

Assessment and Exercise Program Design

Level 1



**PERFORMANCE
REDEFINED**



MOBILITY SCREEN

MAKING EXERCISE MATTER!

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THE CASE FOR MOBILITY

There are many factors that influence *how* each of us moves while working, playing or navigating life's daily activities, one of which is our joint *mobility*. In other words, on any given day, the way we walk, get of bed, put on our pants, etc. will be influenced by how much joint range of motion we have (passive) and access (active) through the coordinated contraction of our muscles.

Despite vast differences in our population's physical activity and lifestyle habits, and thus the physical capacity (e.g. strength, aerobic capacity) required to perform safely and effectively, we all need mobility. The ability to move our joints and position our body segments so that we can sit on a toilet, wash our hair, walk up stairs or tie our shoes transcends any differences that may exist in our physical demands.

Possessing the motivation, knowledge and fitness to perform a specific physical activity may mean very little without the requisite mobility. Forced to find alternative movement solutions to fulfill the need or desire to perform (e.g. tying your shoes), larger ranges of motion will be sought from adjacent joints (e.g. if hip mobility is limited, the knees or low back may be asked to accommodate).

For these reasons, mobility should be one of, if not the first piece of information gathered when assessing a client's physical needs. Knowing whether they have the ability (passively or actively) to place their body in specific positions will shed light on their available movement solutions and help to personalize any exercise, education or coaching solutions.

ASSESSING MOBILITY

Before discussing the many options to assess mobility, a distinction must be made between *passive* and *active* measurements.

Passive mobility refers to the motion observed at a joint when a body segment is moved by an external force, such as the actions of a coach, thus removing any involvement from the muscles. When a segment is moved passively in the direction of interest, the tissues spanning the joint will be lengthened until reaching their physiological limit, at which point no further motion can be achieved – the passive limit has been reached.

Active mobility refers to motion observed at a joint when a body segment is moved by muscular contraction (i.e. internal forces). Active mobility can be isolated to a single joint, or observed in the context of a multi-joint movement, but in either case it must be appreciated that additional factors such as strength, awareness and coordination, along with the passive extensibility of the muscles, will influence the motion observed about a joint of interest.

The combination of passive and active tasks can be used to establish an individual's specific mobility needs; however, separately their utility and thus the interpretation of any findings should be limited.

What can be said if only use **PASSIVE** Testing

- 'Passing' a passive test provides limited insight into a performer's active mobility. Can only say that passive mobility will not be a limiting factor.
- 'Failing' a passive test provides insight into a performer's passive mobility. Can say that passive mobility will limit active mobility.

What can be said if only use **ACTIVE** Testing

- 'Passing' an active test provides insight into a performer's active and passive mobility. Can say that passive mobility does not limit active.
- 'Failing' an active test provides limited insight into a performer's passive mobility. Can only say that passive mobility may be limited.



‘RULING OUT’ VERSUS ‘RULING IN’

Using observation to identify what **IS RIGHT**, instead of what **MIGHT BE WRONG**

THE PROBLEM WITH ‘RULING IN’

The images on the left show two performers at the bottom of an overhead squat. The performer on the left has failed to keep his heels in contact with the floor and the dowel over his feet while descending below a parallel thigh position (with respect to the floor). While each of these observations *may* stem from limited passive mobility at the ankle, shoulder and hip respectively, it would be inappropriate to interpret each observation as being *caused* by a passive mobility restriction. Many other factors such as strength, coordination, balance, perception of risk, motivation, understanding of the task objectives, etc. may have influenced how this individual performed. As such, attempts to *‘rule in’* passive mobility needs based the observed positions achieved during the performance of active tasks may be problematic.

The individual on the left *may* have a passive ankle, hip or shoulder mobility issue that needs to be addressed, but he *may not*. Instead, he may simply lack the body awareness to adopt the desired position, and therefore it would likely be ineffective to have him perform a series of stretches or mobilization exercises to increase his passive mobility. This individual needs to learn how to use the passive mobility he already has.

IDENTIFY WHAT IS RIGHT BY ‘RULING OUT’

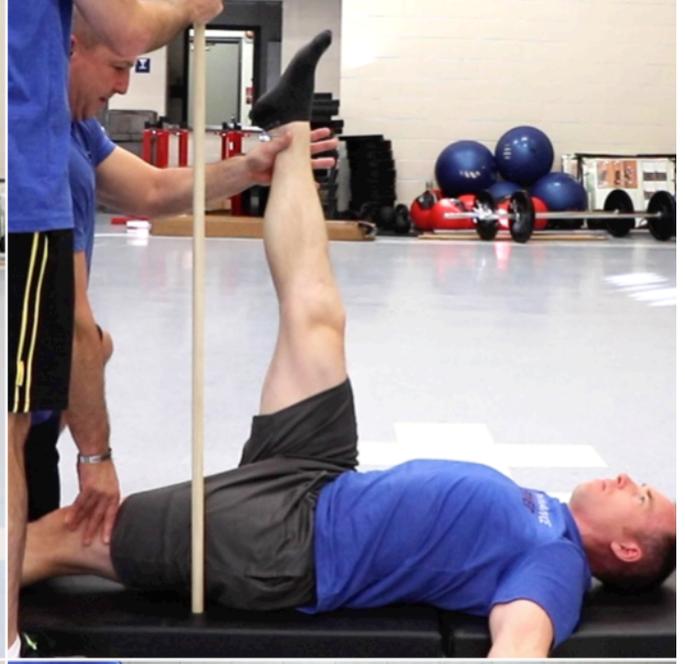
The performer on the right has kept his heels in contact with the floor and the dowel over his feet while descending below a parallel thigh position. He is also able to position his knees past his toes (a measure of ankle dorsiflexion). If the knees were also aligned with the hips and feet when observed front the front, an ankle mobility issue could be *‘ruled out’*. In other words, it would not be possible to meet the screening criteria with limited ankle mobility, and thus by positioning himself as shown it could be stated that he has sufficient passive ankle mobility.

The individual may lack the strength, endurance or coordination to perform higher more complex, higher demand tasks, but he does not have a passive mobility issue. This individual may see limited benefit from stretches and mobilization exercises and should focus on integrating the active mobility he has into other relevant activities.

ACTIVE MOBILITY
(Performer A)



PASSIVE MOBILITY
(Performer B)



NO MOBILITY
(Performer C)



CATEGORIZING MOBILITY NEEDS

Distinguish **ACTIVE** and **PASSIVE** mobility needs to inform exercise recommendations

INFORMING EXERCISE RECOMMENDATIONS

Knowing how someone is able to position their body in space while performing a series of active and passive activities can provide invaluable information that will help to inform personalized exercise recommendations (mobility or otherwise). In general, performers can be categorized as having active and passive mobility, only passive mobility, or no passive mobility (and thus no active mobility).

PERFORMER A (ACTIVE and PASSIVE MOBILITY)

Those who possess the ability to **ACTIVELY** place their body in positions that use ankle dorsiflexion, hip flexion and shoulder flexion while controlling motion at adjacent joints. Displaying active mobility also implies that, at a minimum, the equivalent **PASSIVE** mobility is present.

Implications for Exercise: Activities that emphasize passive mobility may not provide benefit and thus may not be needed. Suggest using activities that provide an opportunity to use the available active and passive range of motion.

PERFORMER B (PASSIVE MOBILITY ONLY)

Those who do not possess the ability to **ACTIVELY** place their body in positions that use ankle dorsiflexion, hip flexion and shoulder flexion while controlling motion at adjacent joints, but do have the equivalent **PASSIVE** mobility.

Implications for Exercise: Activities that emphasize passive mobility may not provide benefit and thus may not be needed. Suggest using activities that provide an opportunity to use the available passive range of motion while controlling motion at adjacent joints. Improving active mobility must be prioritized (i.e. learn how to use available range).

PERFORMER C (No PASSIVE MOBILITY)

Those who do not possess the ability to **ACTIVELY** place their body in positions that use ankle dorsiflexion, hip flexion and shoulder flexion while controlling motion at adjacent joints, and do not have the equivalent **PASSIVE** mobility is not present.

Implications for Exercise: Activities that emphasize passive mobility should be prioritized. In the absence of passive mobility, active ranges will need to be modified. Suggest combining activities that will help to both increase passive mobility and improve active mobility (i.e. access more range and learn how to use new range).

MOBILITY SCREEN™

The Mobility Screen™ comprises a series of 10 tasks that can be used collectively to ‘rule out’ the presence of an ankle dorsiflexion, hip flexion, or shoulder flexion mobility restriction. The 10 tasks are separated into 3 categories (or grades) each differing in complexity and joint range of motion demands.

GRADE 3 tasks require a combination of ACTIVE ankle, hip and/or shoulder mobility.

GRADE 2 tasks require one of ACTIVE ankle, hip or shoulder mobility.

GRADE 1 tasks require one of PASSIVE ankle, hip or shoulder mobility.

Performers should begin the Screen with the **GRADE 3** tasks so that multiple joints can be screened concurrently. These tasks would then be followed by **GRADE 2** and **GRADE 1** tasks to distinguish between ACTIVE and PASSIVE mobility needs. If the grading criteria are met during the performance of any **GRADE 3** or **GRADE 2** task, the Screen can be terminated and it can be concluded that the performer has both ACTIVE and PASSIVE mobility.

The Mobility Screen can be used to categorize performers as having: A) active and passive mobility, B) passive but not active mobility, and C) no active or passive mobility.

	Performer A	Performer A	Performer B	Performer C
GRADE 3	✓	✗	✗	✗
GRADE 2	-	✓	✗	✗
GRADE 1	-	-	✓	✗
	Active + Passive	Active + Passive	Passive Only	No Passive

THE SCREENING TASKS

The 10 tasks outlined below should be used collectively to rule out active and passive mobility restrictions. If the criteria for an active task are met, no further screening is needed and it can be stated that both ACTIVE and PASSIVE mobility are present. If the criteria for a passive task are met it can only be stated that PASSIVE mobility is present and further active screening is needed.

MOVEMENT SCREENING TASKS (GRADE 3)

1. OVERHEAD SQUAT (HEELS DOWN)
Use to screen active ANKLE, HIP and SHOULDER mobility
2. OVERHEAD SQUAT (HEELS UP)
Use to screen active HIP and SHOULDER mobility
3. FRONT SQUAT (HEELS DOWN)
Use to screen active ANKLE and HIP mobility
4. FRONT SQUAT (HEELS UP)
Use to screen active HIP mobility



ACTIVE ROM TASKS (GRADE 2)

5. SPLIT SQUAT (UNILATERAL)
Use to screen active ANKLE mobility
6. LOWER AND LIFT (BILATERAL)
Use to screen active HIP mobility
7. OVERHEAD PRESS (BILATERAL)
Use to screen active SHOULDER mobility



PASSIVE ROM TASKS (GRADE 1)

8. WEIGHT BEARING LUNGE (UNILATERAL)
Use to screen passive ANKLE mobility
9. STRAIGHT LEG RAISE (UNILATERAL)
Use to screen passive HIP mobility
10. SHOULDER REACH (UNILATERAL)
Use to screen passive SHOULDER mobility



MOBILITY SCREEN

Ankle, Hip, Shoulder Mobility

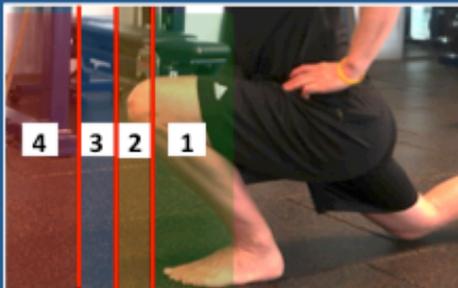
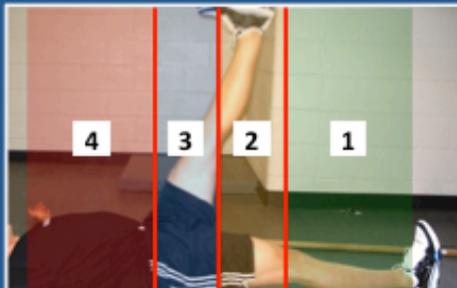
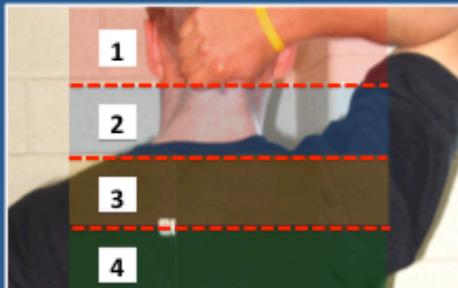
MOVEMENT SCREENING TASKS (GRADE 3)

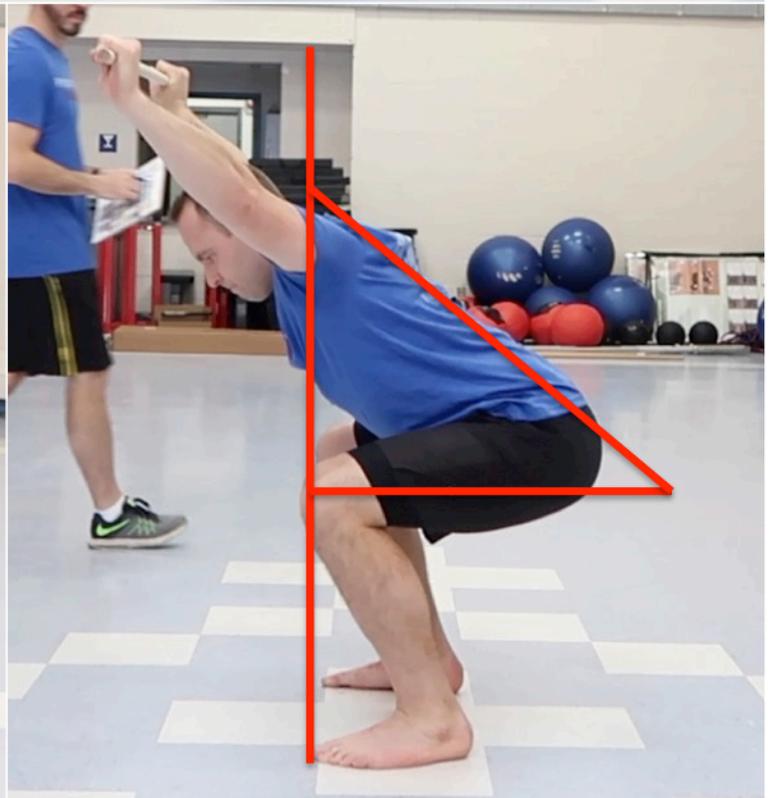
			
OVERHEAD SQUAT, HEELS DOWN	OVERHEAD SQUAT, HEELS UP	FORWARD ARM SQUAT, HEELS DOWN	FORWARD ARM SQUAT, HEELS UP
ANKLE: Knees past toes + CONTROL HIP: Thighs parallel to Floor + CONTROL SHOULDER: Dowel behind toes + CONTROL	ANKLE: Not applicable HIP: Thighs parallel to Floor + CONTROL SHOULDER: Dowel behind toes + CONTROL	ANKLE: Knees past toes + CONTROL HIP: Thighs parallel to Floor + CONTROL SHOULDER: Not applicable	ANKLE: Not applicable HIP: Thighs parallel to Floor + CONTROL SHOULDER: Not applicable

ACTIVE ROM TASKS (GRADE 2)

		
SPLIT SQUAT (Ankle Mobility, Knee Control)	DEADLIFT (Hip Mobility, Back Control)	OVERHEAD PRESS (Shoulder Mobility, Shoulder Control)
ANKLES	HIPS	SHOULDERS
A. Lateral knee (head of fibula) past toes [MOBILITY] B. Knees aligned with hips and feet [CONTROL]	A. Hands (dowel) in line with middle of shins [MOBILITY] B. Normal low back curve [CONTROL]	A. Torso aligned with upper arms [MOBILITY] B. Shoulders down and away from ears [CONTROL]

PASSIVE ROM TASKS (GRADE 1)

		
WEIGHT BEARING LUNGE (Ankle Mobility, Knee Control)	STRAIGHT LEG RAISE (Hip Mobility, Back Control)	SHOULDER REACH (Shoulder Mobility, Shoulder Control)
ANKLES	HIPS	SHOULDERS
A. Knee > 10cm past toes; score of 3 [MOBILITY] B. Knee aligned with hip and foot [CONTROL]	A. Ankle past mid-thigh; score of 3 [MOBILITY] B. Normal low back curve [CONTROL]	A. First below C7; score of 3 [MOBILITY] B. Shoulder down and away from ears [CONTROL]



OVERHEAD SQUAT (HEELS DOWN)

First attempt to **RULE OUT ACTIVE** and **PASSIVE** ankle, hip and shoulder mobility

INSTRUCTIONS

- Remove the shoes and keep the heels in contact with the floor at all times (shoes and a heel lift will limit the ankle dorsiflexion required to perform the task).
- Position the feet shoulder width apart with the toes facing forwards (this will limit the extent to which external rotation of the hips contribute to the range achieved).
- Hold a dowel on top of the head with the elbows at 90° (this will limit the extent to which external rotation of the shoulders contribute to the range achieved).
- Press the dowel directly overhead. While attempting to keep the dowel directly overhead, squat to a parallel depth.
- Perform 3-6 repetitions and provide as much feedback as necessary to help the performer achieve the desired position.

STANDARDS

- ✓ Shoes removed
- ✓ Heels on the floor
- ✓ Feet shoulder width
- ✓ Toes forwards
- ✓ Parallel thigh depth
- ✓ Hand position

SCREENING CRITERIA

ANKLE DORSIFLEXION

(Both criteria must be met when the thighs are parallel to the floor)

ROM: Knees past toes (reference a vertical line from the patella to the floor)

CONTROL: Knees are aligned with the hips and feet (reference line from the hips to the toes)

HIP FLEXION

(Assess both criteria when the thighs are parallel to the floor, not at the lowest point of the squat)

ROM: Thighs are parallel with floor (reference a line through the midpoint of the thigh)

CONTROL: A neutral low back curvature is achieved (reference standing curvature)

SHOULDER FLEXION

(Both criteria must be met when the thighs are parallel to the floor)

ROM: Dowel behind toes (reference a vertical line from the dowel to the floor)

CONTROL: Shoulders are back and down (reference distance between shoulders and ears)

GRADING THE MOBILITY SCREEN™

Use the 10 screening tasks to ‘rule out’ **ACTIVE** and **PASSIVE** mobility limitations at the ankle, hip and shoulder by noting the presence or absence of specific criteria. For each joint, both the ROM and CONTROL criteria must be noted to ‘rule out’ a problem.

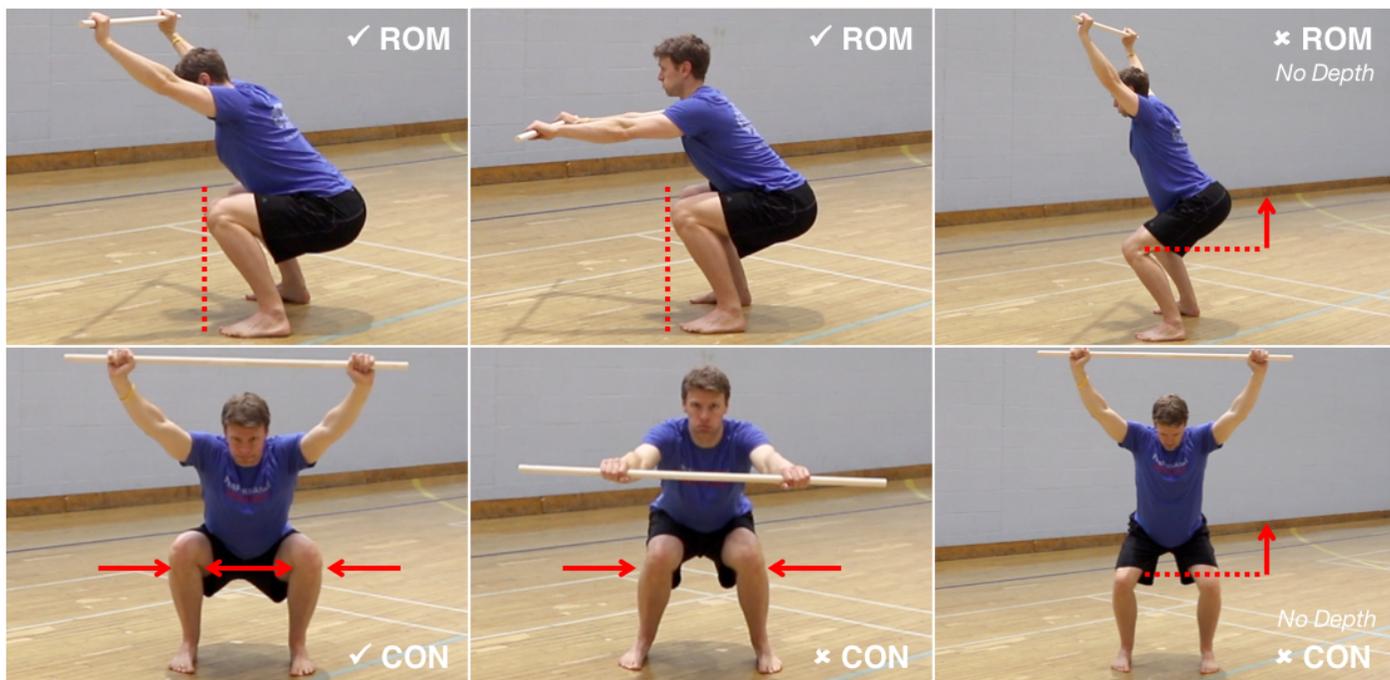
ANKLE DORSIFLEXION

GRADE 3 TASKS

(Overhead Squat (Heels Down) and Front Squat (Heels Down))

ROM: Knees past toes (reference a vertical line from the patella to the floor)

CONTROL: Knees are aligned with the hips and feet (reference line from the hips to the toes)

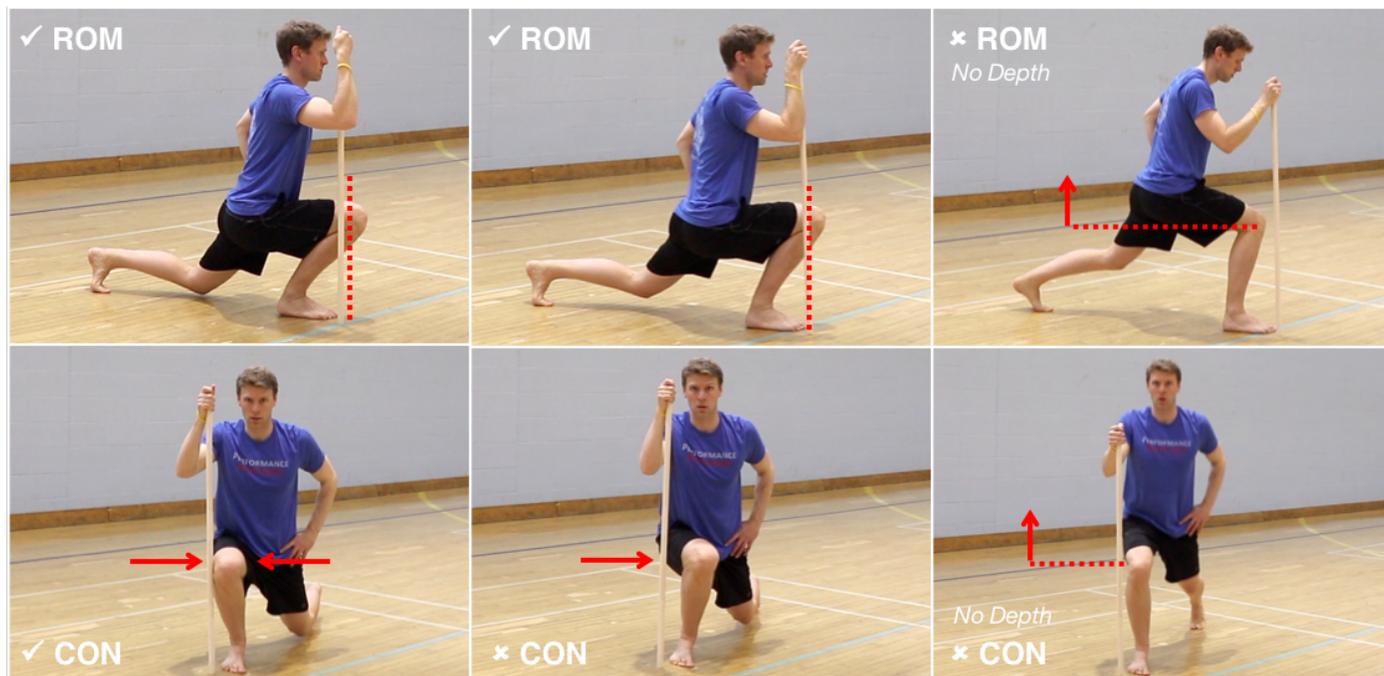


GRADE 2 TASK

(Split Squat)

ROM: Lateral knee past toes (reference a vertical line from the head of fibula to the floor)

CONTROL: Knee is aligned with the hip and foot (reference line from the hip to the toes)

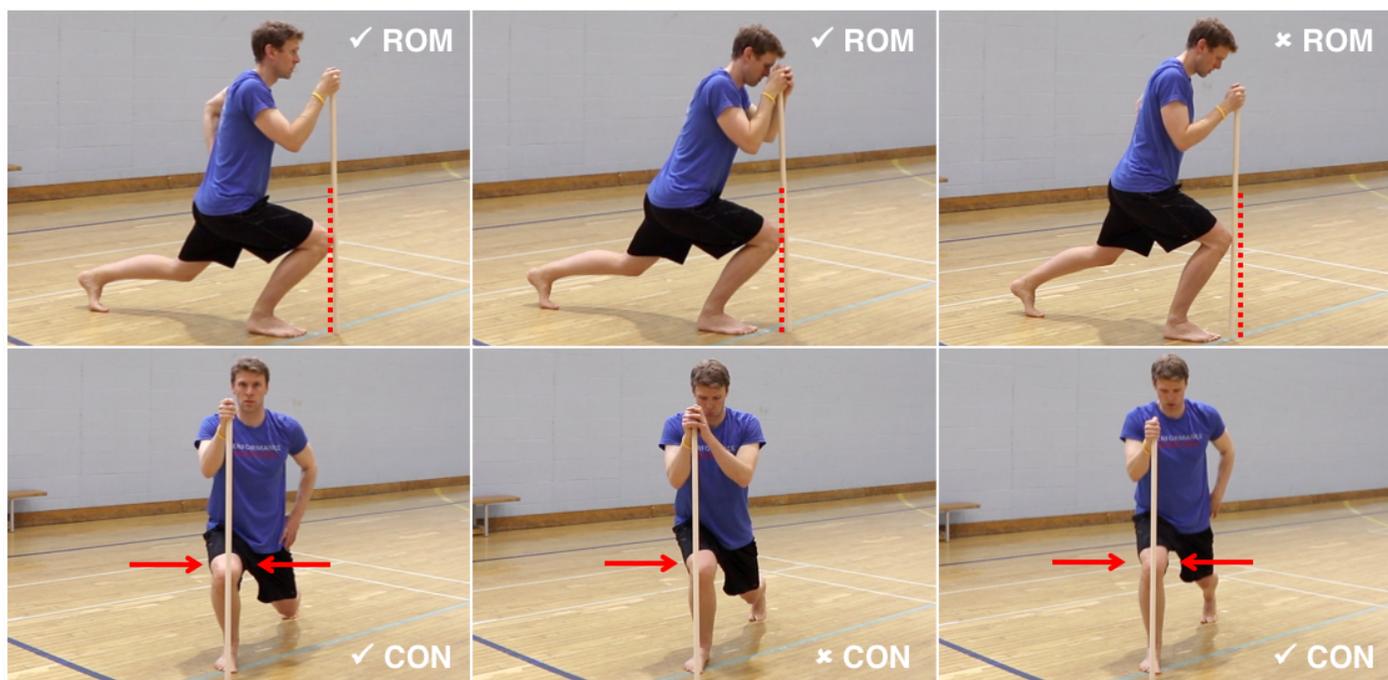


GRADE 1 TASK

(Weight Bearing Lunge)

ROM: Knee is > 10cm past the toes (reference a vertical line from the knee to the floor)

CONTROL: Knee is aligned with the hip and foot (reference line from the hip to the toes)



PRESENTING THE FINDINGS

Three options to present the results of the Mobility Screen™

LETTER GRADE

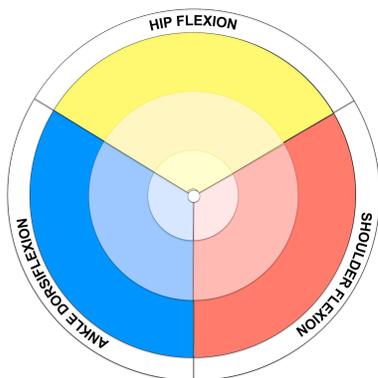
(If presenting as three-letter combination (e.g. ABC), sequence is ANKLE, HIP and SHOULDER)

- Performer A:** Two checks (✓) are noted for one of the Grade 3 or Grade 2 tasks, which implies that ACTIVE and PASSIVE mobility are sufficient and no further screening is needed.
- Performer B:** At least one ✗ is noted for each of the Grade 3 and 2 tasks, but two checks (✓) are noted for Grade 1. PASSIVE mobility is sufficient, but ACTIVE mobility is limited.
- Performer C:** At least one ✗ is noted for each of the screening tasks (Grade 3, 2 and 1), which implies that ACTIVE and PASSIVE mobility are limited.

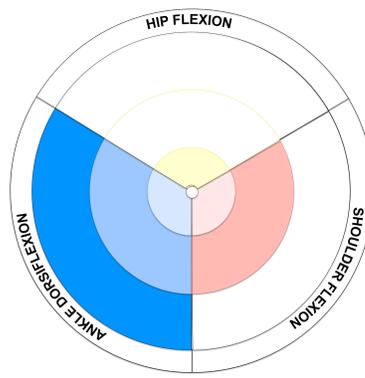
VISUAL

(Ankle is shaded BLUE (left side), Hip is shaded YELLOW (top), Shoulder is shaded RED)

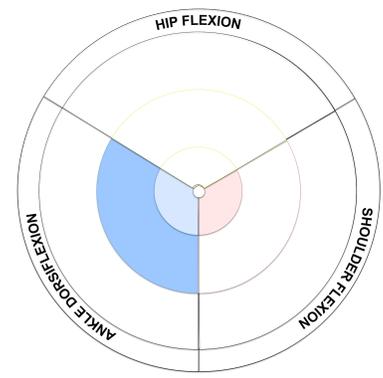
- Outer Circle:** Colour if two checks (✓) are noted for one of the Grade 3 tasks, which implies that ACTIVE and PASSIVE mobility are sufficient and no further screening is needed.
- Middle Circle:** Colour if two checks (✓) are noted for the Grade 2 task, which implies that ACTIVE and PASSIVE mobility are sufficient and no further screening is needed.
- Inner Circle:** Colour if two checks (✓) are noted for the Grade 1 task, which implies that PASSIVE mobility is sufficient, but ACTIVE is limited.



Has ACTIVE and PASSIVE Ankle, Hip and Shoulder



Has ACTIVE Ankle and SHOULDER, and PASSIVE Hip



Has ACTIVE Ankle, PASSIVE Shoulder, and LIMITED Hip

POINTS

- By Joint:** Award 3 points for clearing ACTIVE mobility with a Grade 3 task, 2 points for clearing ACTIVE mobility with a Grade 2 task, and 1 point for clearing PASSIVE mobility with a Grade 1 task. If the Grade 1 task criteria are not met, 0 points are awarded.
- Cumulative:** Sum the total points for each joint. If all three joints are cleared with the Overhead Squat Heels Down, award 1 Bonus point for a total score of 10.

MOVEMENT HYGIENE

Hygiene is defined as “Practices conducive to maintaining health and preventing disease.” For example, we all spend a few minutes every day on our oral hygiene to maintain oral health when we brush our teeth. Although not typically considered, maintaining our physical health can be accomplished in the same way! Dedicating a little time every day to our *Movement Hygiene* will provide an equivalent opportunity to maintain health, prevent disease, and redefine performance with work, life and play!

While there are in infinite number of ways to build a *Daily Movement Practice*, in general, the emphasis should be placed on addressing (i.e. improving) or accommodating (i.e. working around) our specific needs. For example, with regards to the mobility needs identified with the Mobility Screen™, a movement hygiene activity could be structured to **INCREASE** an individual’s passive mobility, **IMPROVE** their active mobility, or **INTEGRATE** the active mobility they currently have into relevant activities that involve squat, lunge, hinge, push and/or pull patterns.

Knowing what joints require RoM to perform each of the five general patterns can also help to identify relevant movement hygiene opportunities for A, B and C performers.

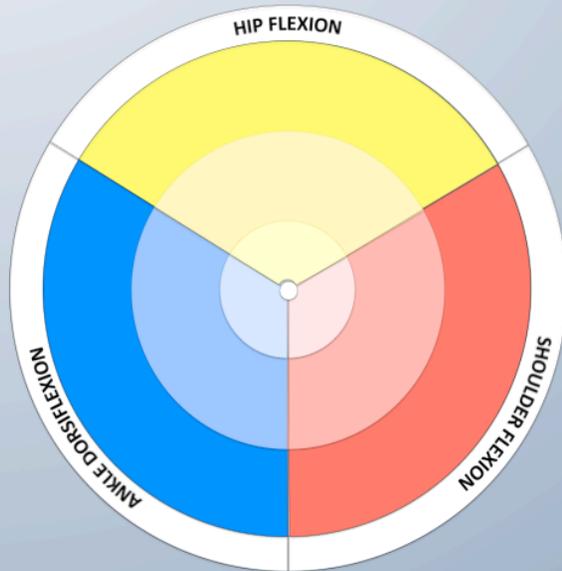
	MOBILITY NEEDS	SAMPLE HYGIENE OPPORTUNITIES
SQUAT	Ankle dorsiflexion, hip flexion	CBA – INCREASE passive ankle
LUNGE	Ankle dorsiflexion, hip flexion, hip extension	ABC – IMPROVE active hip
HINGE	Ankle dorsiflexion, hip flexion	BAB – INTEGRATE active hip
PUSH	Shoulder flexion and extension	AAB – IMPROVE/INTEGRATE active shoulder
PULL	Shoulder flexion and extension	CCC – INCREASE passive / IMPROVE active shoulder

MOBILITY SCREEN (Level 1)

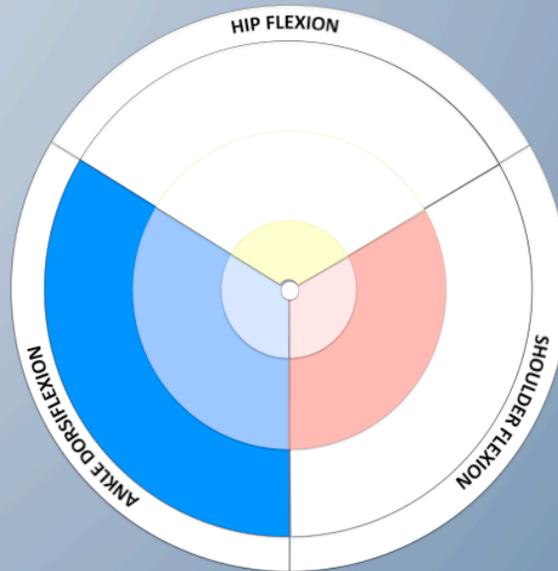
Ankle, Hip, Shoulder Mobility



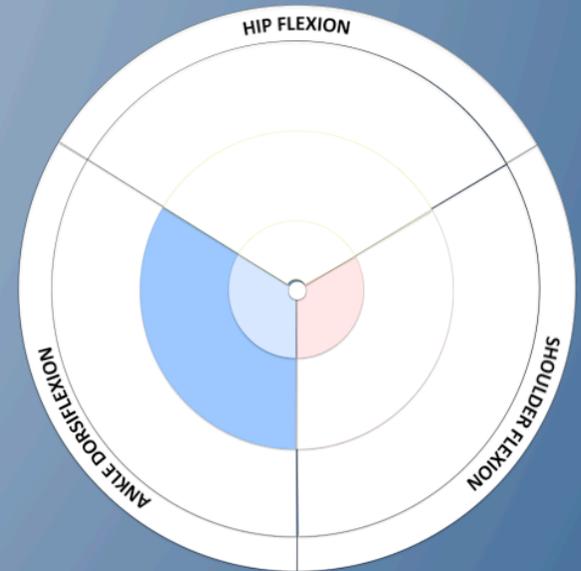
PERFORMER AAA



PERFORMER ABA



PERFORMER ACB



WHAT SHOULD I DO FOR EXERCISE?

INTEGRATE **ACTIVE** RoM

IMPROVE **ACTIVE HIP** RoM

INCREASE **PASSIVE HIP** RoM

INTEGRATE **ACTIVE** RoM

IMPROVE **ACTIVE HIP/SHOULDER** RoM

INTEGRATE **ACTIVE** RoM

PERFORMANCE **REDEFINED.**

BUILDING A HYGIENE SESSION

Hygiene sessions should be brief, simple to perform, and relevant to the needs of a specific performer. Simply because two people share similar demands (i.e. both are firefighters or soccer players), does not imply they have identical needs. Hygiene sessions can also serve as a warm-up, recovery workout, or stand-alone activity that is completed before or after brushing your teeth. In other words, they can take on many forms despite the overarching aim of maintaining health, wellness and performance. Sample guidelines with respect to the design of these sessions include:

INCREASE PASSIVE MOBILITY FIRST

Performers who have been identified as having passive mobility needs should seek to increase their available joint RoM. If physically unable to adopt specific body positions because they lack the passive mobility, they may not be able to take advantage of their experience, awareness, motivation, fitness, etc.

IMPROVE ACTIVE MOBILITY BY USING AVAILABLE ROM

Performers who have been identified as having active mobility needs should learn how to access the joint RoM that is currently available. If unable to adopt specific body positions because they lack the awareness, coordination, etc. they may not be able to take advantage of their experience, motivation, fitness, etc.

INTEGRATE ACTIVE MOBILITY TO REINFORCE BEHAVIORS

Performers who have been identified as having sufficient active mobility should seek to integrate their accessible joint RoM into a variety of relevant activities. Having the awareness, motivation and physical ability to move within a range of contexts (e.g. patterns, environments) will improve the extent to which behaviors persist over time.

INCREASE, IMPROVE AND INTEGRATE IMMEDIATELY

Hygiene sessions may be structured with a singular focus (e.g. increase passive hip flexion), though there is also benefit in using activities that collectively will help to reinforce a specific change. For example, hip flexion can be increased (passive), improved (active), and integrated (active) into a squat pattern within a single session.