Table 1: Distance, mean±SD (max), between landmarks located at the humeral epicondyles, EM and EL, and their respective target positions from motion capture data.

[cm]	EAT	WASH	COMB
EM	1.2 ±0.2 (1.8)	0.7 ±0.2 (1.4)	3.4 ±1.5 (5.1)
EL	1.1 ±0.3 (1.8)	0.7 ±0.3 (1.7)	1.9 ±0.4 (3.0)

Table 2: Distance, mean±SD (max), between the simulated intact motion and the simulated clinical conditions of the humerus landmarks EM and EL.

[cm]	EAT	WASH	COMB
EM			
−SSC	0.6 ±0.3 (1.4)	0.2 ±0.1 (0.5)	1.2 ±0.7 (2.0)
+PMAC	0.5 ±0.3 (1.4)	0.2 ±0.1 (0.9)	0.7 ±0.4 (1.6)
+PMAS	0.4 ±0.3 (1.1)	0.2 ±0.1 (0.6)	0.9 ±0.4 (1.4)
+PMASC	0.4 ±0.2 (1.0)	0.3 ±0.2 (1.1)	0.8 ±0.3 (1.5)
EL			
−SSC	0.6 ±0.4 (1.6)	0.1 ±0.1 (0.3)	0.9 ±0.6 (1.9)
+PMAC	0.5 ±0.4 (1.7)	0.2 ±0.1 (1.0)	0.9 ±0.5 (1.8)
+PMAS	0.4 ±0.2 (1.1)	0.2 ±0.1 (0.6)	0.8 ±0.4 (1.5)
+PMASC	0.4 ±0.2 (1.2)	0.3 ±0.2 (1.1)	0.9 ±0.3 (1.7)

Table 3: For the intact scenario, Spearman correlation coefficients x_{corr} between simulated activations and the processed EMG signals from the reference dataset. Cells are color coded from -1 in red to 1 in green. Muscle abbreviations are listed in the manuscript in Table 1.

	DAN	DMI	DPO	PMAC	PMAS	ISP
EAT	0.47	0.41	-0.06	0.64	-0.03	0.81
WASH	0.78	-0.30	0.23	0.83	0.25	0.36
COMB	0.83	0.57	0.59	0.26	-0.12	0.86

Table 4: Stability of the glenohumeral joint, indicated as the angle [°], mean±SD (max), between the JRF and the pure compression direction.

[°]	EAT	WASH	COMB
intact	13±4(19)	17±3(24)	13± 9(32)
−SSC	30±5(39)	23±5(37)	14±12(36)
+PMAC	28±6(39)	22±6(36)	13±12(35)
+PMAS	24±7(39)	22±6(36)	14±10(36)
+PMASC	25±7(39)	22±7(37)	11±11(35)

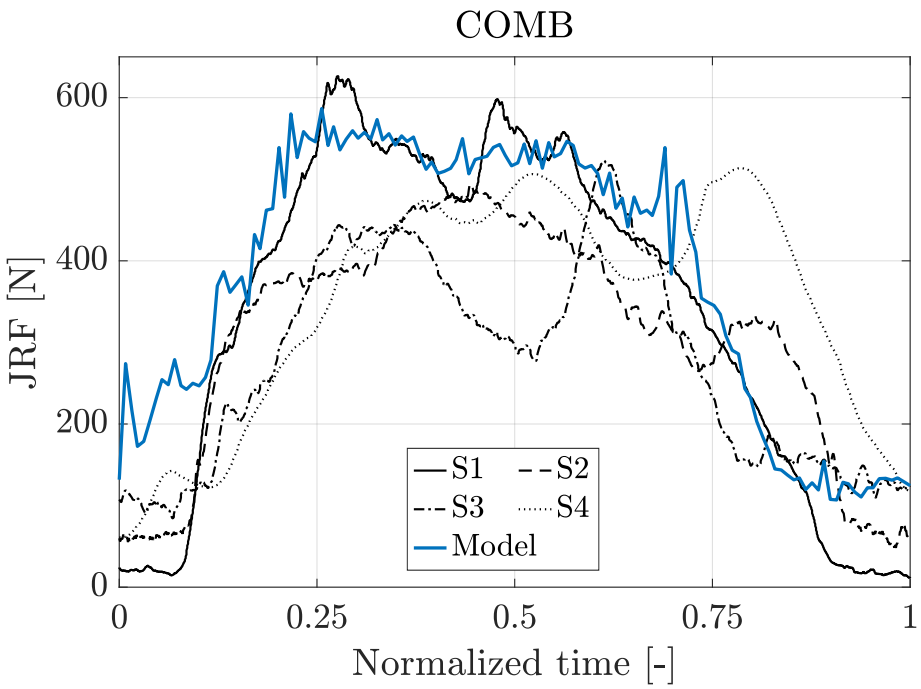

Figure 1: Joint Reaction Force magnitude for the combing motion. In-vivo measurements are shown in black and current Modelling results in blue. All curves are time-normalized to the range [0,1].