# **Supplementary Table 10: Extracted data for studies with shoulder external rotation data.**

Isometric (ISO) and isokinetic (IKO) data of concentric (Con) and Eccentric (Ecc) movement types. Age ranges (AR) included. Outcomes are relative to the described measurement unit; where available, effect sizes were extracted or calculated (Cohen's d).

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| --- | --- | --- | --- | --- |
| **Title** | **Movement Type** | **Measurement Unit** | **Outcomes** | **Effect Size (Cohen’s d)** |
| Kim, et al., 2009  | Isometric | Nm | Males: AR:40-49 = 120.6±33.3 AR:50-59 = 112.8±22.6 AR:60-69 = 99.0±24.6Females: AR:40-49 = 62.8±15.7  AR:50-59 = 65.7±14.7 AR:60-69 = 61.8±12.8  | AR: 40-49 = 1.74 AR: 50-59 = 2.08 AR: 60-69 = 1.51  |
| Murray, et al., 1985  | Isometric | kg-cm | Males: Young 0° = 335±15 Old 0° = 280±10Females: Young0° = 186±8 Old 0° = 152±11 | Young 0° = 9.93Old 0° = 12.8 |
| Roy, et al., 2009  | Isometric | Nm | Males: Young = 33.6±9.0 Mid = 40.0±11.2 Older = 25.9 ± 11.2 Females: Young = 17.2±4.8 Mid = 17.5±3.7 Older = 14.8 ± 5.9  | Young = 1.47Mid = 1.82Older = 2.01 |
| Chezar, et al., 2013  | Isometric | Nm/kg | Males: AR: 30-39 = 102±35 AR: 40-49 = 110±35 AR: 50-59 = 122±43  AR: 60-69 = 89±35 Females: AR: 30-39 = 44±12  AR: 40-49 = 47±18  AR: 50-59 = 47±18  AR: 60-69 = 42±12 | AR: 30-39 = 1.66 AR: 40-49 = 1.80AR: 50-59 = 1.74 AR: 60-69 = 1.34 |
| Lannersten, et al., 1993  | Isometric | Nm | Males: AR: 19-34 = 27±9.1 AR: 35-44 = 28.1±10.6  AR: 45-65 = 25.1±6.9 Females: AR: 19-34 = 15.1±3.8  AR: 35-44 = 14.9±3.2 AR: 45-65 = 14.8±3.2  | AR: 19-34 = 0.14AR: 35-44 = 1.25AR: 45-65 = 1.49  |
| Riemann, et al., 2010  | Isometric | Percent Body Mass | Males: Prone.90° = 18.7±5.9 Neutral.Seat = 17.8±5.2 Seat.30° = 17.8±5.5Females: Prone.90° = 10.8±4.5 Neutral.Seat = 9.9±3.6 Seat.30° = 9.9±3.9 | Prone.90° = 1.34Neutral.Seat = 1.52Seat.30° = 1.44 |
| VanHarlinger, et al., 2015  | Isometric | kg | Males: AR 20-24 = 10±3.1 AR 25-29 = 12.7±2.1 AR 30-34 = 12.4±4 AR 35-39 = 10.1±2.9 AR 40-44 = 12±2.6 AR 45-49 = 10.2±3.6 AR 50-54 = 9±4.1 AR 55-59 = 11.2±3.3 AR 60-64 = 8.4±2.4Females: AR 20-24 = 6.3±2 AR 25-29 = 6±2.3 AR 30-34 = 5.3±2.4 AR 35-39 = 5.7±2.4 AR 40-44 = 5.9±2.7 AR 45-49 = 7.7±2.8 AR 50-54 = 6.1±2.2 AR 55-59 = 5.3±1.8 AR 60-64 = 5.6±2.4 | AR 20-24 = 1.19AR 25-29 = 3.19AR 30-34 = 1.78AR 35-39 = 1.52AR 40-44 = 2.35AR 45-49 = 0.69AR 50-54 = 2.90AR 55-59 = 1.79AR 60-64 = 1.17 |
| McKay, et al., 2017  | Isometric | N | Males: AR:20-59 = 134.7±39.6  AR:60+ = 96.7±25.3 Females: AR:20-59 = 82.2±20.9  AR:60+ = 63.3±19.2  | AR: 20-59 = 1.33AR: 60+ = 1.32 |
| Huberman, et al., 2020  | Isometric | Ibs | Males: 31.23±9.66Females: 32.28±9.69 | 0.12 |
| Westrick, et al., 2013  | Isometric | N/kg | Males: 0.20±0.04Females: 0.16±0.04 | 1 |
| Hughes, et al., 1999  | Isometric | Nm | Males:Internal Rotation (0°) Abduction (15°):  AR: 20-29 = 31±10 AR: 30-39 = 28±6 AR: 40-49 = 25±6 AR: 50-59 = 24±5 AR: 60+ = 20±5Internal Rotation (30°) Abduction (15°):  AR: 20-29 = 34±9 AR: 30-39 = 33±9 AR: 40-49 = 32±10 AR: 50-59 = 29±6 AR: 60+ = 26±5Internal Rotation (0°) Abduction (90°):  AR: 20-29 = 34±8 AR: 30-39 = 31±6 AR: 40-49 = 31±9 AR: 50-59 = 28±6 AR: 60+ = 25±7External Rotation (60°) Abduction (90°):  AR: 20-29 = 30±6 AR: 30-39 = 30±6 AR: 40-49 = 27±9 AR: 50-59 = 25±5 AR: 60+ = 25±7Females:Internal Rotation (0°) Abduction (15°):  AR: 20-29 = 15±6 AR: 30-39 = 19±4 AR: 40-49 = 17±6 AR: 50-59 = 11±3 AR: 60+ = 10±5Internal Rotation (30°) Abduction (15°):  AR: 20-29 = 18±5 AR: 30-39 = 21±5 AR: 40-49 = 19±5 AR: 50-59 = 14±2 AR: 60+ = 11±5Internal Rotation (0°) Abduction (90°):  AR: 20-29 = 20±6 AR: 30-39 = 20±6 AR: 40-49 = 20±4 AR: 50-59 = 15±4 AR: 60+ = 12±5External Rotation (60°) Abduction (90°):  AR: 20-29 = 18±5 AR: 30-39 = 18±4 AR: 40-49 = 17±4 AR: 50-59 = 14±3 AR: 60+ = 12±4 | Internal Rotation (0°) Abduction (15°):  AR: 20-29 = 1.60 AR: 30-39 = 1.5 AR: 40-49 = 1.33 AR: 50-59 = 2.6 AR: 60+ = 1Internal Rotation (30°) Abduction (15°):  AR: 20-29 = 1.78 AR: 30-39 = 1.33 AR: 40-49 = 1.30 AR: 50-59 = 2.50 AR: 60+ = 3Internal Rotation (0°) Abduction (90°):  AR: 20-29 = 1.75 AR: 30-39 = 1.83 AR: 40-49 = 1.22 AR: 50-59 = 2.17 AR: 60+ = 1.86External Rotation (60°) Abduction (90°):  AR: 20-29 = 2 AR: 30-39 = 2 AR: 40-49 = 1.11 AR: 50-59 = 2.2 AR: 60+ = 1.86 |
| Magnusson, et al., 1995  | Isometric | Nm/kg | Males: Left = 0.53±0.03 Right = 0.52±0.03Females: Left = 0.37±0.02 Right = 0.41±0.02 | Left = 3.2 Right = 3.67  |
| Stausholm, et al., 2021 | Isometric | Nm/kg | Males: 1.23±0.31Females: 1.11±0.5 | 0.39 |
| Guirelli, et al., 2021  | Isometric | N/kg | Males: 1.26±0.22Females: 1.26±0.22 | 1.20  |
| Pontillo and Sennet, 2020  | Isometric | kg | Males: 10.7±3.4Females: 7.9±2.5 | 0.82 |
| Andrews, et al., 1996  | Isometric | N | Males: AR: 50-59 = 155.9±33.1 AR: 60-69 = 139.2±27.2Females: AR: 50-59 = 100.4±20.3 AR: 60-69 = 88.4±18.9 | AR: 50-59 = 1.68AR: 60-69 = 1.87 |
| Alizadehkhaiyat, et al., 2014  | Isometric | N | Males: 114.6±31.6Females: 73.7±15.8 | 1.29 |
| Cools, et al., 2016  | Isometric | N | Males: 90-0° = 145.2±28.3  90-90° = 106.2±19.8Females: 90-0° = 113.8±25.3  90-90° = 94.2±23.2 | 90-0° = 1.1190-90° = 0.61 |
| Kramer and Ng, 1995  | Isometric | Nm | Males: Isokinetic Dynamometer = 41±11 Hand-Held Dynamometer = 41±7Females: Isokinetic Dynamometer = 22±7 Hand-Held Dynamometer = 23±5 | Isokinetic Dynamometer = 1.89 Hand-Held Dynamometer = 2.57  |
| Marcondes, et al., 2019  | Isokinetic; 60 °/s; 180 °/s  | Percent Body Mass | Males: 60°/s = 40.1±6.5 180°/s = 69.2±7.8Females: 60°/s = 33.3±3.3 180°/s = 55.5±5.3 | 60°/s = 1.05 180°/s = 1.76 |
| Cahalan, et al., 1989  | Isokinetic; 60 °/s; 180 °/s; 300 °/s  | N, Nm | Males: N = 32±6.5  60°/s = 26±5.5 180°/s = 19.5±4  300°/s = 14.5±4 Females: N = 17.5±2.5  60°/s = 13.5±3 180°/s = 7±3 300°/s = 4±2 | N = 2.23 60°/s = 2.27 180°/s = 3.13 300°/s = 2.63 |
| Shklar and Dvir, 1995  | Isokinetic; 60 °/s; 120 °/s; 180 °/s  | Nm | Males: Con.60° = 25.6±7.2 Con.120° = 22.9±6.4 Con.180° = 21.2±5.7 Ecc.60° = 32±8.1 Ecc.120° = 30.1±8.5 Ecc.180° = 31.3±7.9Females: Con.60° = 16.3±2.5 Con.120° = 14.1±2.6 Con.180° = 13.5±3.3 Ecc.60° = 19.9±4.6 Ecc.120° = 19.8±4.6 Ecc.180° = 19.6±4.4 | Con.60° = 1.29Con.120° = 1.38Con.180° = 1.35Ecc.60° = 1.49Ecc.120° = 1.21Ecc.180° = 1.48  |
| Ivey, et al., 1985  | Isokinetic:60 °/s180 °/s  | Foot-Pounds | Males: Slow = 23.8±5.8 Fast = 21.1±6.8Females: Slow = 13.9±2.3 Fast = 11.2±2.3 | Slow = 1.71 Fast = 1.46  |
| Reid, et al., 1989  | Isokinetic:60 °/s  | Nm | Males: Lying = 31±10 Standing = 29±13Females: Lying = 16±5 Standing = 13±3 | Lying = 1.5Standing = 1.23 |
| McMaster, et al., 1992  | Isokinetic:30°/s180°/s  | Foot-Pounds | Males: Con.30°.Left = 28.1±6.7 Con.30°.Right = 29.1±6 Con.180°.Left = 25.4±8 Con.180°.Right = 27.4±6.4Females: Con.30°.Left = 20.1±3.8 Con.30°.Right = 20.3±3.5 Con.180°.Left = 18.2±3 Con.180°.Right = 16.5±2.3 | Con.30°.Left = 1.19 Con.30°.Right = 1.47Con.180°.Left = 0.9 Con.180°.Right = 1.70  |
| Motta, et al., 2019  | Isokinetic:60°/s 240°/s  | Nm/kg | Males: Con.60° = 306.00±59.00 Con.240° = 180.55±29.40 Ecc.240° = 346.80±102.55Females: Con.60° = 251.20±37.90 Con.240° = 147.55±19.35 Ecc.240° = 316.35±74.00 | Con.60° = 0.93Con.240° = 1.12Ecc.240° = 0.30  |
| Maddux, et al., 1989  | Isokinetic: 60°/s180°/s  | Foot-Pounds | Males: 60°/s = 26±6 180°/s = 18±4Females: 60°/s = 11±2 180°/s = 8±2 | 60°/s = 2.5180°/s = 2.5  |
| Hartsell, 1998 | Isokinetic:60°/s120°/s 180°/s  | Nm | Males:Con.Sit:  60°/s = 42.42±11.57 120°/s = 33.36±10.05  180°/s = 28.51±9.52Con. Stand:  60°/s = 45.60±13.30  120°/s = 39.40±12.04 180°/s = 33.52±12.49Ecc. Sit:  60°/s = -49.45±12.52  120°/s = -46.27±10.63  180°/s = -45.76±12.52Ecc. Stand:  60°/s = -58.34±11.90  120°/s = -59.01±12.90 180°/s = -60.19±11.95 Females:Con. Sit: 60°/s = 17.78±3.11  120°/s = 13.91±2.23 180°/s = 14.08±2.06Con. Stand:  60°/s = 22.63±4.13 120°/s = 16.77±3.14 180°/s = 14.76±2.61 Ecc. Sit:  60°/s = -25.81±5.58  120°/s = -26.66±8.29  180°/s = -26.32±5.72 Ecc. Stand:  60°/s = -30.34±4.97 120°/s = -31.02±5.76 180°/s = -31.52±6.35 | Con.Sit: 60°/s = 2.13 120°/s = 1.94 180°/s = 1.52 Con. Stand: 60°/s = 1.73  120°/s = 1.88 180°/s = 1.50 Ecc. Sit:  60°/s = 1.89  120°/s = 1.85  180°/s = 1.55 Ecc. Stand: 60°/s = 2.35  120°/s = 2.17 180°/s = 2.39  |
| VanMeeteren, et al., 2002  | Isokinetic: 60°/s120°/s 180°/s  | Nm | Males: 29.4±6.45Females: 16.45±3.45 | 2.01 |
| Hill, et al., 2005  | Isokinetic:60°/s 90°/s 120°/s  | Nm | Males:Sitting (60 °/s):  Left = 24.8±7.5 Right = 25.3±8.8 Sitting (90 °/s):  Left = 21.5±7.7 Right = 22.5±7.1Sitting (120 °/s):  Left = 19.2±8.2 Right = 19±6.7Lying (60 °/s):  Left = 33.9±11.8 Right = 35.6±10.6Lying (90 °/s):  Left = 32.5±9.9 Right = 33.6±10.1Lying (120 °/s):  Left = 30.9±8.8 Right = 31.2±9.3Females:Sitting (60 °/s):  Left = 14.8±2.3 Right = 12.2±2.3Sitting (90 °/s):  Left = 12.8±1.9 Right = 12±1.6Sitting (120 °/s):  Left = 11.7±1.5 Right = 10.5±1.2Lying (60 °/s):  Left = 22.8±3.0 Right = 20.7±27Lying (90 °/s):  Left = 21.3±3.4 Right = 19.2±1.5Lying (120 °/s):  Left = 19.8±2.7 Right = 18.5±1.1 | Sitting (60 °/s):  Left = 1.33 Right = 1.49Sitting (90 °/s):  Left = 1.13 Right = 1.48Sitting (120 °/s):  Left = 0.91 Right = 1.27Lying (60 °/s):  Left = 0.94 Right = 1.41Lying (90 °/s):  Left = 1.13 Right = 1.43Lying (120 °/s):  Left = 1.26 Right = 1.37 |
| Hageman, et al., 1989  | Isokinetic:60 °/s180 °/s  | Nm | Males: Con.Flexion.60°/s=25.4±7.7 Con.Abduction.60°/s=30.6±5.3 Ecc.Flexion.60°/s=28.1±6.9 Ecc.Abduction.60°/s=34.1±6.9 Con.Flexion.180°/s=25±6.9 Con.Abduction.180°/s=26.7±7.1 Ecc.Flexion.180°/s=30.2±6.9 Ecc.Abduction.180°/s=33.6±6.7Females: Con.Flexion.60°/s=13.9±4.5 Con.Abduction.60°/s=16.3±3.3 Ecc.Flexion.60°/s=15.2±4.1 Ecc.Abduction.60°/s=18.2±2.9 Con.Flexion.180°/s=12.3±3.3 Con.Abduction.180°/s=15.4±3.1 Ecc.Flexion.180°/s=17.6±4.3 Ecc.Abduction.180°/s=19.9±4.3 | Con.Flexion.60°/s = 1.49Con.Abduction.60°/s = 2.69Ecc.Flexion.60°/s = 1.87Ecc.Abduction.60°/s = 2.30Con.Flexion.180°/s = 1.84Con.Abduction.180°/s = 1.59Ecc.Flexion.180°/s = 1.83Ecc.Abduction.180°/s = 2.04  |
| VanCingel, et al., 2007  | Isokinetic: 60 °/s120 °/s  | Nm/kg | Males: Con.60°/s = 0.49±0.08 Con.120°/s = 0.45±0.08 Ecc.60°/s = 0.63±0.09 Ecc.120°/s = 0.61±0.07Females: Con.60°/s = 0.35±0.06 Con.120°/s = 0.34±0.07 Ecc.60°/s = 0.52±0.10 Ecc.120°/s = 0.54±0.09 | Con.60°/s = 1.75Con.120°/s = 1.38 Ecc.60°/s = 1.22 Ecc.120°/s = 1 |
| Murgia, et al., 2018  | Isokinetic:60°/s90°/s  | Nm | Males: Young 60°/s = 0.50±0.06 Young 90°/s = 0.52±0.04 Old 60°/s = 0.39±0.10 Old 90°/s = 0.43±0.13Females: Young 60°/s = 0.39±0.10 Young 90°/s = 0.43±0.13 Old 60°/s = 0.28±0.09 Old 90°/s = 0.28±0.08 | Young 60°/s = 1.83Young 90°/s = 2.25Old 60°/s = 1.1Old 90°/s = 1.54 |
| Barrenetxea-Garcia, et al., 2019  | Isokinetic:60°/s240°/s  | Nm | Males: 60 °/s = 38.59±6.42  240 °/s = 28.47±5.62 Females: 60 °/s = 23.30±5.06 240 °/s = 17.30±2.21 | 60 °/s = 2.38 240 °/s = 1.98  |
| Ellenbecker and Roetert, 2003  | Isokinetic:210°/s 300°/s  | Nm/kg | Males: 210°/s = 37.8±9.1  300 °/s = 32.9±8.1Females: 210°/s = 24.7±6.1  300 °/s = 21.2±7.3  | 210°/s = 1.44 300 °/s = 1.44  |
| Mayer, et al., 1994  | Isometric; Isokinetic:300°/s240°/s180°/s60°/s  -60°/s  -120°/s  -180°/s -240°/s  | Nm | Males: ISO = 30±10 IKO.Con.300° = 20±6 IKO.Con.240° = 20±5 IKO.Con.180° = 22±5 IKO.Con.60° = 24±5 IKO.Ecc.60° = 30±8 IKO.Ecc.120° = 26±6 IKO.Ecc.180° = 26±4 IKO.Ecc.240° = 28±5Females: ISO = 15±5 IKO.Con.300° = 11±2 IKO.Con.240° = 11±3 IKO.Con.180° = 12±3 IKO.Con.60° = 14±4 IKO.Ecc.60° = 18±4 IKO.Ecc.120° = 18±6 IKO.Ecc.180° = 18±3 IKO.Ecc.240° = 19±3 | ISO = 1.5IKO.Con.300° = 1.5IKO.Con.240° = 1.8 IKO.Con.180° = 2 IKO.Con.60° = 2IKO.Ecc.60° = 1.5IKO.Ecc.120° = 1.33IKO.Ecc.180° = 2 IKO.Ecc.240° = 1.4  |
| Smith, et al., 2001  | Isometric; Isokinetic:90°/s  | Nm | Males: ISO = 36.2±7.6 IKO = 30.2±5.2Females: ISO = 17.5±3.2 IKO = 14.1±2.0 | ISO = 2.46IKO = 3.09  |
| Kramer and Ng, 1996  | Isometric; Isokinetic:0°/s60°/s 120°/s  | Nm | Males: ISO = 42±11 IKO.Con.60°/s = 37±11 IKO.Con.120°/s = 33±11 IKO.Ecc.60°/s = 41±10 IKO.Ecc.120°/s = 41±10Females: ISO = 22±7 IKO.Con.60°/s = 18±7 IKO.Con.120°/s = 15±6 IKO.Ecc.60°/s = 22±8 IKO.Ecc.120°/s = 22±7 | ISO = 1.82IKO.Con.60°/s = 1.73IKO.Con.120°/s = 1.64IKO.Ecc.60°/s = 1.90IKO.Ecc.120°/s = 1.90  |