**Appendix**

**Table A1**. Landing Error Scoring System (LESS) operational definitions of errors, 0 – error absent, 1 or 2 – error present. Adapted from Padua et al.40.

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Item** | **Definition of error** | **Score** |
| 1. | Knee flexion at initial contact | Knee flexion < 30° | 0 or 1 |
| 2. | Hip flexion at initial contact | Thigh is in line with the trunk (hips not flexed) | 0 or 1 |
| 3. | Trunk flexion at initial contact | Trunk is vertical or extended at the hips (i.e., not flexed) | 0 or 1 |
| 4. | Ankle plantar flexion at initial contact | Heel-to-toe or flat foot landing at initial contact | 0 or 1 |
| 5. | Knee valgus (medial knee position) at initial contact | Centre of the patella is medial to the midfoot at initial contact. | 0 or 1 |
| 6. | Lateral trunk flexion at initial contact | Midline of the trunk is flexed to the left or the right side of the body at initial contact | 0 or 1 |
| 7. | Stance width (wide) | Feet are positioned greater than shoulder width apart (acromion processes) at initial contact | 0 or 1 |
| 8. | Stance width (narrow) | Feet are positioned less than shoulder width apart (acromion processes) at initial contact | 0 or 1 |
| 9. | Foot position (toe-in or internal rotation) | Foot is externally rotated more than 30° between initial contact and maximum knee flexion | 0 or 1 |
| 10. | Foot position (toe-out or external rotation) | Foot is internally rotated more than 30° between initial contact and maximum knee flexion | 0 or 1 |
| 11. | Symmetric foot contact at initial contact | 1 foot lands before the other foot or 1 foot lands heel to toe and the other foot lands toe to heel | 0 or 1 |
| 12. | Knee flexion displacement | Knee flexes less than 45° between initial contact and maximum knee flexion | 0 or 1 |
| 13. | Hip flexion at maximal knee flexion | Thigh does not flex more on the trunk between initial contact and maximum knee flexion | 0 or 1 |
| 14. | Trunk flexion at maximal knee flexion | Trunk does not flex more between initial contact and maximum knee flexion | 0 or 1 |
| 15. | Knee valgus displacement | At the point of maximum medial knee position, the centre of the patella is medial to the midfoot | 0 or 1 |
| 16. | Joint displacement | Joint displacement: *Soft (0), Average (1), Stiff (2)* | 0 or 1 or 2 |
| 17. | Overall impression | Overall impression: *Excellent (0), average (1), poor (2)* | 0 or 1 or 2 |

**Table A2.** Summary of the study designs, levels of evidence, and quality scores of the studies reviewed (*n* = 10). The number of stars (\*) allocated for each quality assessment item is provided.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Year** | **Designa** | **Evidenceb** | **Qualityc**  **(category)** | **Representativeness of the sample**  **(max 1\*)** | **Sample size**  **(max 1\*)** | **Non-respondents (max 1\*)** | **Ascertainment of the exposure**  **(max 2\*)** | **Comparability (max 2\*)** | **Assessment of the outcome**  **(max 2\*)** | **Statistical test**  **(max 1\*)** |
| Padua et al.40 | 2009 | Cross sectional | 2 | 6 stars (Moderate) | \* |  |  | \*\* | \* | \*\* |  |
| Onate et al.38 | 2010 | Cross sectional | 3 | 4 stars (Moderate) |  |  |  | \*\* | \*\* |  |  |
| Smith et al.53 | 2012 | Case-control | 4 | 8 stars  (Strong) | \* |  |  | \*\* | \*\* | \*\* | \* |
| Padua et al.39 | 2015 | Prospective cohort | 3 | 8 stars  (Strong) | \* |  |  | \*\* | \*\* | \*\* | \* |
| Beese et al.1 | 2015 | Cross sectional | 2 | 8 stars  (Strong) | \* | \* |  | \*\* | \*\* | \*\* |  |
| Wesley et al.55 | 2015 | Cross sectional | 3 | 7 stars (Moderate) | \* | \* |  | \*\* | \*\* |  | \* |
| James et al.24 | 2016 | Prospective cohort | 3 | 6 stars (Moderate) | \* | \* |  | \*\* | \*\* |  |  |
| Fox et al.18 | 2017 | Cross sectional | 3 | 6 stars (Moderate) | \* |  |  | \*\* | \*\* |  | \* |
| Scarneo et al.49 | 2017 | Cross sectional | 2 | 9 stars  (Strong) | \* | \* |  | \*\* | \*\* | \*\* | \* |
| Dar et al.9 | 2018. | Cross sectional | 2 | 8 stars  (Strong) | \* |  |  | \*\* | \*\* | \*\* | \* |

a Study design based on Parab & Bhalerao41

b Level of evidence based on the Oxford Centre for Evidence-Based Medicine 2011 table; 5, lowest level of evidence; 1, highest level of evidence37.

c Methodology quality assessment score based on Newcastle – Ottawa Quality Assessment Scale adapted for cross-sectional studies, weak (0 to 3 stars), moderate (4 to 6 stars), and strong (7 to 10 stars)36