Johnson, 2016). Due to hypomobility, flexibility exercises are recommended (Johnson, 2016). Due to the harmonic inter-segmental mobility with harmonic stability, dynamic strength, stability and proprioception exercises may be tolerated in some cases.
91	Sacrum/Pelvis/Hip complex (sagittal): Anterior pelvic tilt; Hypermobility; Anteriorised tilt	In a forward sacral tilt posture: Generally, shortened muscles of the torso may include lumbar erector spinae and psoas major; shortened hip muscles may include rectus femoris, iliacus, tensor fasciae latae and sartorius. Lengthened/weakened torso muscles may include rectus abdominis, and the hip muscles gluteus maximus, and hamstrings (Johnson, 2016). Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them (Johnson, 2016). Stability exercises may be appropriate and pain-free using a stable pelvic range of motion bias towards a posterior tilt, performed statically

		initially, due to a forward-tilt instability (Liebenson, 1996).
92	Sacrum/Pelvis/Hip complex (sagittal): Anterior pelvic tilt; Hypermobility; normal range of pelvic tilt	In a forward sacral tilt posture: Generally, shortened muscles of the torso may include lumbar erector spinae and psoas major; shortened hip muscles may include rectus femoris, iliacus, tensor fasciae latae and sartorius. Lengthened/weakened torso muscles may include rectus abdominis, and the hip muscles gluteus maximus, and hamstrings (Johnson, 2016). Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. Note: Sacral stability is within normal values (Johnson, 2016).
93	Sacrum/Pelvis/Hip complex (sagittal): Anterior pelvic tilt; Hypermobility; Posteriorised tilt	In a forward sacral tilt posture: Generally, shortened muscles of the torso may include lumbar erector spinae and psoas major; shortened hip muscles may include rectus femoris, iliacus, tensor fasciae latae and sartorius. Lengthened/weakened torso muscles may include rectus abdominis, and the hip muscles gluteus maximus, and hamstrings (Johnson, 2016). Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. (Johnson, 2016). Stability exercises may be appropriate and pain-free using a stable pelvic range of motion bias towards an anterior tilt, performed statically initially, due to a

		posterior-tilt instability (Liebenson, 1996).
94	Sacrum/Pelvis/Hip complex (sagittal): Anterior pelvic tilt; Normal range of mobility; Anteriorised tilt	In a forward sacral tilt posture: Generally, shortened muscles of the torso may include lumbar erector spinae and psoas major; shortened hip muscles may include rectus femoris, iliacus, tensor fasciae latae and sartorius. Lengthened/weakened torso muscles may include rectus abdominis, and the hip muscles gluteus maximus, and hamstrings (Johnson, 2016). With normal sacral mobility, the focus may be to strengthen weak tissues. (Johnson, 2016). Stability exercises may be appropriate and pain-free using a stable pelvic range of motion bias towards a posterior tilt, performed statically initially, due to a forward-tilt instability (Liebenson, 1996).
95	Sacrum/Pelvis/Hip complex (sagittal): Anterior pelvic tilt; Normal range of mobility; Normal range of pelvic tilt	In a forward sacral tilt posture: Generally, shortened muscles of the torso may include lumbar erector spinae and psoas major; shortened hip muscles may include rectus femoris, iliacus, tensor fasciae latae and sartorius. Lengthened/weakened torso muscles may include rectus abdominis, and the hip muscles gluteus maximus, and hamstrings (Johnson, 2016). With normal sacral mobility and stability, the focus may be to strengthen weak tissues. (Johnson, 2016).

96	Sacrum/Pelvis/Hip complex (sagittal): Anterior pelvic tilt; Normal range of mobility; Posteriorised pelvic tilt	In a forward sacral tilt posture: Generally, shortened muscles of the torso may include lumbar erector spinae and psoas major; shortened hip muscles may include rectus femoris, iliacus, tensor fasciae latae and sartorius. Lengthened/weakened torso muscles may include rectus abdominis, and the hip muscles gluteus maximus, and hamstrings (Johnson, 2016). With normal sacral mobility, the focus may be to strengthen weak tissues (Johnson, 2016). Stability exercises may be appropriate and pain-free using a stable pelvic range of motion bias towards a forward tilt, performed statically initially, due to a backward-tilt instability (Liebenson, 1996).
97	Sacrum/Pelvis/Hip complex (sagittal): Anterior pelvic tilt; Hypomobility; Anteriorised pelvic tilt	In a forward sacral tilt posture: Generally, shortened muscles of the torso may include lumbar erector spinae and psoas major; shortened hip muscles may include rectus femoris, iliacus, tensor fasciae latae and sartorius. Lengthened/weakened torso muscles may include rectus abdominis, and the hip muscles gluteus maximus, and hamstrings (Johnson, 2016). Due to sacral hypomobility, flexibility exercises are recommended (Johnson, 2016). Stability exercises may be appropriate and pain-free using a stable pelvic range of motion bias towards a posterior tilt, performed statically initially, due to a forward-tilt instability (Liebenson, 1996).
98	Sacrum/Pelvis/Hip complex (sagittal): Anterior pelvic tilt; Hypomobility; Normal range of pelvic tilt	In a forward sacral tilt posture: Generally, shortened muscles of the torso may include lumbar erector spinae and psoas major; shortened hip muscles may include rectus femoris, iliacus, tensor fasciae latae and sartorius. Lengthened/weakened torso muscles may include rectus abdominis, and the hip muscles gluteus maximus, and hamstrings (Johnson, 2016). Due to sacral hypomobility, flexibility exercises

		are recommended along with any strength exercises to address the general posture correction recommendations above (Johnson, 2016). Note: Sacral stability is within normal values
99	Sacrum/Pelvis/Hip complex (sagittal): Anterior pelvic tilt; Hypomobility; Posteriorised pelvic tilt	In a forward sacral tilt posture: Generally, shortened muscles of the torso may include lumbar erector spinae and psoas major; shortened hip muscles may include rectus femoris, iliacus, tensor fasciae latae and sartorius. Lengthened/weakened torso muscles may include rectus abdominis, and the hip muscles gluteus maximus, and hamstrings (Johnson, 2016). Due to sacral hypomobility, flexibility exercises are recommended (Johnson, 2016). Stability exercises may be appropriate and pain-free using a stable pelvic range of motion bias towards an anterior tilt, performed statically initially, due to a backward-tilt instability (Liebenson, 1996).
100	Sacrum/Pelvis/Hip complex (sagittal): Normal range of pelvic tilt; Hypermobility; Anteriorised pelvic tilt	For normal sacral tilt posture: Generally, no postural correction is recommended. Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them (Johnson, 2016). Stability exercises may be appropriate and pain-free using a stable pelvic range of motion bias towards a posterior tilt, performed statically initially, due to a forward-tilt instability (Liebenson, 1996).

101	Sacrum/Pelvis/Hip complex (sagittal): Normal range of pelvic tilt; Hypermobility; Normal range of pelvic tilt	For normal sacral tilt posture: Generally, no postural correction is recommended. Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. Note: Sacral stability is within normal values (Johnson, 2016).
102	Sacrum/Pelvis/Hip complex (sagittal): Normal range of pelvic tilt; Hypermobility; Posteriorised pelvic tilt	For normal sacral tilt posture: Generally, no postural correction is recommended. Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. (Johnson, 2016). Stability exercises may be appropriate and pain-free using a stable pelvic range of motion bias towards an anterior tilt, performed statically initially, due to a posterior-tilt instability (Liebenson, 1996).
103	Sacrum/Pelvis/Hip complex (sagittal): Normal range of pelvic tilt; Normal range of mobility; Anteriorised pelvic tilt	For normal sacral tilt posture: Generally, no postural correction is recommended. With normal sacral mobility, the focus may be to strengthen weak tissues. (Johnson, 2016). Stability exercises may be appropriate and pain-free using a stable pelvic range of motion bias towards a posterior tilt, performed statically initially, due to a forward-tilt instability (Liebenson, 1996).
104	Sacrum/Pelvis/Hip complex (sagittal): Normal range of pelvic tilt; Normal range of mobility; Normal range of pelvic tilt	For normal sacral tilt posture: Generally, no postural correction is recommended. With normal sacral mobility and stability, there is no specific corrective exercise focus.

105	Sacrum/Pelvis/Hip complex (sagittal): Normal range of pelvic tilt; Normal range of mobility; Posteriorised pelvic tilt	For normal sacral tilt posture: Generally, no postural correction is recommended. With normal sacral mobility, the focus may be to strengthen weak tissues (Johnson, 2016). Stability exercises may be appropriate and pain-free using a stable pelvic range of motion bias towards a forward tilt, performed statically initially, due to a backward-tilt instability (Liebenson, 1996).
106	Sacrum/Pelvis/Hip complex (sagittal): Normal range of pelvic tilt; Hypomobility; Anteriorised pelvic tilt	For normal sacral tilt posture: Generally, no postural correction is recommended. Due to sacral hypomobility, flexibility exercises are recommended (Johnson, 2016). Stability exercises may be appropriate and pain-free using a stable pelvic range of motion bias towards a posterior tilt, performed statically initially, due to a forward-tilt instability (Liebenson, 1996).
107	Sacrum/Pelvis/Hip complex (sagittal): Normal range of pelvic tilt; Hypomobility; Normal range of pelvic tilt	For normal sacral tilt posture: Generally, no postural correction is recommended. Due to sacral hypomobility, flexibility exercises are recommended (Johnson, 2016). Note: Sacral stability is within normal values.
108	Sacrum/Pelvis/Hip complex (sagittal): Normal range of pelvic tilt; Hypomobility; Posteriorised pelvic tilt	For normal sacral tilt posture: Generally, no postural correction is recommended. Due to sacral hypomobility, flexibility exercises are recommended (Johnson, 2016). Stability exercises may be appropriate and pain-free using a stable pelvic range of motion bias towards an anterior tilt, performed statically initially, due to a backward-tilt instability (Liebenson, 1996).

109	Sacrum/Pelvis/Hip complex (sagittal): Posteriorised pelvic tilt; Hypermobility; Anteriorised pelvic tilt	In a backward sacral tilt posture: Generally shortened muscles of the torso may include lower abdominals and gluteus maximus; shortened hip muscles may include the hamstrings. Lengthened/weakened torso muscles include lumbar erector spinae and psoas major, and the hip muscles iliacus and rectus femoris (Johnson, 2016). Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them (Johnson, 2016). Stability exercises may be appropriate and pain-free using a stable pelvic range of motion bias towards a posterior tilt, performed statically initially, due to a forward-tilt instability (Liebenson, 1996).
110	Sacrum/Pelvis/Hip complex (sagittal): Posteriorised pelvic tilt; Hypermobility; Normal range of pelvic tilt	In a backward sacral tilt posture: Generally shortened muscles of the torso may include lower abdominals and gluteus maximus; shortened hip muscles may include the hamstrings. Lengthened/weakened torso muscles include lumbar erector spinae and psoas major, and the hip muscles iliacus and rectus femoris (Johnson, 2016). Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. Note: Sacral stability is within normal values (Johnson, 2016).
111	Sacrum/Pelvis/Hip complex (sagittal): Posteriorised pelvic tilt; Hypermobility; Posteriorised pelvic tilt	In a backward sacral tilt posture: Generally shortened muscles of the torso may include lower abdominals and gluteus maximus; shortened hip muscles may include the hamstrings. Lengthened/weakened torso muscles include lumbar erector spinae and psoas major, and the hip muscles iliacus and rectus femoris (Johnson, 2016). Due to hypermobility findings, often with flexibility at the expense of strength, the focus may be to strengthen weak tissues, not to lengthen them. (Johnson,

		2016). Stability exercises may be appropriate and pain-free using a stable pelvic range of motion bias towards an anterior tilt, performed statically initially, due to a posterior-tilt instability (Liebenson, 1996).
112	Sacrum/Pelvis/Hip complex (sagittal): Posteriorised pelvic tilt; Normal range of mobility; Anteriorised pelvic tilt	In a backward sacral tilt posture: Generally shortened muscles of the torso may include lower abdominals and gluteus maximus; shortened hip muscles may include the hamstrings. Lengthened/weakened torso muscles include lumbar erector spinae and psoas major, and the hip muscles iliacus and rectus femoris (Johnson, 2016). With normal sacral mobility, the focus may be to strengthen weak tissues. (Johnson, 2016). Stability exercises may be appropriate and pain-free using a stable pelvic range of motion bias towards a posterior tilt, performed statically initially, due to a forward-tilt instability (Liebenson, 1996).
113	Sacrum/Pelvis/Hip complex (sagittal): Posteriorised pelvic tilt; Normal range of mobility; Normal range of pelvic tilt	In a backward sacral tilt posture: Generally shortened muscles of the torso may include lower abdominals and gluteus maximus; shortened hip muscles may include the hamstrings. Lengthened/weakened torso muscles include lumbar erector spinae and psoas major, and the hip muscles iliacus and rectus femoris (Johnson, 2016). With normal sacral mobility and stability, the focus may be to strengthen weak tissues. (Johnson, 2016).

114	Sacrum/Pelvis/Hip complex (sagittal): Posteriorised pelvic tilt; Normal range of mobility; Posteriorised pelvic tilt	In a backward sacral tilt posture: Generally shortened muscles of the torso may include lower abdominals and gluteus maximus; shortened hip muscles may include the hamstrings. Lengthened/weakened torso muscles include lumbar erector spinae and psoas major, and the hip muscles iliacus and rectus femoris (Johnson, 2016). With normal sacral mobility, the focus may be to strengthen weak tissues (Johnson, 2016). Stability exercises may be appropriate and pain-free using a stable pelvic range of motion bias towards a forward tilt, performed statically initially, due to a backward-tilt instability (Liebenson, 1996).
115	Sacrum/Pelvis/Hip complex (sagittal): Posteriorised pelvic tilt; Hypomobility; Anteriorised pelvic tilt	In a backward sacral tilt posture: Generally shortened muscles of the torso may include lower abdominals and gluteus maximus; shortened hip muscles may include the hamstrings. Lengthened/weakened torso muscles include lumbar erector spinae and psoas major, and the hip muscles iliacus and rectus femoris (Johnson, 2016). Due to sacral hypomobility, flexibility exercises are recommended (Johnson, 2016). Stability exercises may be appropriate and pain-free using a stable pelvic range of motion bias towards a posterior tilt, performed statically initially, due to a forward-tilt instability (Liebenson, 1996).
116	Sacrum/Pelvis/Hip complex (sagittal): Posteriorised pelvic tilt; Hypomobility; Normal range of pelvic tilt	In a backward sacral tilt posture: Generally shortened muscles of the torso may include lower abdominals and gluteus maximus; shortened hip muscles may include the hamstrings. Lengthened/weakened torso muscles include lumbar erector spinae and psoas major, and the hip muscles iliacus and rectus femoris (Johnson, 2016). Due to sacral hypomobility, flexibility exercises are recommended along with any strength exercises to address the general posture correction

		recommendations above (Johnson, 2016). Note: Sacral stability is within normal values
117	Sacrum/Pelvis/Hip complex (sagittal): Posteriorised pelvic tilt; Hypomobility; Posteriorised pelvic tilt	In a backward sacral tilt posture: Generally shortened muscles of the torso may include lower abdominals and gluteus maximus; shortened hip muscles may include the hamstrings. Lengthened/weakened torso muscles include lumbar erector spinae and psoas major, and the hip muscles iliacus and rectus femoris (Johnson, 2016). Due to sacral hypomobility, flexibility exercises are recommended (Johnson, 2016). Stability exercises may be appropriate and pain-free using a stable pelvic range of motion bias towards an anterior tilt, performed statically initially, due to a backward-tilt instability (Liebenson, 1996).

DISCUSSION

This attempt was made, for the first time, to examine the role of non-radiographic goniometric technology to assist clinicians in a spinal physical examination and therapeutic exercise/manual therapy management. The goal of this study is to assist the workflow of busy clinicians, to provide instant feedback on posture, mobility, stability and instability findings from a spinal examination, and provide recommendations from known references, matched to each finding. Specifically, to provide general exercise recommendations for postural correction, mobility, stability and strength, utilizing objective goniometric measurement.

A review of the literature for exercise recommendations to remedy this group of examination findings was performed, with referencing. A potential limitation of this study is only to consider osteokinematic results, relative to normative values, and prescribe exercises to remedy any identified deficits. The whole patient should be considered, and exercise prescription, or manual therapy should be appropriate for each individual.

I would like to acknowledge and thank Idiag AG, in collaboration with Andrew Welsh for supplying the figures 1,2 and 3, containing the classification of spinal findings that made the basis for the creation of this algorithm for exercise recommendation possible.

CONCLUSION

The role of technology, such as spinal electrogoniometers, is not to replace visual estimation or other essential components of clinical examination. But instead to provide an opportunity for clinicians to quantify their current physical examinations, and match spinal examination findings with known normative values. From this, clinicians, such as Osteopaths and Physical Therapists, can improve their workflow by utilizing this osteokinematic information to make specific, measurable improvements in posture, mobility and stability deficits.

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