THE FMS™ ACTIVE STRAIGHT LEG RAISE – SCREENING AND CORRECTIVE EXERCISE CONSIDERATIONS FOR PERSONAL TRAINERS WITH MINIMAL FMS™ EXPERIENCE

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The Functional Movement Screen (FMS™) is a polarizing, but common movement screen used in various performance and rehabilitation settings (7). Globally, the FMS is a quick and reliable screen that can provide insight into a client's strengths and areas of improvement with fundamental movement patterns that reflect common strength training exercises (e.g., squat, Romanian deadlift, and shoulder press) (1). Specifically, FMS results can help the personal trainer determine the direction of the client's training program or if a client has pain with basic movement patterns, which would necessitate a referral to a healthcare provider (1). Elements of the FMS such as reliability, validity, and injury predictive capabilities are well established in the research (7). A central theme of FMS research has been the ability of the movement screen to predict injury via the overall composite score calculation, with the basic implementation, scoring, and calculation of the FMS composite score well-documented in the research (3). Currently, most publications identify a limited ability of the FMS composite score to predict injury, with most publications recommending a greater investigation (and focus) on the individual movement patterns within the FMS and movement asymmetries (7). What is currently lacking in the present FMS research is a more intimate exploration of each individual pattern and the unique screening and corrective exercise integration decisions that are relevant to the personal training industry. Therefore, this article is the first in a planned article series to review essential considerations of each FMS pattern; this article will examine the FMS active straight leg raise (ASLR) in greater detail to help personal trainers with minimal FMS experience better understand the pattern, consistently identify movement compensations, and effectively integrate ASLR corrective exercises into their current training programs.

PATTERN OVERVIEW

The ASLR (also known as the reciprocal lower body pattern) is a multi-faceted pattern that primarily assesses a client's pelvic disassociation (i.e., the ability to create flexion on one limb and extension on the other) capabilities (2). Pelvic disassociation is a critical developmental sequence reflected in various exercises and daily movements (e.g., rolling, crawling, walking, running, skipping). Also, the pattern allows for an assessment of the client's ability to effectively transfer load between the spine and lower extremities, which is important for strength and conditioning movements such as the hip hinge and deadlift (5).

To complete the ASLR, the client actively moves one limb through hip flexion (with the knee straight), which requires adequate hamstring and calf flexibility, while the opposite limb must reciprocally extend, which requires adequate hip flexor flexibility (5). The ASLR allows for assessment of both the client's right and left leg pelvic disassociation and load transfer abilities. The client's core activation strategies (feedforward versus feedback), pelvic orientation (anterior versus posterior tilt), open chain knee extension, and open chain ankle dorsiflexion capabilities all contribute to the client's ability to complete the ASLR pattern (5). Personal trainers should remember that the ASLR is a multi-faceted pattern with the spine in a fixed and supported position; thus, deficient performance on the ASLR is not solely because of hamstring or calf flexibility issues on the moving extremity and may highlight compensatory strategies used during quadruped, kneeling, and standing exercises (4).

SCREENING CONSIDERATIONS AND MOVEMENT COMPENSATIONS

Previous publications have documented the proper setup, cues, and FMS scoring criteria for the ASLR (2). For a client to receive a functional score (i.e., an ordinal score of "3"), they must demonstrate the ability to get the malleolus of their moving leg (maintaining a straight knee) past a vertical dowel rod (Figure 1) positioned halfway between their hip and knee (mid-thigh) with the non-moving limb (i.e., the stationary leg) remaining in the neutral test setup position (2). The challenge of the ASLR for providers new to the movement screen is visually watching both limbs simultaneously while determining if the malleolus clears the mid-thigh before any compensations are present. Often, new providers focus exclusively on the moving leg and miss compensatory changes in the non-moving limb that would affect the client's score (i.e., ordinal scores of "2" or "1").

For example, Figure 2 represents a scenario where a client's non-moving limb externally rotates out of the neutral test position before the client's moving leg malleolus clears the vertical dowel rod. In this scenario, the test should stop at the point the neutral test position is lost, which would be indicative of a significant compensatory strategy that should be addressed with corrective interventions. Figure 3 represents a scenario where the client's non-moving knee flexes (the knee should remain in extension) before the moving limb malleolus clears the vertical dowel rod. Like the previous scenario, the test should stop at the point the neutral test position is lost, which will drastically change the client's score and our interpretation of the ASLR capabilities.

Finally, Figure 4 represents a scenario where the client is unable to keep their feet in the standardized test position (toes pointed toward the ceiling with soles of the shoes perpendicular to the floor) before the moving leg malleolus clears the vertical dowel rod. Once again, this compensatory strategy changes the assessment of ASLR performance and warrants the inclusion of corrective exercises into the client's existing training program. Globally, personal trainers using the ASLR as part of their client assessment should remember that the compensatory strategies referenced in Figures 2 – 4 are only considered compensations if they occur before the moving leg malleolus clears the vertical dowel rod.

FIGURE 1. FMS ORDINAL SCORE OF 3 ON THE ASLR

FIGURE 2. NON-MOVING LIMB EXTERNAL ROTATION

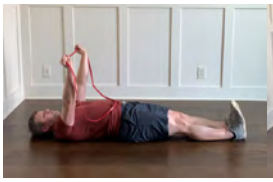
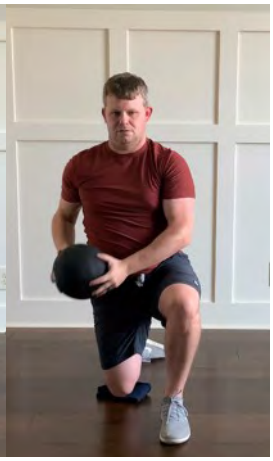
FIGURE 3. NON-MOVING LIMB KNEE FLEXION

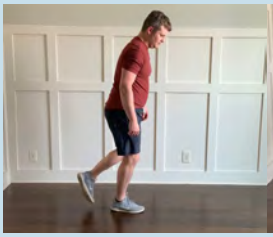
FIGURE 4. FEET OUT OF THE STANDARDIZED TEST POSITION

FIGURE 5. REVERSE PATTERN ASLR

FIGURE 6. REVERSE PATTERN ASLR

TABLE 1. SAMPLE ASLR CORRECTIVE EXERCISE PROGRESSION

EXERCISE	SETS X REPS	COACHING CUES	EQUIPMENT	START	FINISH
Feedback ASLR	1 – 3 x 10 – 12	**Position**: Lie flat on your back; keep the knuckles to the sky with constant tension in the band **Action**: Pull the band to the floor; raise the right leg (knee straight) as high as you can and then lower the right leg; repeat the action on the left side **Feel**: Back of the moving leg and stomach; no knee, hip, or back pain	Light to medium resistance band		
Mountain Climber	1 – 3 x 10 – 12	**Position**: Hands and toes into the ground (shoulder-width apart); neutral spine **Action**: Bring the right knee towards the right elbow keeping a neutral spine throughout; return to the start position and repeat on the left leg **Feel**: Front and back of the moving leg and stomach; no knee, back, or hip pain	Sliders or towel		
Half-Kneeling Chop	1 – 3 x 10 – 12	**Position**: Right knee on the ground; left leg in front with a 90/90/90 alignment (hip, knee, and ankle) **Action**: Bring the medicine ball from the left ear to the right hip (crossing the chest); return to the start position **Feel**: Stomach and arms; no knee, back, or shoulder pain **Comments**: 1. Toes can be either loaded into the ground (ankle dorsiflexion) or unloaded (ankle plantarflexion) 2. After completing a set of the exercise with the medicine ball moving from the left ear to the right hip, clients should change their leg position (left knee down and right leg up) and move the medicine ball from the right ear to the left hip	Light to medium resistance band or medicine ball		

EXERCISE	SETS X REPS	COACHING CUES	EQUIPMENT	START	FINISH
Single-Leg Deadlift	1 – 3 x 10 – 12	**Position**: Stand on the right leg with a soft bend in the knee and a neutral spine **Action**: Push hips back toward the wall while maintaining a neutral spine; return to the start position **Feel**: Hips and lower leg; no knee, hip, or back pain **Comment**: 1. After completing a set of the exercise, clients should change their leg position (stand on the left leg) and repeat the movement action	Bodyweight (the exercise can progress to light-medium load)		

CORRECTIVE EXERCISE INTEGRATION

Clients who do not achieve an ordinal score of "3" (i.e., functional) on the ASLR (both the right and left leg of the pattern) can complete corrective exercise strategies to improve their performance on the pattern. Corrective exercise integration can occur in various forms based on the preferences of the client and personal trainer.

For example, some personal trainers may decide that modifying the client's warm-up and cool-down to include specific ASLR corrective strategies is the best approach. Controversially, other personal trainers may decide to remove certain exercises (such as the hip hinge and Romanian deadlift pattern) from their client's program temporarily until the pattern improves; removal of an exercise such as a hip hinge is based on the transfer of load between the spine and lower extremity, which is important for strength and conditioning exercises such as the hip hinge or Romanian deadlift (5). Alternatively, other personal trainers may simply decide to add an ASLR corrective movement before their client completes a hip hinge or Romanian deadlift or provide their client with at-home exercises to complete.

Regardless of the approach the personal trainer decides to take, corrective strategies are an important part of the client's program to improve their pelvic disassociation, load transfer, and lower-extremity flexibility, all of which are reflected in their ASLR performance. Corrective exercises for the ASLR are not simply practicing the ASLR; instead, corrective exercises are exercises that reflect the different elements of the ASLR pattern (6). Progressive corrective exercises that mimic various postural positions (Table 1) and reverse-patterning exercises (Figure 5) improve the connection between the pattern and the exercises the client completes in their training program (6). The exercises presented in Figure 5 and Table 1 are based on movement pattern retraining, with each exercise designed to reinforce the mobility, stability, coordination, and timing needed to complete the ASLR successfully. For example, the feedback ASLR (Table 1) actively engages the client's core (via the band pull) before completing the ASLR, which helps reinforce the proper sequencing of core activation and proper pelvic orientation before the client completes the movement. The movement pattern retraining established with the feedback ASLR is then progressed over time (based on client form, movement quality, and exercise competence) with different postural challenges as reflected in the mountain climber, half-kneeling chop, and single-leg deadlift. The mountain climber, half-kneeling chop, and single-leg deadlift continue to reinforce the various elements of the ASLR pattern. Additionally, soft tissue techniques (e.g., foam rolling, static stretching, and dynamic stretching) for the muscles of the lower extremity (e.g., calves, hamstrings, hip flexors, tensor fasciae latae, and quadriceps) should be incorporated into the client's warm-up and cool-down to help address potential mobility and stability or postural limitations within the pattern.

CONCLUSION

The ASLR is a multi-faceted pattern that primarily assesses a client's pelvic disassociation, load transfer, and lower extremity flexibility characteristics; the pattern is reflected in common strength training exercises (e.g., Romanian deadlift) and postures (e.g., half-kneeling) (2). Clients who are unable to achieve a functional score on the ASLR (both the right and left leg) can benefit from corrective exercise strategies that improve the mobility, stability, coordination, and timing elements of the movement pattern. Corrective exercises for the ASLR should approximate the various functional requirements needed to complete the pattern, be completed with adequate form and quality, and progress over time. Personal trainers should communicate their approach to corrective exercise integration with their clients and that the FMS is comprised of seven unique fundamental movements; this article is only a review of the ASLR pattern and its associated corrective exercise considerations.

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