Supplemental material for “Biomechanical analysis of users of multi-articulating externally-powered prostheses with and without their device “”

The main article provides data on only the heavy and light power tasks and the jar lid opening task Here we present data on the remaining Southampton Hand Assessment Procedure tasks that were not shown in the main article: heavy and light sphere, tripod, lateral, tip, and extension task, as well as the simulated food cutting and page turning tasks.

Of interest, only one variable (elbow supination/pronation ROM for page turning) showed significantly increased movement during the prosthesis condition. This increase was due to the inability to release and regrip the page mid flip, as seen during the non-prosthesis condition and healthy cohort, forcing the participants to fully twist their forearm in order for the prosthesis to successfully flip the page. While this approach resulted in a high joint ROM, elbow supination/pronation is a may be a preferred motion compared to compensation at the shoulder in this task, and we did not view increased ROM in this instance as a negative outcome.

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| **Table S.1.** Kinematic results for heavy and light sphere tasks. Presented as group mean (SD). Units in degrees. \* indicates p<0.05 and ^ indicates p<0.10 between prosthesis conditions. ‡indicates p<0.05 and † indicates p<0.10 after applying Bonferroni Correction for our secondary analysis. | | | | | |
| Sphere Task  4-Digit Limb Loss Group | | Light Condition | | Heavy Condition | |
| Prosthesis | Non-Prosthesis | Prosthesis | Non-Prosthesis |
| Total Upper Body Composite Score | | 86.8 (14.7) | 82.4 (33.4) | *110.3 (31.3^)* | *145.1 (30.2)^* |
| Trunk  ROM | Flexion/Extension | 2.3 (1.3) | 3.3 (2.7) | 4.4 (2.3) | 4.3 (1.5) |
| Medial/Lateral Tilt | 2.1 (1.2) | 1.6 (0.6) | 3.0 (1.7) | 2.2 (0.3) |
| Axial Rotation | 2.8 (2.6) | 3.8 (1.5) | 3.4 (2.0) | 3.8 (0.8) |
| Scapulaa  ROM | Anterior/Posterior Tilt | 4.3 (0.7) | 4.5 (2.4) | 6.9 (0.8) | 5.5 (2.9) |
| Up/Downward Rotation | 5.2 (3.3) | 3.6 (0.6) | 6.9 (1.8) | 6.4 (2.3) |
| Protraction/Retraction | 5.4 (1.8) | 6.8 (1.8) | 8.3 (5.1) | 6.9 (3.4) |
| Shoulder  ROM | Flexion/Extension | 12.9 (5.7) | 17.8 (4.6) | 24.1 (4.3) | 19.2 (5.5) |
| Adduction/Abduction | 11.4 (3.2) | 7.5 (3.8) | 11.9 (8.3) | 11.1 (5.7) |
| Int/External Rotation | 16.8 (5.7) | 11.4 (3.4) | 21.0 (2.0) | 20.5 (7.3) |
| Elbow  ROM | Flexion/Extension | 28.3 (3.3) | 28.1 (15.1) | 35.3 (15.5) | 37.9 (10.2) |
| Pronation/Supination | 24.1 (8.0) | 17.2 (8.3) | 27.1 (13.3) | 57.7 (22.9) |
| Wrist  ROM | Flexion/Extension | 11.4 (5.5) | 13.1 (11.0) | 28.0 (14.9) | 50.6 (10.3) |
| Radial/Ulnar Deviation | 5.6 (5.6) | 3.2 (1.4) | 6.7 (3.0) | 13.4 (5.1) |
| Sphere Task  5-Digit Limb Loss Group | | Light Condition | | Heavy Condition | |
| Prosthesis | Non-Prosthesis | Prosthesis | Non-Prosthesis |
| Total Upper Body Composite Score | | 153.8 (110.0) | 154.8 (22.7) | **135.5 (73.9)\*** | **204.4 (20.2)\*** |
| Trunk  ROM | Flexion/Extension | 2.9 (2.1) | 3.6 (1.4) | 5.2 (3.9) | 5.5 (1.8) |
| Medial/Lateral Tilt | 2.8 (2.3) | 1.8 (0.8) | 6.7 (4.4) | 2.7 (0.4) |
| Axial Rotation | 3.8 (3.3) | 5.4 (1.0) | 5.1 (3.6) | 4.9 (1.6) |
| Scapulaa  ROM | Anterior/Posterior Tilt | 19.4 (20.0) | 11.4 (7.9) | 8.4 (5.2) | 11.9 (7.7) |
| Up/Downward Rotation | 10.7 (12.1) | 12.2 (13.2) | 9.4 (7.7) | 13.8 (11.5) |
| Protraction/Retraction | 24.3 (21.9) | 13.3 (4.4) | 12.2 (7.8) | 14.1 (2.9) |
| Shoulder  ROM | Flexion/Extension | 43.5 (51.5) | 29.0 (11.6) | 24.1 (4.3) | 19.2 (5.5) |
| Adduction/Abduction | 18.8 (20.3) | 9.4 (5.0) | 11.9 (8.3) | 11.1 (5.7) |
| Int/External Rotation | 42.1 (42.3) | 22.2 (8.0) | 21.9 (2.0) | 20.5 (7.3) |
| Elbow  ROM | Flexion/Extension | 35.3 (5.4) | 49.4 (8.4) | 35.3 (15.5) | 37.9 (10.2) |
| Pronation/Supination | 28.6 (13.2) | 24.6 (13.8) | 27.1 (13.3) | 57.7 (22.9) |
| Wrist  ROM | Flexion/Extension | **8.6 (4.3)‡** | **33.6 (6.6)‡** | **11.6 (6.1)‡** | **28.0 (14.9)‡** |
| Radial/Ulnar Deviation | 6.5 (3.3) | 6.8 (1.7) | 4.4 (2.2) | 6.7 (3.0) |
| a. Missing scapula data on one participant in each limb loss group. | | | | | |

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| **Table S.2.** Kinematic results for heavy and light tripod tasks. Presented as group mean (SD). Units in degrees. \* indicates p<0.05 and ^ indicates p<0.10 between prosthesis conditions. ‡indicates p<0.05 and † indicates p<0.10 after applying Bonferroni Correction for our secondary analysis. | | | | | |
| Tripod Task  4-Digit Limb Loss Group | | Light Condition | | Heavy Condition | |
| Prosthesis | Non-Prosthesis | Prosthesis | Non-Prosthesis |
| Total Upper Body Composite Score | | 107.7 (63.0) | 116.6 (61.2) | 68.0 (31.7) | 94.2 (46.8) |
| Trunk  ROM | Flexion/Extension | 4.5 (5.0) | 4.0 (3.9) | 2.1 (1.4) | 2.2 (1.0) |
| Medial/Lateral Tilt | 7.5 (5.9) | 5.3 (3.8) | 4.2 (2.7) | 3.6 (0.8) |
| Axial Rotation | 4.2 (4.6) | 3.2 (2.1) | 2.0 (1.0) | 1.6 (0.4) |
| Scapulaa  ROM | Anterior/Posterior Tilt | 5.0 (2.8) | 6.4 (4.4) | 4.8 (2.8) | 4.0 (1.7) |
| Up/Downward Rotation | 5.7 (3.0) | 4.3 (2.0) | 4.1 (2.2) | 4.0 (1.3) |
| Protraction/Retraction | 5.0 (1.6) | 6.2 (3.7) | 3.5 (1.4) | 4.4 (1.8) |
| Shoulder  ROM | Flexion/Extension | 21.8 (15.8) | 19.1 (11.3) | 16.5 (9.6) | 12.3 (7.1) |
| Adduction/Abduction | 15.4 (9.7) | 17.3 (12.2) | 8.1 (4.1) | 13.2 (6.7) |
| Int/External Rotation | 27.0 (15.5) | 22.9 (17.8) | 20.2 (10.9) | 18.8 (8.3) |
| Elbow  ROM | Flexion/Extension | 15.6 (3.8) | 22.3 (10.9) | 11.2 (1.8) | 18.4 (4.0) |
| Pronation/Supination | 31.6 (27.8) | 32.0 (24.6) | 14.9 (11.4) | 30.5 (27.9) |
| Wristb  ROM | Flexion/Extension | 12.8 (9.6) | 29.2 (7.3) | 10.3 (5.8) | 19.0 (12.0) |
| Radial/Ulnar Deviation | 7.6 (6.0) | 10.3 (3.1) | 5.7 (3.5) | 6.5 (4.4) |
| Tripod Task  5-Digit Limb Loss Group | | Light Condition1 | | Heavy Condition | |
| Prosthesis | Non-Prosthesis | Prosthesis | Non-Prosthesis |
| Total Upper Body Composite Score | | 47.7 (17.7) | 149.3 (92.7) | 62.9 (37.9) | 119.8 (44.3) |
| Trunk  ROM | Flexion/Extension | 1.6 (1.5) | 2.0 (1.4) | 1.5 (0.7) | 2.5 (1.1) |
| Medial/Lateral Tilt | 2.2 (1.5) | 3.9 (2.0) | 3.2 (2.7) | 3.7 (3.2) |
| Axial Rotation | 1.5 (0.5) | 1.8 (0.3) | 2.0 (1.3) | 1.9 (1.6) |
| Scapulaa  ROM | Anterior/Posterior Tilt | 6.6 (9.0) | 4.3 (1.6) | 5.2 (4.3) | 7.0 (5.4) |
| Up/Downward Rotation | 5.5 (6.4) | 4.3 (2.6) | 7.1 (5.3) | 5.7 (4.2) |
| Protraction/Retraction | 9.1 (10.6) | 5.0 (1.2) | 6.9 (5.8) | 5.9 (1.4) |
| Shoulder  ROM | Flexion/Extension | 12.4 (5.4) | 16.9 (7.3) | 15.0 (9.1) | 15.3 (5.8) |
| Adduction/Abduction | 7.0 (3.0) | 14.1 (8.5) | 8.4 (7.0) | 11.8 (4.9) |
| Int/External Rotation | 12.8 (7.1) | 27.0 (10.9) | 14.1 (9.4) | 21.0 (8.5) |
| Elbow  ROM | Flexion/Extension | 11.5 (2.1) | 45.3 (53.3) | 12.0 (3.1) | 22.7 (8.0) |
| Pronation/Supination | 8.7 (4.1) | 46.2 (40.6) | 11.5 (6.0) | 40.5 (30.9) |
| Wrist  ROM | Flexion/Extension | 5.2 (4.0) | 35.0 (19.8) | 7.9 (9.5) | 26.2 (8.7) |
| Radial/Ulnar Deviation | 5.4 (4.1) | 6.2 (1.2) | 6.3 (6.1) | 13.1 (8.8) |
| 1. One 5-digit limb loss participant was not able to complete task during non-prosthesis condition.  a. Missing scapula data on one participant in each limb loss group.  b. Missing data on one participant during light non-prosthesis condition and heavy prosthesis condition. | | | | | |

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| **Table S.3. Kinematic results for heavy and light lateral tasks. 4-digit results only as the 5-digit group was unable to complete the task without their prosthesis. Presented as group mean (SD). Units in degrees. \* indicates p<0.05 and ^ indicates p<0.10 between prosthesis conditions. ‡indicates p<0.05 and † indicates p<0.10 after applying Bonferroni Correction for our secondary analysis.** | | | | | |
| Lateral Task  4-Digit Limb Loss Group | | Light Condition | | Heavy Condition | |
| Prosthesis | Non-Prosthesis | Prosthesis | Non-Prosthesis |
| Total Upper Body Composite Score | | 38.7 (32.5) | 71.7 (86.4) | *46.8 (46.6)^* | *70.0 (63.2)^* |
| Trunk  ROM | Flexion/Extension | 2.0 (0.9) | 6.7 (8.3) | 3.2 (2.7) | 5.5 (4.4) |
| Medial/Lateral Tilt | 5.0 (2.2) | 4.2 (3.7) | 3.7 (1.8) | 4.7 (1.8) |
| Axial Rotation | 2.8 (2.0) | 2.4 (1.3) | 2.0 (0.4) | 2.6 (1.6) |
| Scapulaa  ROM | Anterior/Posterior Tilt | 4.0 (1.4) | 4.8 (2.5) | 4.3 (1.6) | 5.0 (1.2) |
| Up/Downward Rotation | 3.1 (0.3) | 6.7 (4.3) | 4.6 (0.8) | 4.9 (1.9) |
| Protraction/Retraction | 5.9 (0.8) | 5.6 (1.5) | 5.8 (1.1) | 5.7 (1.5) |
| Shoulder  ROM | Flexion/Extension | 12.7 (3.0) | 19.4 (9.7) | 18.1 (5.2) | 22.9 (4.0) |
| Adduction/Abduction | 7.8 (3.4) | 14.9 (12.0) | 8.2 (6.2) | 15.1 (6.8) |
| Int/External Rotation | 10.1 (4.7) | 22.0 (23.8) | 15.4 (13.7) | 27.8 (13.3) |
| Elbow  ROM | Flexion/Extension | 15.7 (4.5) | 32.7 (19.6) | 19.4 (7.2) | 30.1 (7.4) |
| Pronation/Supination | 12.9 (4.0) | 26.3 (23.0) | 12.8 (8.7) | 22.5 (9.5) |
| Wristb  ROM | Flexion/Extension | 10.4 (3.2) | 18.6 (16.4) | 10.1 (7.0) | 16.1 (7.4) |
| Radial/Ulnar Deviation | 5.5 (2.1) | 5.3 (1.9) | 4.4 (1.0) | 3.9 (0.9) |
| a. Missing scapula data on one participant in each limb loss group.  b. Missing data on one participant during light prosthesis condition | | | | | |

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| **Table S.4.** Kinematic results for heavy and light tip tasks. Presented as group mean (SD). Units in degrees. \* indicates p<0.05 and ^ indicates p<0.10 between prosthesis conditions. ‡indicates p<0.05 and † indicates p<0.10 after applying Bonferroni Correction for our secondary analysis. | | | | | |
| Tip Task  4-Digit Limb Loss Group | | Light Condition | | Heavy Condition | |
| Prosthesis | Non-Prosthesis | Prosthesis | Non-Prosthesis |
| Total Upper Body Composite Score | | 50.7 (9.6) | 55.5 (8.0) | 68.3 (22.5) | 70.3 (13.8) |
| Trunk  ROM | Flexion/Extension | 2.0 (0.9) | 3.1 (1.2) | 2.9 (0.9) | 2.9 (1.0) |
| Medial/Lateral Tilt | 1.9 (1.0) | 2.2 (1.0) | 3.3 (2.0) | 3.0 (2.0) |
| Axial Rotation | 1.7 (0.9) | 1.4 (0.4) | 1.7 (0.4) | 1.8 (0.7) |
| Scapulaa  ROM | Anterior/Posterior Tilt | 3.8 (1.8) | 3.2 (1.3) | 4.9 (2.1) | 3.6 (1.6) |
| Up/Downward Rotation | 3.6 (2.1) | 3.7 (1.9) | 3.4 (0.8) | 4.7 (2.2) |
| Protraction/Retraction | 2.7 (1.0) | 3.1 (0.3) | 2.8 (0.8) | 3.6 (0.5) |
| Shoulder  ROM | Flexion/Extension | 11.1 (6.2) | 10.7 (5.1) | 16.8 (9.6) | 14.0 (9.3) |
| Adduction/Abduction | 7.2 (3.9) | 6.0 (1.9) | 10.1 (5.6) | 7.7 (2.8) |
| Int/External Rotation | 16.3 (7.9) | 15.9 (7.7) | 22.4 (9.8) | 17.0 (9.7) |
| Elbow  ROM | Flexion/Extension | 6.8 (0.8) | 11.8 (2.4) | 8.7 (1.0) | 13.1 (3.1) |
| Pronation/Supination | 9.6 (6.1) | 10.6 (5.3) | 16.6 (9.3) | 14.8 (10.2) |
| Wristb  ROM | Flexion/Extension | 9.6 (8.7) | 9.2 (3.7) | 7.1 (5.5) | 14.0 (4.5) |
| Radial/Ulnar Deviation | 4.6 (3.4) | 3.6 (1.7) | 4.3 (3.2) | 5.7 (1.5) |
| Tip Task  5-Digit Limb Loss Group | | Light Condition1 | | Heavy Condition2 | |
| Prosthesis | Non-Prosthesis | Prosthesis | Non-Prosthesis |
| Total Upper Body Composite Score | | 56.1 (25.5) | 120.4 (125.1) | 45.7 (12.5) | 63.8 (87.5) |
| Trunk  ROM | Flexion/Extension | 2.7 (1.7) | 9.1 (5.2) | 2.0 (1.2) | 6.3 (1.5) |
| Medial/Lateral Tilt | 4.7 (1.3) | 9.9 (8.1) | 3.0 (1.4) | 5.1 (1.2) |
| Axial Rotation | 3.3 (3.0) | 5.7 (4.4) | 1.7 (0.1) | 4.2 (0.2) |
| Scapulaa  ROM | Anterior/Posterior Tilt | 5.6 (6.2) | 11.6 (6.6) | 4.1 (3.4) | 5.2 (0.3) |
| Up/Downward Rotation | 4.2 (1.7) | 14.8 (6.8) | 3.7 (2.2) | 6.5 (1.7) |
| Protraction/Retraction | 7.6 (5.0) | 11.0 (6.3) | 5.7 (4.2) | 11.2 (0.6) |
| Shoulder  ROM | Flexion/Extension | 11.6 (4.5) | 36.6 (22.5) | 9.3 (2.7) | 28.1 (2.3) |
| Adduction/Abduction | 9.6 (6.5) | 24.5 (9.0) | 5.8 (1.9) | 19.3 (10.9) |
| Int/External Rotation | 12.2 (6.7) | 44.9 (17.7) | 7.9 (3.5) | 33.2 (3.3) |
| Elbow  ROM | Flexion/Extension | 9.8 (3.0) | 39.8 (14.4) | 9.3 (2.2) | 30.4 (9.4) |
| Pronation/Supination | 10.7 (6.8) | 32.3 (20.3) | 11.0 (4.4) | 31.6 (8.6) |
| Wrist  ROM | Flexion/Extension | 4.3 (1.9) | 45.7 (17.6) | 4.8 (2.4) | 41.5 (7.7) |
| Radial/Ulnar Deviation | 4.3 (1.6) | 13.3 (9.6) | 4.8 (2.6) | 12.0 (4.6) |
| 1. One 5-digit limb loss participant was not able to complete task during non-prosthesis condition.  2. Two 5-digit limb loss participants were not able to complete task during non-prosthesis condition.  a. Missing scapula data on one participant in each limb loss group.  b. Missing data on one participant during light prosthesis condition. | | | | | |

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| **Table S.5.** Kinematic results for heavy and light extension tasks. Presented as group mean (SD). Units in degrees. \* indicates p<0.05 and ^ indicates p<0.10 between prosthesis conditions. ‡indicates p<0.05 and † indicates p<0.10 after applying Bonferroni Correction for our secondary analysis. | | | | | |
| Extension Task  4-Digit Limb Loss Group | | Light Condition | | Heavy Condition | |
| Prosthesis | Non-Prosthesis | Prosthesis | Non-Prosthesis |
| Total Upper Body Composite Score | | 63.1 (14.2) | 54.4 (12.4) | 88.3 (42.0) | 62.8 (15.7) |
| Trunk  ROM | Flexion/Extension | 1.9 (0.8) | 2.3 (1.1) | 4.1 (2.1) | 3.0 (1.8) |
| Medial/Lateral Tilt | 3.4 (2.8) | 1.3 (0.6) | 6.0 (4.4) | 2.0 (0.9) |
| Axial Rotation | 1.5 (0.3) | 1.5 (0.6) | 3.1 (2.9) | 2.2 (1.3) |
| Scapulaa  ROM | Anterior/Posterior Tilt | 5.9 (2.9) | 2.5 (1.1) | 5.4 (1.0) | 3.0 (0.5) |
| Up/Downward Rotation | 5.3 (1.8) | 3.2 (1.7) | 4.4 (0.9) | 3.6 (1.9) |
| Protraction/Retraction | 3.6 (1.0) | 3.4 (0.6) | 3.4 (0.7) | 3.3 (0.7) |
| Shoulder  ROM | Flexion/Extension | 13.3 (4.5) | 9.2 (4.3) | 24.2 (14.0) | 11.3 (4.6) |
| Adduction/Abduction | 9.7 (5.7) | 6.3 (4.2) | 16.3 (15.1) | 9.4 (3.1) |
| Int/External Rotation | 18.3 (7.2) | 12.9 (7.1) | 29.0 (12.5) | 14.2 (7.1) |
| Elbow  ROM | Flexion/Extension | 9.5 (3.5) | 12.2 (2.3) | 9.0 (3.0) | 13.6 (3.7) |
| Pronation/Supination | 11.1 (4.7) | 12.0 (5.3) | 19.1 (12.6) | 11.0 (5.9) |
| Wristb  ROM | Flexion/Extension | 10.9 (7.4) | 10.9 (2.6) | 11.4 (5.4) | 13.9 (2.5) |
| Radial/Ulnar Deviation | 3.5 (2.5) | 4.3 (1.0) | 6.8 (4.1) | 5.6 (2.6) |
| Extension Task  5-Digit Limb Loss Group | | Light Condition | | Heavy Condition2 | |
| Prosthesis | Non-Prosthesis | Prosthesis | Non-Prosthesis |
| Total Upper Body Composite Score | | *63.3 (26.9)^* | *132.7 (83.3)^* | *59.0 (28.7)^* | *114.5 (29.5)^* |
| Trunk  ROM | Flexion/Extension | 2.8 (2.8) | 4.4 (3.5) | 1.4 (0.6) | 4.7 (1.4) |
| Medial/Lateral Tilt | 4.7 (2.8) | 8.0 (7.9) | 2.8 (0.5) | 5.5 (1.5) |
| Axial Rotation | 3.0 (2.5) | 3.2 (2.4) | 1.3 (0.8) | 2.8 (1.5) |
| Scapulaa  ROM | Anterior/Posterior Tilt | 3.0 (1.6) | 7.3 (7.7) | 3.8 (3.1) | 7.3 (4.7) |
| Up/Downward Rotation | 3.6 (1.5) | 9.1 (10.5) | 4.8 (4.7) | 7.1 (3.8) |
| Protraction/Retraction | 6.6 (4.2) | 5.3 (3.0) | 4.4 (1.5) | 7.2 (1.7) |
| Shoulder  ROM | Flexion/Extension | 14.0 (5.8) | 15.8 (11.4) | 12.9 (4.8) | 16.6 (4.4) |
| Adduction/Abduction | 8.9 (3.5) | 13.2 (7.4) | 8.5 (6.5) | 16.0 (7.4) |
| Int/External Rotation | 19.0 (16.5) | 19.9 (10.2) | 17.2 (14.7) | 22.3 (4.0) |
| Elbow  ROM | Flexion/Extension | 9.2 (3.6) | 27.6 (16.8) | 11.7 (3.6) | 24.7 (7.2) |
| Pronation/Supination | 13.6 (4.8) | 39.5 (31.5) | 13.2 (8.3) | 24.1 (11.3) |
| Wrist  ROM | Flexion/Extension | 4.3 (2.7) | 32.2 (20.6) | 6.4 (4.4) | 24.0 (7.1) |
| Radial/Ulnar Deviation | 5.6 (2.6) | 12.4 (9.1) | 3.2 (1.0) | 9.5 (4.3) |
| 2. Two 5-digit limb loss participants were not able to complete task during non-prosthesis condition.  a. Missing scapula data on one participant in each limb loss group.  b. Missing data on one participant during heavy prosthesis condition. | | | | | |

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| **Table S.6.** Kinematic results for simulated food cutting task. 4-digit results only as the 5-digit group was unable to complete the task without their prosthesis. Presented as group mean (SD). Units in degrees. \* indicates p<0.05 and ^ indicates p<0.10 between prosthesis conditions. ‡indicates p<0.05 and † indicates p<0.10 after applying Bonferroni Correction for our secondary analysis. | | | |
| Simulated Food Cutting  4-Digit Limb Loss Group | | Prosthesis | Non-Prosthesis |
| Total Upper Body Composite Score | | 96.6 (66.7) | 118.1 (61.2) |
| Trunk ROM | Flexion/Extension | 3.6 (3.3) | 3.8 (2.9) |
| Medial/Lateral Tilt | 4.7 (3.8) | 7.3 (5.2) |
| Axial Rotation | 3.8 (3.9) | 5.6 (3.1) |
| Scapulaa  ROM | Anterior/Posterior Tilt | 7.1 (1.8) | 11.4 (6.0) |
| Up/Downward Rotation | 5.8 (2.2) | 9.2 (5.1) |
| Protraction/Retraction | 6.1 (3.6) | 7.4 (4.0) |
| Shoulder ROM | Flexion/Extension | 17.1 (16.0) | 16.8 (9.3) |
| Adduction/Abduction | 19.6 (17.3) | 18.1 (10.2) |
| Internal/External Rotation | 27.3 (19.0) | 23.6 (8.7) |
| Elbow ROM | Flexion/Extension | 16.3 (5.5) | 16.3 (7.4) |
| Pronation/Supination | 23.0 (26.9) | 31.7 (23.8) |
| Wrist  ROM | Flexion/Extension | 10.6 (12.3) | 22.2 (12.5) |
| Radial/Ulnar Deviation | 8.3 (8.5) | 8.1 (4.8) |
| a. Missing scapula data on one participant in each limb loss group. | | | |

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| **Table S.7.** Kinematic results for page turning task. Presented as group mean (SD). Units in degrees. \* indicates p<0.05 and ^ indicates p<0.10 between prosthesis conditions. ‡indicates p<0.05 and † indicates p<0.10 after applying Bonferroni Correction for our secondary analysis. | | | |
| Page Turning  4-Digit Limb Loss Group | | Prosthesis | Non-Prosthesis |
| Total Upper Body Composite Score | | 203.4 (42.6) | 240.5 (35.6) |
| Trunk ROM | Flexion/Extension | 6.1 (4.4) | 4.1 (2.9) |
| Medial/Lateral Tilt | 7.8 (5.2) | 7.3 (2.8) |
| Axial Rotation | 8.3 (2.6) | 7.0 (3.4) |
| Scapulaa  ROM | Anterior/Posterior Tilt | 8.2 (2.6) | 8.9 (3.7) |
| Up/Downward Rotation | 11.5 (4.1) | 11.6 (1.7) |
| Protraction/Retraction | 15.0 (5.3) | 17.3 (7.1) |
| Shoulder ROM | Flexion/Extension | 31.2 (16.1) | 46.9 (18.2) |
| Adduction/Abduction | 26.9 (8.4) | 21.7 (8.6) |
| Internal/External Rotation | 53.5 (10.7) | 68.1 (10.2) |
| Elbow ROM | Flexion/Extension | 39.0 (21.6) | 26.9 (9.5) |
| Pronation/Supination | 63.9 (35.0) | 66.2 (33.5) |
| Wristb  ROM | Flexion/Extension | 23.2 (15.1) | 49.3 (6.8) |
| Radial/Ulnar Deviation | 13.5 (10.4) | 14.0 (4.7) |
| Page Turning  5-Digit Limb Loss Group | | Prosthesis | Non-Prosthesis |
| Total Upper Body Composite Score | | 228.8 (64.0) | 227.4 (49.2) |
| Trunk ROM | Flexion/Extension | 5.3 (4.4) | 6.1 (2.3) |
| Medial/Lateral Tilt | 10.3 (1.9) | 9.5 (4.7) |
| Axial Rotation | 7.1 (2.7) | 5.1 (2.2) |
| Scapulaa  ROM | Anterior/Posterior Tilt | 16.6 (9.8) | 14.1 (5.8) |
| Up/Downward Rotation | 16.9 (13.6) | 14.8 (1.9) |
| Protraction/Retraction | 18.7 (8.6) | 19.9 (3.7) |
| Shoulder ROM | Flexion/Extension | 24.7 (7.4) | 38.7 (13.1) |
| Adduction/Abduction | 15.7 (7.2) | 33.8 (6.9) |
| Internal/External Rotation | 39.4 (17.7) | 58.5 (11.9) |
| Elbow ROM | Flexion/Extension | 37.7 (28.1) | 54.9 (28.1) |
| Pronation/Supination | 106.4 (25.1) | 53.2 (34.0) |
| Wrist  ROM | Flexion/Extension | 22.2 (8.7) | 39.5 (5.6) |
| Radial/Ulnar Deviation | 12.6 (5.6) | 17.0 (4.8) |
| a. Missing scapula data on one participant in each limb loss group.  b. Missing data on one participant during the non-prosthesis condition. | | | |