# **Supplementary Table 9: Extracted data for studies with shoulder internal 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)** |
| Roy, et al., 2009 | Isometric | Nm | Males: Young = 46.8±16.5 Mid = 50.5±16.7 Old = 37.1 ± 10.1Females: Young = 23.2±9.0 Mid = 18.8±5.7 Older = 19.8 ± 7.1  | Young = 24.5Mid = 1.43Older = 1.89 |
| Murray, et al., 1985 | Isometric | kg-cm | Males: Young 0° = 592±27 Old 0° = 444±17Females: Young 0° = 289±12 Old 0° = 229±15 | Young 0° = 11.22Old 0° = 24.41 |
| Chezar, et al., 2013 | Isometric | Nm/kg | Males: AR: 30-39 = 51±13  AR: 40-49 = 55±11  AR: 50-59 = 57±20  AR: 60-69 = 45±16 Females: AR: 30-39 = 33±10  AR: 40-49 = 37±12  AR: 50-59 = 34±16  AR: 60-69 = 32±9 | AR: 30-39 = 1.38 AR: 40-49 = 1.64 AR: 50-59 = 1.15 AR: 60-69 = 0.813 |
| Riemann, et al., 2010 | Isometric | Percent Body Mass | Males: Pronated 90° = 21.6±6.3 Neutral Seated = 21.1±5.9 Seated 30° = 21.4±6.0Females: Prone 90° = 11.6±5.1 Neutral Seated = 12.4±5.0 Seated 30° = 12.4±4.5 | Pronated 90° = 1.59Neutral Seated = 8.7Seated 30° = 1.5  |
| VanHarlinger, et al., 2015  | Isometric | kg | Males: AR: 20-24 = 10.12±4.3 AR: 25-29 = 11.7±3.7 AR: 30-34 = 14.2±5.9 AR: 35-39 = 10.5±6.6 AR: 40-44 = 15.1±4.3 AR: 45-49 = 11.3±4.9 AR: 50-54 = 8.3±3 AR: 55-59 = 10.7±3.2 AR: 60-64 = 11.3±3.7Females: AR: 20-24 = 5.7±2.4 AR: 25-29 = 4.8±2.1 AR: 30-34 = 4.5±2.4 AR: 35-39 = 4.7±2.4 AR: 40-44 = 6.3±2.9 AR: 45-49 = 7±2 AR: 50-54 = 5±1.6 AR: 55-59 = 4.7±2.2 AR: 60-64 = 5.9±3.8 | AR: 20-24 = 1.03AR: 25-29 = 1.86AR: 30-34 = 1.64AR: 35-39 = 0.88AR: 40-44 = 2.05AR: 45-49 = 0.88AR: 50-54 = 1.1AR: 55-59 = 1.88AR: 60-64 = 1.46  |
| McKay, et al., 2017  | Isometric | N | Males: AR: 20-59 = 202.4±55.9  AR: 60+ = 159.7±42.9Females: AR: 20-59 = 109.7±33.6 AR: 60+ = 86±27.5  | AR: 20-59 = 1.66AR: 60+ = 1.72 |
| Huberman, et al., 2020  | Isometric | Ibs | Males: 30.63±10.78Females: 32.18±10.81 | 0.14 |
| Westrick, et al., 2013  | Isometric | N/kg | Males: 0.27±0.06Females: 0.21±0.05 | 0.83  |
| Hughes, et al., 1999  | Isometric | Nm | Males:Internal Rotation (0°) Abduction (15°):  AR: 20-29 = 51±19 AR: 30-39 = 48±10 AR: 40-49 = 48±6 AR: 50-59 = 43±9 AR: 60+ = 40±7Internal Rotation (0°) Abduction (15°):  AR: 20-29 = 53±19 AR: 30-39 = 49±9 AR: 40-49 = 51±9 AR: 50-59 = 41±7 AR: 60+ = 42±7External Rotation (30°) Abduction (90°):  AR: 20-29 = 48±12 AR: 30-39 = 44±7 AR: 40-49 = 41±12 AR: 50-59 = 37±7 AR: 60+ = 35±5External Rotation (60°) Abduction (90°):  AR: 20-29 = 48±12 AR: 30-39 = 44±7 AR: 40-49 = 41±12 AR: 50-59 = 37±7 AR: 60+ = 35±5Females:Internal Rotation (0°) Abduction (15°):  AR: 20-29 = 28±10 AR: 30-39 = 31±8 AR: 40-49 = 27±6 AR: 50-59 = 20±4 AR: 60+ = 16±5Internal Rotation (0°) Abduction (15°):  AR: 20-29 = 28±10 AR: 30-39 = 33±10 AR: 40-49 = 27±8 AR: 50-59 = 20±5 AR: 60+ = 16±6External Rotation (30°) Abduction (90°):  AR: 20-29 = 27±11 AR: 30-39 = 28±8 AR: 40-49 = 22±7 AR: 50-59 = 17±6 AR: 60+ = 13±5External Rotation (60°) Abduction (90°):  AR: 20-29 = 24±11 AR: 30-39 = 25±8 AR: 40-49 = 18±7 AR: 50-59 = 15±5 AR: 60+ = 12±5 | Internal Rotation (0°) Abduction (15°):  AR: 20-29 = 1.21 AR: 30-39 = 1.7 AR: 40-49 = 3.5 AR: 50-59 = 2.56 AR: 60+ = 3.43Internal Rotation (0°) Abduction (15°):  AR: 20-29 = 1.32 AR: 30-39 = 1.78 AR: 40-49 = 2.67 AR: 50-59 = 3 AR: 60+ = 3.71External Rotation (30°) Abduction (90°):  AR: 20-29 = 1.75 AR: 30-39 = 2.29 AR: 40-49 = 1.58 AR: 50-59 = 2.86 AR: 60+ = 4.4External Rotation (60°) Abduction (90°):  AR: 20-29 = 2 AR: 30-39 = 2.71 AR: 40-49 = 1.92 AR: 50-59 = 3.14 AR: 60+ = 4.6  |
| Magnusson, et al., 1995  | Isometric | Nm/kg | Males: Left = 0.59±0.05 Right = 0.55±0.04Females: Left = 0.36±0.04 Right = 0.39±0.03 | Left = 4.6 Right = 4  |
| Stausholm, et al., 2021  | Isometric | Nm/kg | Males: 1.57±0.30Females: 1.31±0.31 | 0.87 |
| Pontillo and Sennet, 2020  | Isometric | kg | Males: 12±3.8Females: 8.7±2.6 | 0.87 |
| Andrews, et al., 1996  | Isometric | N | Males: AR: 50-59 = 193.3±40.2 AR: 60-69 = 163.3±28.9Females: AR: 50-59 = 100.7±19.9 AR: 60-69 = 92.3±18.7 | AR: 50-59 = 2.30AR: 60-69 = 2.57  |
| Alizadehkhaiyat, et al., 2014  | Isometric | N | Males: 157.6±40.1Females: 95.1±18.3 | 1.56 |
| Cools, et al., 2016  | Isometric | N | Males: 90-0° = 165.4±29.6 90-90° = 183.3±45.8Females: 90-0° = 112.5±20.4 90-90° = 114.0±31.3 | 90-0° = 1.79 90-90° = 1.51  |
| Kramer and Ng, 1995 | Isometric | Nm | Males: Isokinetic Dynamometer = 58±19 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°/s180°/s | Percent Body Mass | Males: 60°/s = 81.4±8.6 180°/s = 161.5±12.5Females: 60°/s = 67.5±4.7 180°/s = 124.3±12.1 | 60°/s = 1.62180°/s = 2.98 |
| Cahalan, et al., 1989 | Isokinetic:60°/s180°/s300°/s | N, Nm | Males: N = 57±17 60 °/s = 44.5±13.5 180 °/s = 38.5±12.5 300 °/s = 33±12Females: N = 26.5±4.5 60 °/s = 21±4 180 °/s = 16.5±4 300 °/s = 13±4 | N = 1.7960 °/s = 1.74180 °/s = 1.76300 °/s = 1.67 |
| Shklar and Dvir, 1995 | Isokinetic:60°/s120°/s180°/s | Nm | Males: Con.60° = 42.6±13.4 Con.120° = 38.2±11.9 Con.180° = 37.1±11.4 Ecc.60° = 47.4±14.8 Ecc.120° = 46.5±15.1 Ecc.180° = 45.2±15.9Females: Con.60° = 22.6±3.4 Con.120° = 21.2±2.6 Con.180° = 20.1±3.2 Ecc.60° = 27.4±6.2 Ecc.120° = 26.1±6.4 Ecc.180° = 26.3±6.6 | Con.60° = 1.49Con.120° = 1.43Con.180° = 1.49Ecc.60° = 1.35Ecc.120° = 1.35Ecc.180° = 1.19 |
| McMaster, et al., 1992 | Isokinetic:30°/s180°/s | Foot-pounds | Males: Con.30°.L = 36.8±10.4 Con.30°.R = 39.3±9.6 Con.180°.L = 41.8±9.4 Con.180°.R = 37.6±12.1Females: Con.30°.L = 26.7±4.4 Con.30°.R = 27.2±3.7 Con.180°.L = 27.6±4.4 Con.180°.R = 27.9±3.8 | Con.30°.L = 0.97Con.30°.R = 1.26 Con.180°.L = 1.51Con.180°.R = 1.63 |
| Ivey, et al., 1985  | Isokinetic: 60°/s | Foot-Pounds | Males: Slow = 36.4±12.2 Fast = 32.7±11.0Females: Slow = 19.6±2.9 Fast = 17.1±3.0 | Slow = 1.38 Fast = 1.42 |
| Reid, et al., 1989  | Isokinetic:60°/s | Nm | Males: Lying = 40±16 Standing = 42±19Females: Lying = 19±5 Standing = 23±5 | Lying = 1.31Standing = 1 |
| Motta, et al., 2019  | Isokinetic:60°/s 240°/s  | Nm/kg | Males: Con.60° = 160.30±23.55 Con.240° = 107.20±19.00 Ecc.240° = 232.50±34.65Females: Con.60° = 128.55±19.90 Con.240° = 86.12±16.45 Ecc.240° = 196.10±34.60 | Con.60° = 1.35Con.240° = 1.11Ecc.240° = 1.05 |
| Maddux, et al., 1989  | Isokinetic:60°/s 180°/s  | Foot-Pounds | Males: 60°/s = 32±10 180°/s = 30±8Females: 60°/s = 17±4 180°/s = 13±4 | 60°/s = 1.5180°/s = 2.13 |
| Hartsell, 1998  | Isokinetic60°/s 120°/s 180°/s  | Nm | Males:Con.Sit:  60°/s = 86.35±23.09 120°/s = 83.82±23.50 78.11±23.12 (180 °/s)Con.Stand:  60 °/s = 81.98±20.4 120°/s = 76.30±25.47  180 °/s = 70.24±23.12 Ecc.Sit:  60 °/s = -94.22±26.28 120°/s =-93.55±30.53  180 °/s = -92.37±31.53 Ecc.Stand: 60 °/s = -90.54±22.97 120°/s =-85.84±26.15 180 °/s = -84.66±24.38 Females:Con.Sit:  60 °/s = 45.91±6.62 120°/s = 41.22±6.67 180 °/s = 37.73±7.48 Con.Stand:  60 °/s = 47.11±10.56 120°/s = 42.42±7.82  180 °/s = 39.06±8.07 Ecc.Sit:  60 °/s = 52.81±7.87 120°/s = -51.30±8.90 180 °/s = -50.97±8.58Ecc. Stand: 60 °/s = -52.65±13.38 120°/s = -51.97±10.96 180 °/s = -56.17±3.08 | Con.Sit:  60°/s = 1.75 120°/s =1.81 180 °/s = 1.75Con.Stand:  60°/s = 1.71 120°/s = 1.33 180 °/s = 1.35 Ecc.Sit: 60°/s = 1.58 120°/s = 1.38 180 °/s = 1.31 Ecc. Stand:  60 °/s = 1.65  120°/s = 1.29 180 °/s = 1.17 |
| VanMeeteren, et al., 2002  | Isokinetic: 60 °/s120°/s180°/s  | Nm | Males: 49.25±13.25Females: 25.5±6.95 | 1.79 |
| Hill, et al., 2005  | Isokinetic: 60°/s 90°/s 120°/s  | Nm | Males:Sitting (60°/s):  Left = 44.1±14.5 Right = 47.6±14.1Sitting (90°/s):  Left = 41.7±13.4 Right = 46±12Sitting (120°/s): Left = 43±12.1 Right = 44.7±12.5Lying (60°/s):  Left = 43.8±13.7 Right = 47.5±14.2Lying (90°/s):  Left = 38.6±10 Right = 41.5±12.3Lying (120°/s):  Left = 37.4±7.9 Right = 38.4±10.6Females:Sitting (60 °/s):  Left = 27.3±4.5 Right = 26.7±3.4Sitting (90 °/s):  Left = 26±5.2 Right = 26.7±3.9Sitting (120 °/s):  Left = 24±3.7 Right = 25.3±4.9Lying (60 °/s):  Left = 27±2.8 Right = 26.7±4.0Lying (90 °/s):  Left = 24.3±3.3 Right = 24.8±3.1Lying (120 °/s):  Left = 23.3±2.9 Right = 23.3±2.7 | Sitting (60 °/s):  Left = 1.16 Right = 1.48Sitting (90 °/s):  Left = 1.17 Right = 1.61Sitting (120 °/s):  Left = 1.57 Right = 1.55Lying (60 °/s):  Left = 1.23 Right = 1.46Lying (90 °/s):  Left = 1.43 Right = 1.36Lying (120 °/s):  Left = 1.78 Right = 1.42  |
| VanCingel, et al., 2007  | Isokinetic:60°/s 120°/s  | Nm/kg | Males: Con.60°/s = 0.69±0.11 Con.120°/s = 0.63±0.11Females: Con.60°/s = 0.45±0.09 Con.120°/s = 0.42±0.09 | Con.60°/s = 2.18Con.120°/s = 1.91 |
| Murgia, et al., 2018  | Isokinetic:60°/s90°/s  | Nm | Males: Young 60°/s = 0.65±0.20 Young 90°/s = 0.65±0.24 Old 60°/s = 0.55±0.12 Old 90°/s = 0.56±0.11Females: Young 60°/s = 0.35±0.06 Young 90°/s = 0.36±0.05 Old 60°/s = 0.33±0.12 Old 90°/s = 0.35±0.12 | Young 60°/s = 1.5Young 90°/s = 1.21Old 60°/s = 1.83Old 90°/s = 1.91  |
| Barrenetxea-Garcia, et al., 2019  | Isokinetic:60°/s 240°/s  | Nm | Males: 60°/s = 50.41±9.82 240°/s = 42.88±7.43 Females: 60°/s = 30.50±6.62  240°/s = 24.10±5.26 | 60°/s = 2.03 240°/s = 2.53 |
| Ellenbecker and Roetert, 2003  | Isokinetic 210°/s 300°/s  | Nm/kg | Males: 210°/s = 55.1±14.6 300°/s = 46.5±13.2 Females: 210°/s = 33.2±8.6  300°/s = 28.8±9/4  | 210°/s = 1.5300°/s = 1.34  |
| Mayer, et al., 1994 | Isometric; Isokinetic:300°/s240°/s180°/s60°/s-60°/s -120°/s -180°/s-240°/s | Nm | Males: ISO = 43±12 IKO.Con.300° = 34±8 IKO.Con.240° = 35±8 IKO.Con.180° = 37±8 IKO.Con.60° = 42±8 IKO.Ecc.60° = 46±13 IKO.Ecc.120° = 41±10 IKO.Ecc.180° = 42±6 IKO.Ecc.240° = 43±8Females: ISO = 21±7 IKO.Con.300° = 19±3 IKO.Con.240° = 18±5 IKO.Con.180° = 20±4 IKO.Con.60° = 23±5 IKO.Ecc.60° = 25±7 IKO.Ecc.120° = 23±6 IKO.Ecc.180° = 27±4 IKO.Ecc.240° = 24±3 | ISO = 1.83IKO.Con.300° = 1.88IKO.Con.240° = 2.12IKO.Con.180° = 2.12IKO.Con.60° = 2.38IKO.Ecc.60° = 1.62 IKO.Ecc.120° = 1.8 IKO.Ecc.180° = 2.5 IKO.Ecc.240° = 2.38 |
| Smith, et al., 2001  | Isometric; Isokinetic:90 °/s  | Nm | Males: ISO = 52.8±9.9 IKO = 47.5±7.3Females: ISO = 25.9±5.5 IKO = 25.4±3.8 | ISO = 2.71IKO = 3.03  |
| Hageman, et al., 1989  | Isokinetic:60°/s180°/s  | Nm | Males: Con.Flexion.60°/s = 48±10.9 Con.Abduction.60°/s = 48.6±10.8 Ecc.Flexion.60°/s = 51.3±11.1 Ecc.Abduction.60°/s = 54.9±13.8 Con.Flexion.180°/s = 42.5±9.3 Con.Abduction.180°/s = 42.3±8.3 Ecc.Flexion.180°/s = 49.1±10.6 Ecc.Abduction.180°/s = 54.1±12.9Females: Con.Flexion.60°/s = 22.1±5.2 Con.Abduction.60°/s = 23.7±5.1 Ecc.Flexion.60°/s = 24.9±6.7 Ecc.Abduction.60°/s = 29.2±7.4 Con.Flexion.180°/s = 21.9±7.4 Con.Abduction.180°/s = 22.2±5.6 Ecc.Flexion.180°/s = 28.2±10.2 Ecc.Abduction.180°/s = 28.6±8 | Con.Flexion.60°/s = 2.38Con.Abduction.60°/s = 2.31Ecc.Flexion.60°/s = 2.38Ecc.Abduction.60°/s = 1.86Con.Flexion.180°/s = 2.22Con.Abduction.180°/s = 2.42Ecc.Flexion.180°/s = 1.97Ecc.Abduction.180°/s = 1.98  |
| Aydin, et al., 2000  | Isometric; Isokinetic: 90°/s  | Nm, W | Males:Concentric: Nm = 49.3±12.3  W = 46.8±12.0Isometric Preload:  Nm = 56.0±12.2  W = 46.8±12.0Eccentric:  Nm = 59.5±12.5  W = 63.9±14.2 Females:Concentric: Nm = 21.7±3.5 W = 19.0±4.4Isometric Preload:  Nm = 24.6±3.0 W = 21.4±4.6Eccentric:  Nm = 28.5±3.1  W = 25.7±4.8 | Concentric:  Nm = 2.24 W = 2.32Isometric: Nm = 2.57  W = 2.17 Eccentric:  Nm = 2.48 W = 2.69 |
| Kramer and Ng, 1996 | Isometric; Isokinetic: 0°/s 60°/s 120°/s  | Nm | Males: ISO = 58±19 IKO.Con.60°/s = 44±14 IKO.Con.120°/s = 43±15 IKO.Ecc.60°/s = 54±20 IKO.Ecc.120°/s = 57±17Females: ISO = 27±7 IKO.Con.60°/s = 23±5 IKO.Con.120°/s = 20±6 IKO.Ecc.60°/s = 27±6 IKO.Ecc.120°/s = 27±6 | ISO = 1.63IKO.Con.60°/s = 1.5IKO.Con.120°/s = 1.53IKO.Ecc.60°/s = 1.35IKO.Ecc.120°/s = 1.76 |