VIEN VU PERFORMANCE LAB

VALD HEALTH

Vien Vu Performance Lab HHD and Force Plates Lab Activities

Activity 1:

1) Perform 1-3 reps each of below HHD tests in the demonstrated sequence.
2) Perform the supine adduction test (break). How does it differ to side lying (Make)?
3) Calculate your 5 Second Squeeze Test Torque. What are your thoughts?

Moment arm: _____ cm, bodyweight: _____ lbs

	Right	Left	Peak R vs L
Side lying Hip Abduction – Break			
Side lying Hip Adduction - Make			
Prone Hip ER w/ belt - Break			
Prone Hip IR w/ belt - Break			
Prone Hip Extension (long lever) - Make			
Groin Squeeze - Make			
Supine Hip Flexion - Break			
Supine Adduction - Break			

Key metrics:

- Return to Run
  - >75% limb symmetry index in all muscle groups for interval running clearance
  - 1.8 Nm/kg and <3/10 pain on 5 Second Squeeze Test
- Return to Sport
  - >90% limb symmetry index in all muscle groups for full clearance
  - Normative data (level 1 cutting sports; Larson et al, 2022)
    - Hip abduction (Nm/kg): .6-1.2 (youth), 2.35 – 2.6 (adults)
    - Hip adduction (Nm/kg): .9 (youth), 2.45 – 3.0 (adults)
  - >2.2 Nm/kg and <3/10 pain on 5 Second Squeeze Test

Activity 2:

1) Perform 1-3 reps each of below HHD tests in the demonstrated sequence.
2) Was there a difference between seated and supine knee extension test?
3) How'd you feel about the supine 90-90 knee flexion test?

Moment arm: _____ cm, bodyweight: _____ lbs

	Right	Left	Peak R vs L
Knee Extension Seated - Make			
Knee Extension Supine - Make			
Prone Knee Flexion - Break			
Supine 90-90 Knee Flexion - Make			

Key metrics:

- **Return to running:** >75% limb symmetry index in quadriceps (ISOMETRIC)
  - 57-77% BW or 1.72-2.30 Nm/kg
  - Ultimately, the higher the better
- **Full Return to Sport:** >90% limb symmetry index in quadriceps
- **Normative data (level 1 cutting sports; Larson et al, 2022)**
  - Knee Extension(Nm/kg): 1.5-2.2 (youth), 2.2 – 3.5 (adults)

Activity 3:

1) Perform/administer below tests on the force plates.
2) How do you compare to elite athletes in regard to peak power/BM?
    a. All-Conference D1 Track and Field sprinter and jumper = 80-100 W/kg
    b. NFL wide receivers = 75-95 W/kg
    c. Average D1 football player = 60-65 W/kg
3) Did your CMJ asymmetries fall the same variance trends?
    a. Landing impulse > Eccentric deceleration impulse > Concentric impulse
    b. Landing Impulse Asymmetry CV = 25%
    c. Eccentric Deceleration Asymmetry CV = 20%
    d. Concentric Impulse CV = 10%
4) Were your asymmetries different on single leg CMJ compared to DL CMJ?

	Jump Height	Peak Power/ BM	Ecc Deceleration Impulse Asymmetry	Ecc Peak Velocity	Con Impulse Asymmetry	Landing Impulse Asymmetry
Countermovement Jump (3-5 trials each)						

	Jump Height	RSI	Peak Power/ BM	Con Impulse Asymmetry	Drop Landing Impulse Asymmetry	Landing Impulse Asymmetry
Drop Vertical Jump (3-5 trials each)						

	Jump Height	mRSI	Peak Power/ BM	Con Impulse Asymmetry	Drop Landing Impulse Asymmetry	Landing Impulse Asymmetry
Single leg Countermovement Jump (2-3 trials each)						

Perform/administer the components below of the AnkleGO (Appendix A and B)

1) Single limb stance
    a. Perform a single limb stance test on force plates (20 seconds eyes closed)
    b. During the test, count the amount of errors each side
2) Side hop test:
    a. Perform the side hop test
        i. 30 cm apart, 10 times as fast as possible, begin with lateral hop
        ii. Only test involved side
3) Perform Figure-8 Hop test
    a. Two markers 5 meters apart
    b. Two figure 8 laps for time (as fast as possible)
    c. Only test involved side

Perform the heel raise test using the Calf Raise app

    d. Place sticker on a person heel
    e. Use a 10 degree wedge for the heel raise
    f. BPM is set to 60
    g. The tester can only have an index finger of each hand on a vertical wall
    h. Cue them to go all the way up and down
    i. The person will go until fatigue, or until the proctor deems them “failing”
    j. Set the marker size as 2 cm
    k. Analyze the data and perform it on the other side

Activity 4:

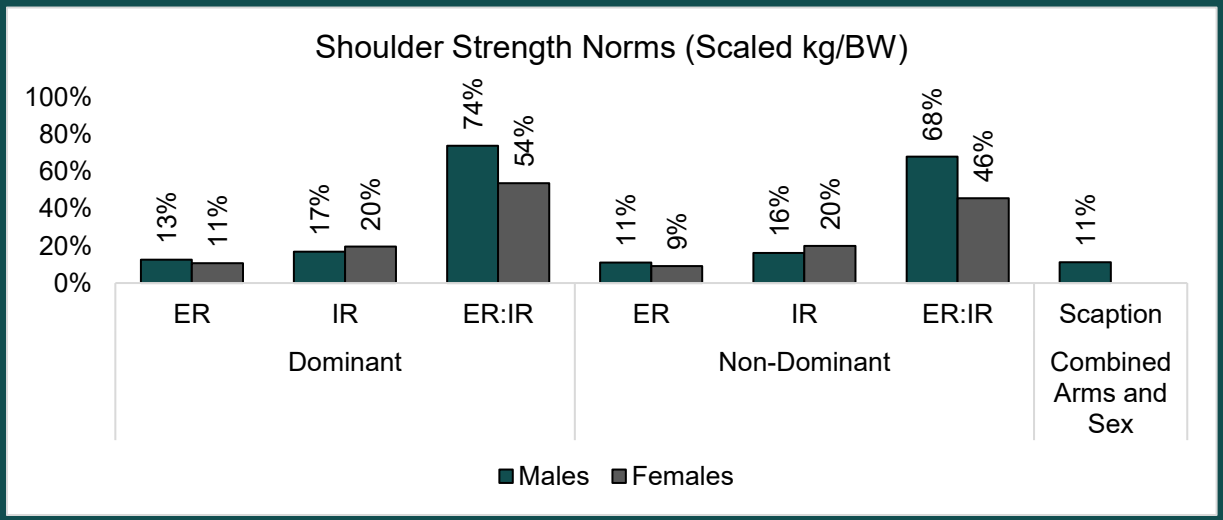
Perform 1-3 reps each of below HHD tests in the demonstrated sequence.

Make Test (bodyweight: ____ lbs)

ER/IR @ mod-neutral	Right Peak Force	Left Peak Force	R vs L
Upright shoulder external rotation at modified neutral			
Upright shoulder internal rotation at modified neutral			
Upright scaption			
Grip Strength			
ER/IR @ 90-90	**Right Peak Force**	**Left Peak Force**	**R vs L**
Upright shoulder external rotation			
Upright shoulder internal rotation			
Upright scaption			
Grip Strength			

Key metrics:

- >75% limb symmetry index in all muscle groups for UE plyometrics clearance
- >90% limb symmetry index in all muscle groups for full clearance and beginning of interval throwing
- Normative data below (Recreational athletes, Decleve et al, 2020, Collin et al, 2018)

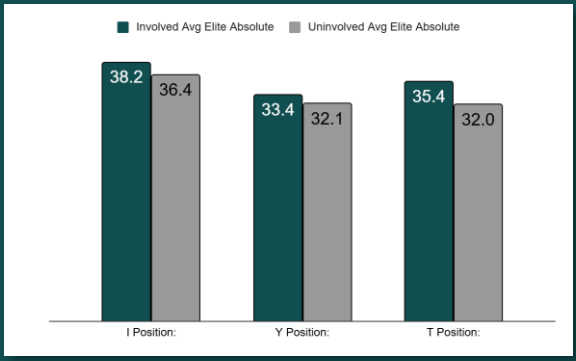


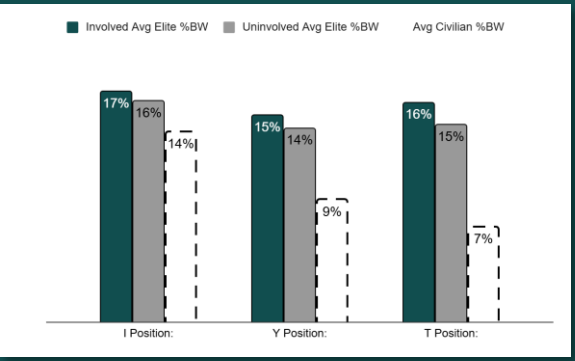
Activity 4 part 2: Perform 1-3 reps each of below HHD tests in the demonstrated sequence.

Force Plates	Right Peak Force	Left Peak Force	R vs L Peak Force
Isometric I			
Isometric Y			
Isometric T			
HHD	**Right Peak Force**	**Left Peak Force**	**R vs L Peak Force**
Isometric I			
Isometric Y			
Isometric T			

Key metrics:

- >75% peak force limb symmetry index in all muscle groups for UE plyometrics and return to swim program clearance
- >90% peak force limb symmetry index in all positions for full clearance and beginning of interval throwing
- Normative data below (Recreational athletes, Krowlikowska et al, 2022); reference slides for elite athlete cohort data





	Involved			Uninvolved		
	Involved Avg Elite Absolute (lbs)	Involved Avg Elite %BW	Involved Avg Civilian %BW	Uninvolved Avg Elite Absolute (lbs)	Uninvolved Avg Elite %BW	Avg Civilian %BW
I Position:	38.2	17%	14%	36.4	16%	14%
Y Position:	33.4	15%	9%	32.1	14%	9%
T Position:	35.4	16%	7%	32.0	15%	7%

Appendix A: AnkleGO

Table 3. List of tests and questionnaires used for the construction of the Ankle-GO score and system to determine the points for each component

Tests		Test Value	Weight	Maximum Score by Test
SLS		>3 errors	0	3
		1-3 errors	1	
		0 errors	2	
		No feeling of instability	+1	
mSEBT		COMP <90%	0	7
		COMP 90-95%	2	
		COMP >95%	4	
		ANT >60%	+1	
		PM >90%	+1	
		No feeling of instability	+1	
SHT		>13 s	0	5
		10-13 s	2	
		<10 s	4	
		No feeling of instability	+1	
F8T		>18 s	0	3
		13-18 s	1	
		<13 s	2	
		No feeling of instability	+1	
FAAM	Activities of daily living	<90%	0	2
		90-95%	1	
		>95%	2	
	Sport	<80%	0	2
		80-95%	1	
		>95%	2	
ALR-RSI		<55%	0	3
		55-63%	1	
		63-76%	2	
		>76%	3	

ALR-RSI, ankle ligament reconstruction-return to sport after injury; ANT, anterior; COMP, composite score; FAAM, foot and ankle ability measure; F8T, figure-of-8 test; mSEBT, star excursion balance test; PM, posteromedial; PROM, patient-reported outcome measure; SHT, side hop test; SLS, single-leg stance test.

Appendix B: ALR-RSI

ALR-RSI (Ankle Ligament Reconstruction-Return to Sport Injury) scale

ALR-RSI scale

Please answer the following questions referring to your main sport prior to injury. For each question, tick a box □✓ between the two descriptions to indicate how you feel right now relative to the two extremes.

1.Are you confident that you can perform at your previous level of sport participation?

Not at all confident □ □ □ □ □ □ □ □ □ □ □ Fully confident

0 1 2 3 4 5 6 7 8 9 10

2.Do you think you are likely to re-injure your ankle by participating in your sport?

Extremely likely □ □ □ □ □ □ □ □ □ □ □ Not likely at all

0 1 2 3 4 5 6 7 8 9 10

3.Are you nervous about playing your sport?

Extremely nervous □ □ □ □ □ □ □ □ □ □ □ Not nervous at all

0 1 2 3 4 5 6 7 8 9 10

4.Are you confident that your ankle will not give way by playing your sport?

Not at all confident □ □ □ □ □ □ □ □ □ □ □ Fully confident

0 1 2 3 4 5 6 7 8 9 10

5.Are you confident that you could play your sport without concern for your ankle?

Not at all confident □ □ □ □ □ □ □ □ □ □ □ Fully confident

0 1 2 3 4 5 6 7 8 9 10

6.Do you find it frustrating to have to consider your ankle with respect to your sport?

Extremely frustrating □ □ □ □ □ □ □ □ □ □ □ Not at all frustrating

0 1 2 3 4 5 6 7 8 9 10

7.Are you fearful of re-injuring your ankle by playing your sport?

Extremely fearful □ □ □ □ □ □ □ □ □ □ □ No fear at all

0 1 2 3 4 5 6 7 8 9 10

8.Are you confident about your ankle holding up under pressure?

Not at all confident □ □ □ □ □ □ □ □ □ □ □ Fully confident

0 1 2 3 4 5 6 7 8 9 10

9.Are you afraid of accidentally injuring your ankle by playing your sport?

Extremely afraid □ □ □ □ □ □ □ □ □ □ □ Not at all afraid

0 1 2 3 4 5 6 7 8 9 10

10. Do thoughts of having to go through surgery and rehabilitation prevent you from playing your sport?

All of the time □ □ □ □ □ □ □ □ □ □ □ None of the time

0 1 2 3 4 5 6 7 8 9 10

11. Are you confident about your ability to perform well at your sport?

Not at all confident □ □ □ □ □ □ □ □ □ □ □ Fully confident

0 1 2 3 4 5 6 7 8 9 10

12. Do you feel relaxed about playing your sport?

Not at all relaxed □ □ □ □ □ □ □ □ □ □ □ Fully relaxed

0 1 2 3 4 5 6 7 8 9 10

ALR-RSI score total x 100 / 120 = __ %