**Kinetic asymmetries and Wingate wheelchair sprinting performance differ between elite and sub-elite Wheelchair rugby players.**

**Briley, S1,2, O’Brien, T2, Murphy, C2, Goosey-Tolfrey, V.L2**

1Human Sciences Research Centre, University of Derby, Derby, United Kingdom

2Peter Harrison Centre for Disability Sport, School of Sport, Exercise and Health Sciences, Loughborough University, Loughborough, United Kingdom

s.briley@derby.ac.uk; @simon\_briley

Wheelchair rugby (WCR) is a popular Paralympic sport primarily played at low average speeds; however, high-speed activities are fundamental aspects of play. Successful / higher-ranked teams perform a greater number of high-speed activities and attain higher peak speeds during competition (Rhodes [2015]. Journal of Sports Sciences, *33*, 2070-2078). Yet, the underlying biomechanical parameters of WCR sprinting that distinguish elite players from sub-elite within the same sports classification are not well understood. Therefore, the purpose of this study was to examine the spatio-temporal, kinetic, and kinetic asymmetries of sprint performance during a 30 s Wingate test on a wheelchair ergometer in sub-elite and elite wheelchair rugby players.  Twenty WCR players (age 27 ± 7 years; body mass 65 ± 13 kg) provided written informed consent and participated in the study which had institutional ethics approval. All participants were from the same WCR nation. Ten players represented the elite squad and ten the development squad (Sub-elite). Participants were further categorised according to their World Wheelchair Rugby (WWR) classification, with low-point (LP) most impaired players (≤1.5, elite = 6, sub-elite = 4), and high-point (HP) least impaired players (≥2.0, elite = 4 and sub-elite = 5). All Wingate trials were conducted in participants' own WCR wheelchairs on a dual roller ergometer. Overall, HP players travelled ~30 m further, achieved higher peak speeds, and greater peak forces and peak power over the first three pushes than LP players (*P* <0.001, ES ≥1.83). Elite players covered ~1 m further after the first three pushes (*P* <0.001, ES = 2.24) and attained higher peak speeds (3.5 ± 0.7 m.s-1 vs 3.2 ± 0.5 m.s-1, *P* = 0.014, ES = 0.51) compared to sub-elite players. Elite players displayed lower peak power asymmetry (symmetry index) than sub-elite players over the first three pushes (11.7 ± 5.9 % vs 22.4 ± 12.5 %, *P* = 0.033, ES = 1.09) and overall (13.6 ± 6.9 % vs 35.2 ± 28.3 %, *P* = 0.047, ES = 1.05). HP players at both elite and sub-elite level generated greater peak forces, power and propulsion velocity during sprinting than LP players. However, greater peak speeds and distances attained by elite WCR players coincided with lower asymmetries in peak power compared to sub-elite players irrespective of classification. Therefore, coaches and athletes working with developing WCR players could consider quantifying kinetic asymmetries during sprinting and where appropriate prioritise reducing this variable rather than only developing peak power, speed expression.