



Modified STAR Excursion Balance Test (SEBT)¹

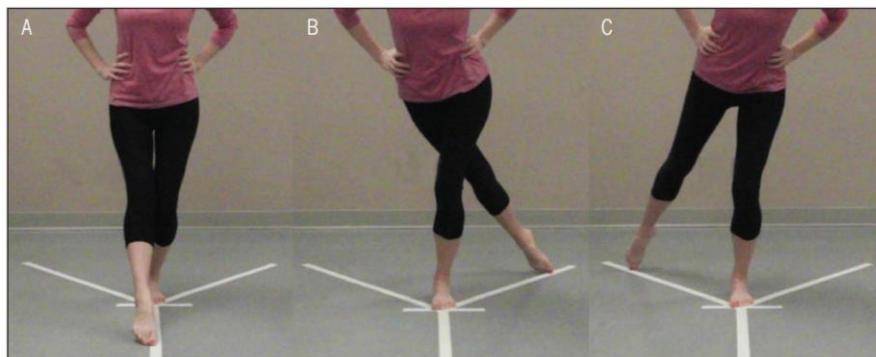


FIGURE 1. Star Excursion Balance Test directions and foot placement. Directions are described in reference to the stance foot. (A) Anterior reach, (B) posterolateral reach, (C) posteromedial reach.

Test performance description:

- For each limb (barefoot):
 - Place most distal aspect of great toe in center of "Y"
 - While maintaining single leg stance, patient is asked to reach with their free limb in the anterior, posteromedial, and posterolateral directions
 - In each test direction, complete **3 recorded reaches**
- Discard and repeat trial if:
 - Stance foot is lifted or moved, weight is transferred to the reach foot, balance is lost, or hands are removed from hips
- Outcomes (Enter in Excel Spreadsheet):
 - Reach distances for both dominant and non-dominant limbs
 - **Anterior, Posterolateral, Posteromedial** directions

Use of SEBT:

| Population | Results |
|---|---|
| Healthy D I athletes ¹ (Avg. ages: 19.3-20.5) | SEBT varies by sport and gender; side-to-side differences of 3-8% are normal |
| High school basketball players ² (9-12 th grade) | SEBT is a screening tool for prediction of LE injury: <ul style="list-style-type: none">- Players with anterior side-to-side differences > 4 cm, 2.5x more likely injured- Female players with composite score < 94% of leg length, 6.5x more likely injured |
| Patients with LE injuries ³ | SEBT differentiates chronic ankle instability, ACLR, and patellofemoral pain syndrome SEBT is a marker of normalization of neuromuscular control after these injuries |
| Healthy individuals and chronic ankle instability ³ | SEBT identifies improvements in dynamic stability after exercise intervention focused on neuromuscular control |



Normal Data for Men/Women Across Sport¹:

| TABLE 2 | | NORMALIZED REACH DISTANCE ON THE STAR EXCURSION BALANCE TEST FOR EACH LIMB, BY TEAM* | | | | | | | |
|------------|--|---|-----------------------------|--------------------------------|----------------------------|----------------------------|------------------------------|--------------------------------|----------------------------|
| Sex/Sport | | Dominant Limb | | | | Nondominant Limb | | | |
| | | Anterior | Posterolateral | Posteromedial | Composite | Anterior | Posterolateral | Posteromedial | Composite |
| Women | | | | | | | | | |
| Basketball | | 64.3 ± 6.9 (61.2, 67.4) | 88.7 ± 8.0 (85.1, 92.4) | 100.2 ± 7.1 (97.0, 103.5) | 84.4 ± 6.5 (81.5, 87.4) | 63.4 ± 7.9 (59.8, 67.0) | 85.7 ± 8.4 (81.8, 89.6) | 101.5 ± 7.7 (98.0, 105.0) | 83.5 ± 7.0 (80.3, 86.7) |
| Golf | | 69.4 ± 5.5 (65.4, 73.3) | 86.5 ± 10.2 (79.2, 93.8) | 105.3 ± 10.0 (98.2, 112.4) | 87.0 ± 7.7 (81.5, 92.6) | 67.6 ± 4.4 (64.5, 70.8) | 85.9 ± 8.7 (79.7, 92.1) | 102.2 ± 7.8 (96.7, 107.8) | 85.2 ± 6.2 (80.8, 89.7) |
| Hockey | | 66.6 ± 7.3 (64.1, 69.1) | 93.1 ± 10.7 (89.5, 96.8) | 110.3 ± 10.7 (106.7, 114.0) | 90.0 ± 8.6 (87.1, 92.9) | 67.0 ± 6.9 (64.6, 69.3) | 93.0 ± 11.0 (89.2, 96.7) | 113.1 ± 7.6 (110.5, 115.6) | 91.0 ± 7.5 (88.5, 93.5) |
| Soccer | | 66.8 ± 5.3 (65.1, 68.5) | 88.7 ± 8.8 (85.9, 91.5) | 104.3 ± 8.0 (101.8, 106.8) | 86.6 ± 6.3 (84.6, 88.6) | 67.4 ± 5.2 (65.8, 69.1) | 90.2 ± 9.9 (89.1, 93.3) | 105.3 ± 8.1 (102.8, 107.9) | 87.7 ± 6.7 (85.5, 89.8) |
| Softball | | 63.5 ± 5.6 (61.2, 65.9) | 87.0 ± 11.3 (82.4, 91.6) | 100.7 ± 8.8 (97.1, 104.3) | 83.7 ± 7.5 (80.6, 86.9) | 63.9 ± 4.8 (61.9, 65.8) | 85.3 ± 9.2 (81.5, 89.1) | 99.6 ± 9.3 (95.7, 103.4) | 82.9 ± 6.3 (80.3, 85.5) |
| Volleyball | | 66.8 ± 7.1 (63.6, 69.9) | 86.6 ± 10.4 (82.0, 91.2) | 102.7 ± 10.5 (98.1, 107.4) | 85.4 ± 8.5 (81.6, 89.2) | 65.3 ± 5.4 (62.9, 67.7) | 88.4 ± 9.5 (84.2, 92.6) | 102.3 ± 7.9 (98.8, 105.9) | 85.3 ± 6.9 (82.3, 88.4) |
| Men | | | | | | | | | |
| Basketball | | 61.8 ± 4.3 (59.6, 64.1) | 86.6 ± 11.6 (80.6, 92.5) | 99.2 ± 7.8 (95.2, 103.2) | 82.5 ± 5.9 (79.5, 85.6) | 61.6 ± 4.8 (59.2, 64.1) | 86.9 ± 13.0 (80.2, 93.6) | 97.9 ± 7.9 (93.9, 102.0) | 82.1 ± 6.5 (78.8, 85.5) |
| Golf | | 65.1 ± 6.2 (61.2, 69.1) | 83.9 ± 12.1 (76.2, 92.6) | 103.7 ± 9.0 (98.0, 109.4) | 84.2 ± 8.5 (78.9, 89.6) | 68.2 ± 4.7 (65.2, 71.2) | 85.3 ± 10.2 (78.9, 91.8) | 106.0 ± 7.2 (101.4, 110.6) | 86.5 ± 5.9 (82.8, 90.2) |
| Hockey | | 67.3 ± 5.2 (65.6, 69.0) | 95.6 ± 9.5 (92.5, 98.7) | 110.9 ± 5.5 (109.2, 112.7) | 91.3 ± 5.0 (89.6, 92.9) | 67.6 ± 4.0 (66.3, 68.9) | 96.6 ± 10.6 (93.2, 100.1) | 111.2 ± 5.7 (109.4, 113.0) | 91.8 ± 5.6 (90.0, 93.6) |
| Soccer | | 62.7 ± 4.9 (61.1, 64.2) | 89.9 ± 7.7 (87.5, 92.4) | 103.5 ± 8.6 (100.8, 106.2) | 85.4 ± 5.5 (83.6, 87.1) | 62.9 ± 5.0 (61.3, 64.5) | 88.9 ± 8.3 (87.3, 92.5) | 104.2 ± 8.8 (101.4, 107.0) | 85.7 ± 5.9 (83.8, 87.5) |
| Football | | 62.2 ± 8.2 (60.4, 64.0) | 88.6 ± 12.9 (85.8, 91.5) | 99.8 ± 8.7 (97.9, 101.7) | 83.5 ± 7.9 (81.8, 85.3) | 61.9 ± 7.3 (60.3, 63.5) | 87.9 ± 13.0 (85.1, 90.8) | 99.8 ± 8.9 (97.9, 101.8) | 83.2 ± 8.0 (81.4, 85.0) |
| Wrestling | | 66.7 ± 6.7 (64.7, 68.7) | 91.1 ± 11.9 (87.6, 94.6) | 110.3 ± 11.1 (107.0, 113.5) | 89.4 ± 8.2 (87.0, 91.8) | 67.8 ± 8.2 (65.4, 70.2) | 90.8 ± 10.3 (87.8, 93.8) | 111.0 ± 12.3 (107.4, 114.6) | 89.9 ± 8.3 (87.4, 92.3) |

*Values are mean ± SD (95% confidence interval) percent limb length.

| TABLE 3 | | SIDE-TO-SIDE REACH-DISTANCE ASYMMETRIES ON THE STAR EXCURSION BALANCE TEST, BY SPORT AND SEX* | | | | | | | |
|------------|--|--|--------------------------|-------------------------|-------------------------|---------------------------------------|-------------------------|-------------------------|-------------------------|
| Sex/Sport | | Normalized Reach Distance Asymmetry, Percent Limb Length [†] | | | | Absolute Reach Distance Asymmetry, cm | | | |
| | | Anterior | Posterolateral | Posteromedial | Composite | Anterior | Posterolateral | Posteromedial | Composite |
| Women | | | | | | | | | |
| Basketball | | 4.3 ± 2.7 (3.3, 5.2) | 5.2 ± 3.2 (3.4, 7.0) | 5.2 ± 3.2 (3.8, 6.6) | 4.9 ± 2.1 (4.0, 5.8) | 3.5 ± 2.9 (2.2, 4.8) | 4.6 ± 3.3 (3.1, 6.1) | 4.5 ± 3.7 (2.9, 6.2) | 4.2 ± 2.4 (3.1, 5.3) |
| Golf | | 2.8 ± 1.4 (1.4, 4.1) | 5.1 ± 2.8 (2.4, 7.7) | 5.3 ± 3.2 (3.3, 7.4) | 4.4 ± 1.8 (3.1, 5.7) | 2.0 ± 1.6 (0.9, 3.1) | 3.4 ± 2.9 (1.3, 5.5) | 4.5 ± 2.7 (2.6, 6.5) | 3.3 ± 1.5 (2.2, 4.4) |
| Hockey | | 3.4 ± 2.5 (2.7, 4.2) | 6.3 ± 4.0 (4.9, 7.7) | 6.0 ± 3.8 (4.9, 7.0) | 5.2 ± 1.8 (4.6, 5.9) | 2.5 ± 2.2 (1.8, 3.2) | 5.1 ± 4.0 (3.8, 6.5) | 4.6 ± 4.0 (3.2, 5.9) | 4.1 ± 1.7 (3.5, 4.7) |
| Soccer | | 3.1 ± 1.9 (2.4, 3.7) | 6.0 ± 5.1 (4.7, 7.2) | 5.0 ± 2.5 (4.0, 6.0) | 4.7 ± 2.1 (4.0, 5.3) | 2.4 ± 1.9 (1.8, 3.0) | 4.6 ± 4.8 (3.1, 6.1) | 4.1 ± 2.7 (3.3, 5.0) | 3.7 ± 2.0 (3.1, 4.3) |
| Softball | | 2.9 ± 2.0 (2.1, 3.7) | 8.0 ± 5.3 (5.9, 10.2) | 5.7 ± 5.7 (3.4, 8.1) | 5.5 ± 3.6 (4.1, 7.0) | 2.3 ± 1.8 (1.5, 3.0) | 6.6 ± 5.0 (4.6, 8.7) | 4.6 ± 5.0 (2.6, 6.7) | 4.5 ± 3.1 (3.2, 5.8) |
| Volleyball | | 4.2 ± 2.3 (3.2, 5.2) | 6.3 ± 2.9 (5.0, 7.5) | 5.0 ± 2.0 (4.1, 5.9) | 5.1 ± 1.7 (4.4, 5.9) | 3.1 ± 2.6 (2.0, 4.3) | 5.6 ± 3.5 (4.1, 7.2) | 3.2 ± 2.6 (2.1, 4.4) | 4.0 ± 1.9 (3.1, 4.8) |
| Men | | | | | | | | | |
| Basketball | | 3.7 ± 2.5 (2.6, 4.7) | 6.9 ± 4.3 (4.8, 8.9) | 4.6 ± 2.7 (3.0, 6.1) | 5.0 ± 2.0 (4.0, 6.0) | 3.3 ± 2.7 (2.0, 4.7) | 6.7 ± 5.4 (3.9, 9.4) | 4.2 ± 3.3 (2.5, 5.9) | 4.7 ± 2.3 (3.6, 5.9) |
| Golf | | 4.2 ± 2.9 (3.0, 5.5) | 7.1 ± 5.4 (4.7, 9.5) | 6.2 ± 3.4 (4.4, 8.0) | 5.8 ± 2.5 (4.7, 7.0) | 4.0 ± 2.9 (2.1, 5.8) | 6.2 ± 5.7 (2.6, 9.8) | 5.9 ± 3.4 (3.7, 8.0) | 5.3 ± 2.2 (3.9, 6.7) |
| Hockey | | 2.8 ± 1.9 (2.2, 3.5) | 6.2 ± 4.0 (4.9, 7.6) | 5.1 ± 4.0 (4.1, 6.1) | 4.7 ± 2.4 (4.1, 5.4) | 2.4 ± 2.2 (1.7, 3.1) | 5.3 ± 4.6 (3.8, 6.8) | 4.4 ± 3.9 (3.2, 5.7) | 4.0 ± 2.6 (3.2, 4.9) |
| Soccer | | 2.9 ± 1.8 (2.2, 3.5) | 5.9 ± 3.8 (4.6, 7.2) | 4.5 ± 2.7 (3.5, 5.5) | 4.4 ± 1.7 (3.8, 5.1) | 2.2 ± 1.8 (1.6, 2.7) | 5.1 ± 3.6 (4.0, 6.2) | 3.5 ± 2.9 (2.6, 4.4) | 3.6 ± 1.6 (3.1, 4.1) |
| Football | | 4.0 ± 2.9 (3.4, 4.6) | 6.6 ± 4.8 (5.6, 7.7) | 5.3 ± 3.0 (4.6, 5.9) | 5.3 ± 2.2 (4.8, 5.8) | 3.8 ± 3.0 (3.1, 4.4) | 5.7 ± 5.5 (4.5, 6.9) | 4.7 ± 3.5 (4.0, 5.5) | 4.7 ± 2.4 (4.2, 5.3) |
| Wrestling | | 3.7 ± 3.2 (2.7, 4.6) | 6.0 ± 3.5 (5.0, 7.0) | 5.0 ± 2.8 (4.2, 5.9) | 4.9 ± 2.1 (4.3, 5.5) | 2.9 ± 3.2 (1.9, 3.8) | 4.3 ± 3.5 (3.3, 5.4) | 3.8 ± 3.0 (2.9, 4.6) | 3.7 ± 2.2 (3.0, 4.3) |

*Values are mean ± SD (95% confidence interval).

[†]No significant differences were found between sexes or sports.



References:

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