

Appendix 1 – Push and pull strength

1a - Anthropometric characteristics of subjects

Age (years)	Sex	No.	Stature		Weight		Elbow height		Hand length		Hand Breadth	
			Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
2-5	m	7	1062.86	98.27	18.54	3.10	844.29	84.82	106.29	10.27	52.71	1.89
	f	8	1008.75	44.54	15.50	1.96	806.25	42.74	114.00	8.40	51.63	4.21
6-10	m	4	1297.50	118.71	27.60	7.09	1067.50	103.08	137.50	15.67	61.25	6.03
	f	9	1356.67	95.00	30.71	8.98	1104.44	82.02	142.78	12.67	63.67	5.34
11-15	m	7	1653.57	55.43	50.83	6.20	1383.57	52.58	171.57	10.01	75.86	6.74
	f	6	1590.00	102.57	50.37	11.29	1321.67	85.19	164.50	9.33	69.00	4.52
16-20	m	14	1762.86	67.30	63.80	10.84	1460.00	59.36	181.43	5.61	81.57	5.29
	f	5	1680.00	60.83	60.00	16.09	1416.00	86.20	168.00	7.18	72.20	6.83
21-30	m	6	1876.67	76.33	79.02	13.63	1540.00	44.72	187.83	6.68	82.33	5.13
	f	8	1617.50	157.91	66.21	12.34	1350.00	127.28	170.00	5.66	70.38	4.34
31-50	m	9	1746.67	201.00	81.20	11.29	1501.11	76.72	188.89	8.55	85.22	2.73
	f	9	1662.22	83.33	74.29	27.42	1385.56	69.84	165.89	15.78	75.22	4.76
51-60	m	4	1802.50	34.03	243.70	311.39	1492.50	5.00	195.50	6.35	85.00	3.56
	f	5	1656.00	48.27	66.12	8.48	1378.00	54.50	177.40	6.88	79.00	5.39
61-70	m	5	1798.00	55.41	80.36	8.44	1506.00	55.05	195.60	11.33	86.60	3.13
	f	14	1623.57	51.38	61.71	10.66	1347.14	54.13	173.64	9.56	76.50	4.01
71-80	m	9	1748.89	42.85	81.00	7.20	1452.22	48.93	190.11	6.97	86.67	2.87
	f	13	1613.08	64.82	68.57	9.99	1348.85	54.70	176.00	9.05	77.38	4.27
81-90	m	2	1800.00	28.28	71.20	7.92	1505.00	21.21	182.00	2.83	83.50	0.71
	f	7	1595.71	78.07	59.77	10.63	1330.00	86.22	170.86	12.93	78.00	3.37

1b – Differences between males and females (t-test)

Push

Age (years)	Sex	No.	Horizontal push 1 hand			Vertical push 1 hand			Horizontal push 2 hands			Vertical push 2 hands		
			t	df	Sig	t	df	Sig	t	df	Sig	t	df	Sig
2-5	m	7	-0.188	10.513	0.854	0.006	9.958	0.995	-0.503	9.767	0.626	-0.383	8.269	0.711
	f	8												
6-10	m	4	0.140	11.000	0.891	-0.273	11.000	0.790	1.193	3.058	0.317	-0.136	11.000	0.894
	f	9												
11-15	m	6	-1.206	10.000	0.256	-2.251	10.000	0.048*	-1.765	10.000	0.108	-2.063	10.000	0.066
	f	6												
16-20	m	14	-0.911	17.000	0.375	-1.161	17.000	0.262	-0.937	17.000	0.362	-1.372	17.000	0.188
	f	5												
21-30	m	6	-0.026	12.000	0.979	-0.082	12.000	0.936	0.159	12.000	0.877	0.398	12.000	0.698
	f	8												
31-50	m	9	2.067	16.000	0.055	1.955	16.000	0.068	2.313	16.000	0.034*	2.123	16.000	0.050
	f	9												
51-60	m	4	1.610	7.000	0.151	-0.797	7.000	0.452	2.271	7.000	0.057	-0.547	5.148	0.607
	f	5												
61-70	m	5	1.846	17.000	0.082	1.672	17.000	0.113	1.521	4.296	0.198	2.175	17.000	0.044*
	f	14												
71-80	m	8	0.568	19.000	0.577	1.301	19.000	0.209	0.654	19.000	0.521	1.115	19.000	0.279
	f	13												
81 to 90	m	2	-0.490	7.000	0.639	-0.296	7.000	0.776	-0.051	7.000	0.961	-0.236	7.000	0.820

Pull

Age (years)	Sex	No.	Horizontal push 1 hand			Vertical push 1 hand			Horizontal push 2 hands			Vertical push 2 hands		
			t	df	Sig	t	df	Sig	t	df	Sig	t	df	Sig
2-5	m	7	-0.247	10.622	0.809	0.216	13.000	0.832	-0.565	8.735	0.586	-0.496	9.908	0.631
	f	8												
6-10	m	4	0.642	11.000	0.534	-0.035	11.000	0.972	0.755	11.000	0.466	-0.282	11.000	0.783
	f	9												
11-15	m	6	-1.279	10.000	0.230	-1.480	10.000	0.170	-0.843	10.000	0.419	-1.072	10.000	0.309
	f	6												
16-20	m	14	0.389	17.000	0.702	0.634	17.000	0.534	0.839	17.000	0.413	0.815	17.000	0.426
	f	5												
21-30	m	6	0.291	12.000	0.776	0.220	12.000	0.829	0.501	12.000	0.626	0.124	12.000	0.903
	f	8												
31-50	m	9	3.376	12.089	0.005*	2.951	16.000	0.009*	2.651	13.627	0.019*	3.077	16.000	0.007*
	f	9												
51-60	m	4	1.329	6.200	0.231	-0.307	5.313	0.770	0.525	7.000	0.616	-0.524	4.534	0.625
	f	5												
61-70	m	5	2.530	17.000	0.022*	2.301	17.000	0.034*	2.817	17.000	0.012*	2.655	17.000	0.017*
	f	14												
71-80	m	8	-0.805	20.000	0.430	-0.548	20.000	0.590	-1.164	20.000	0.258	-0.586	20.000	0.564
	f	13												
81 to 90	m	2	-0.500	7.000	0.633	-0.317	7.000	0.761	-0.393	7.000	0.706	-0.245	7.000	0.813
	f	7												

Key:

t = value from t-test

df = degrees of freedom

sig = level of statistical significance (*denotes significant difference at 0.05 level)

1c – Differences between age groups (t-test)

Age (years)	2-5	6-10	11-15	16-20	21-30	31-50	51-60	61-70	71-80	81-90
2-5		* not vpush 1 vpush2 hpush1 hpull1 hpush2 hpull2	X	X	X	* not vpull1 hpull2 vpull2	X	X	X	X
6-10			* not vpush1 vpush1 vpush2 hpush1 hpull1 hpull2	*	X	*	*	X	* not vpull1	X
11-15				X	X	* not vpull1 hpull2 vpull2	X	X	X	X
16-20					X	* not vpush 1 vpull1 vpull2 hpull1 hpush2 hpull2	X	X	X	X
21-30						* not vpull1 vpull2 hpull1 hpull2	X	X	X	X
31-50							X	* not hpull2	* not vpull1 vpull2 vpush2 hpull1 hpush2 hpull2	* not vpull1 vpush2 hpull1 hpush2 hpull2
51-60								X	X	X
61-70									X	X
71-80										X

Key:

* = significant difference at 0.05 level

X = no significant difference between age groups

vpush1 = Vertical push on a cylindrical bar with one hand

vpush2 = Vertical push on a cylindrical bar with two hands

vpull1 = Vertical pull on a cylindrical bar with one hand

vpull2 = Vertical pull on a cylindrical bar with two hands

hpush1 = Horizontal push on a cylindrical bar with one hand

hpush2 = Horizontal push on a cylindrical bar with two hands

hpull1 = Horizontal pull on a cylindrical bar with one hand

hpull2 = Horizontal pull on a cylindrical bar with two hands

1d – Differences between orientation of handle and number of hands used (Paired samples test)

Action	t	df	Sig
hpush1 - hpush2	-4.856	149	0.000*
hpush1 - vpush2	-8.119	149	0.000*
hpush1 - hpull2	6.953	149	0.000*
hpush1 - vpull1	6.430	149	0.000*
hpush1 - hpull2	6.264	149	0.000*
hpush2 - vpull2	4.503	149	0.000*
vpush1 - hpush2	-4.858	149	0.000*
vpush1 - vpush2	-11.868	149	0.000*
vpush1 - hpull1	6.550	149	0.000*
vpush1 - vpull1	6.626	149	0.000*
vpush1 - vpull2	5.890	149	0.000*
vpush1 - vpull2	4.506	149	0.000*
hpush2 - vpush2	-3.169	149	0.002*
hpush2 - hpull1	8.683	149	0.000*
hpush2 - vpull1	8.412	149	0.000*
hpush2 - hpull2	8.216	149	0.000*
hpush2 - vpull2	6.963	149	0.000*
vpush2 - hpull1	11.816	149	0.000*
vpush2 - vpull1	11.965	149	0.000*
vpush2 - hpull2	10.844	149	0.000*
vpush2 - vpull2	10.043	149	0.000*
hpull1 - vpull2	-2.652	150	0.009*
vpull1 - vpull2	-4.202	150	0.000*
hpull1 - vpull2	-3.311	150	0.001*

Key:

vpush1 = Vertical push on a cylindrical bar with one hand

vpush2 = Vertical push on a cylindrical bar with two hands

vpull1 = Vertical pull on a cylindrical bar with one hand

vpull2 = Vertical pull on a cylindrical bar with two hands

hpush1 = Horizontal push on a cylindrical bar with one hand

hpush2 = Horizontal push on a cylindrical bar with two hands

hpull1 = Horizontal pull on a cylindrical bar with one hand

hpull2 = Horizontal pull on a cylindrical bar with two hands

t = value from t-test

df = degrees of freedom

sig = level of statistical significance (*denotes significant difference at 0.05 level)

1e - Correlation between measurements (Pearson Correlation)

	Horizontal push one hand	Vertical push one hand	Horizontal push two hands	Vertical push two hands	Horizontal pull one hand	Vertical pull one hand	Horizontal pull two hands	Vertical pull two hands
Horizontal push one hand	1.00	0.93**	0.92**	0.91**	0.87**	0.82**	0.81**	0.80**
Vertical push one hand	0.93**	1.00	0.90**	0.96**	0.84**	0.84**	0.79**	0.81**
Horizontal push two hands	0.92**	0.90**	1.00	0.92**	0.84**	0.81**	0.80**	0.79**
Vertical push two hands	0.91**	0.96**	0.92**	1.00	0.87**	0.86**	0.81**	0.83**
Horizontal pull one hand	0.87**	0.84**	0.84**	0.87**	1.00	0.92**	0.93**	0.90**
Vertical pull one hand	0.82**	0.84**	0.81**	0.86**	0.92**	1.00	0.91**	0.96**
Horizontal pull two hands	0.81**	0.79**	0.80**	0.81**	0.93**	0.91**	1.00	0.93**
Vertical pull two hands	0.80**	0.81**	0.79**	0.83**	0.90**	0.96**	0.93**	1.00

* Correlation is significant at the 0.05 significant level

** Correlation is significant at the 0.01 significant level

Appendix 2 - Push with the thumb or 2 or more fingers

2a - Anthropometric characteristics of subjects

Age (years)	Sex	No.	Stature		Weight		Elbow height		Hand length		Hand Breadth	
			Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
2-5	m	9	1061.11	81.62	18.24	2.81	633.33	62.45	108.89	10.72	52.56	2.24
	f	8	1007.50	60.18	15.58	2.00	611.25	47.34	113.75	8.08	53.63	6.14
6-10	m	5	1340.00	116.62	29.37	6.16	865.00	74.77	141.00	13.67	62.50	4.37
	f	8	1353.75	93.34	30.55	9.58	850.00	70.31	142.75	13.54	62.88	5.74
11-15	m	7	1648.57	63.62	51.03	6.18	1052.86	39.46	171.14	11.58	76.00	6.68
	f	5	1618.00	104.26	52.32	11.43	1040.00	70.71	165.80	9.81	70.40	3.29
16-20	m	14	1766.43	68.57	65.04	11.73	1102.14	52.21	180.86	180.86	81.36	5.15
	f	5	1628.00	75.96	59.28	16.45	1040.00	52.44	168.40	7.02	72.60	6.88
21-30	m	7	1877.14	69.69	77.67	12.94	1166.67	33.27	187.14	6.36	82.43	4.69
	f	9	1682.22	44.94	65.52	11.73	1060.00	43.87	170.78	5.78	71.22	4.79
31-50	m	7	1798.57	91.91	81.29	11.29	1150.00	57.45	188.00	8.14	85.43	2.99
	f	8	1655.00	95.34	76.88	28.33	1058.57	53.18	170.13	13.90	75.88	1.52
51-60	m	4	1802.50	20.62	83.95	20.07	1137.50	29.86	195.50	6.35	85.00	3.56
	f	5	1672.00	35.64	64.92	8.50	1050.00	33.91	178.20	3.83	75.80	2.28
61-70	m	4	1780.00	38.30	76.50	4.46	1125.00	20.82	193.75	12.09	88.50	2.65
	f	15	1632.67	87.22	63.84	13.27	1032.00	64.94	176.00	11.70	77.20	4.81
71-80	m	9	1745.56	51.99	81.11	7.50	1102.22	36.67	189.11	7.20	86.56	3.71
	f	14	1615.71	66.76	68.29	9.66	1031.43	52.46	175.93	8.70	76.86	4.55
81-90	m	2	1810.00	14.14	71.20	7.92	1140.00	0.00	182.00	2.83	83.50	0.71
	f	8	1640.00	105.02	59.77	10.63	1012.50	54.97	171.00	11.98	76.88	3.91

2b - Differences between males and females (t-test)

Age (years)	Sex	No.	Push with fingers forward			Push with fingers down			Push with thumb		
			t	df	Sig	t	df	Sig	t	df	Sig
2-5	m	9	1.162	15.000	0.264	1.678	14.000	0.115	0.513	14.000	0.616
	f	8									
6-10	m	5	-0.765	11.000	0.460	-0.903	11.000	0.386	-0.828	11.000	0.425
	f	8									
11-15	m	7	2.170	10.000	0.055	0.997	10.000	0.342	1.282	10.000	0.229
	f	5									
16-20	m	14	2.910	17.000	0.010*	2.811	17.000	0.012*	2.347	17.000	0.031*
	f	5									
21-30	m	7	2.462	14.000	0.027*	4.168	14.000	0.001*	2.517	14.000	0.025*
	f	9									
31-50	m	7	3.230	13.000	0.007*	3.529	13.000	0.004*	3.332	13.000	0.005*
	f	8									
51-60	m	4	3.689	7.000	0.008*	2.704	7.000	0.030*	3.144	7.000	0.016*
	f	5									
61-70	m	4	1.640	17.000	0.119	1.544	17.000	0.141	1.135	17.000	0.272
	f	15									
71-80	m	9	4.235	21.000	0.000*	3.628	21.000	0.002*	3.598	21.000	0.002*
	f	14									
81 to 90	m	2	1.369	1.044	0.395	2.926	8.000	0.019*	1.599	1.016	0.353
	f	8									

Key:

t = value from t-test

df = degrees of freedom

sig = level of statistical significance (*denotes significant difference at 0.05 level)

2c – Differences between age groups (t-test)

Age (years)	2-5	6-10	11-15	16-20	21-30	31-50	51-60	61-70	71-80	81-90
2-5		*	*	*	*	*	*	*	*	*
6-10			*	*	*	*	*	*	*	X
11-15				*	*	*	*	X	X	*
16-20					X	X	X	* not fingf	*	*
21-30						* not fingf thumd	X	*	*	*
31-50							X	*	*	*
51-60								* not fingf thumd	*	*
61-70									X	* not thumd
71-80										* not fingf thumd

Key:

* = significant difference at 0.05 level

X = no significant difference between age groups

fingf = Pushing forward with fingers

fingd = Pushing down with fingers

thumd = Pushing down with thumb

2d – Differences between age groups (t-test)

Action	t	df	Sig
fingf – thumd	-4.764	151.000	0.000*
fingd – thumd	-5.416	151.000	0.000*

Key:

fingf = Pushing forward with fingers

fingd = Pushing down with fingers

thumd = Pushing down with thumb

t = value from t-test

df = degrees of freedom

sig = level of statistical significance (*denotes significant difference at 0.05 level)

2e - Correlation between measurements (Pearson Correlation)

Action	Push with fingers downwards	Push with fingers downward	Push with thumb down
Push with fingers forwards	1.00	0.96	0.89 **
Push with fingers down	0.96**	1.00	0.89 **
Push with thumb down	0.89**	0.89**	1.00

* Correlation is significant at the 0.05 significant level

** Correlation is significant at the 0.01 significant level

Appendix 3 – Push with the shoulder

3a - Anthropometric characteristics of subjects

Age (years)	Sex	No.	Stature		Weight		Shoulder height	
			Mean	SD	Mean	SD	Mean	SD
2-5	m	8	1062.50	87.14	18.53	2.87	853.75	86.84
	f	9	1012.22	58.05	15.62	1.87	805.00	57.76
6-10	m	5	1335.00	109.22	28.48	6.45	1084.00	89.05
	f	8	1353.75	93.34	28.48	6.45	1084.00	89.05
11-15	m	7	1648.57	63.62	51.03	6.18	1387.14	44.61
	f	5	1618.00	104.26	52.32	11.43	1340.00	82.76
16-20	m	14	1766.43	68.57	65.04	11.73	1457.14	71.30
	f	5	1628.00	75.96	59.28	16.45	1342.00	46.58
21-30	m	7	1877.14	69.69	77.67	12.94	1537.14	41.52
	f	9	1682.22	44.94	65.52	11.73	1398.89	53.49
31-50	m	7	1798.57	91.91	81.29	11.29	1481.43	78.19
	f	8	1655.00	91.03	76.88	28.33	1367.50	68.40
51-60	m	4	1802.50	20.07	83.95	20.07	1507.50	35.94
	f	5	1672.00	35.64	64.92	8.50	1384.00	43.93
61-70	m	15	1780.00	38.30	76.50	4.46	1482.50	42.72
	f	4	1632.67	87.22	63.84	13.27	1358.00	78.94
71-80	m	9	1745.56	51.99	81.11	7.50	1458.89	42.56
	f	14	1615.71	66.76	68.29	9.66	1340.00	54.63
81-90	m	2	1810.00	14.14	71.20	7.92	1495.00	21.21
	f	8	1602.50	71.66	59.77	10.63	1347.50	54.45

3b – Differences between males and females (t-test)

Push with shoulder at 100% of shoulder height

Age (years)	Sex	No.	t	df	Sig
2-5	m	8	0.592	15.000	0.563
	f	9			
6-10	m	5	1.632	11.000	0.131
	f	8			
11-15	m	7	5.860	10.000	0.000*
	f	5			
16-20	m	14	2.641	16.000	0.018*
	f	4			
21-30	m	7	5.730	7.719	0.001*
	f	9			
31-50	m	7	0.553	13.000	0.590
	f	8			
51-60	m	4	3.721	7.000	0.007*
	f	5			
61-70	m	4	2.278	17.000	0.036*
	f	15			
71-80	m	9	1.865	21.000	0.076
	f	14			
81 to 90	m	2	1.444	8.000	0.187
	f	8			

Push with shoulder at 90%

Age (years)	Sex	No.	t	df	Sig
2-5	m	8	0.377	11.485	0.713
	f	9			
6-10	m	5	-0.363	11.000	0.724
	f	8			
11-15	m	7	3.855	10.000	0.003*
	f	5			
16-20	m	7	5.442	4.722	0.003*
	f	5			
21-30	m	7	2.053	11.000	0.065
	f	6			
31-50	m	9	1.593	15.000	0.132
	f	8			
51-60	m	4	3.031	6.000	0.023*
	f	4			
61-70	m	5	1.601	17.000	0.128
	f	14			
71-80	m	9	2.026	20.000	0.056
	f	13			
81 to 90	m	2	1.986	5.000	0.104
	f	5			

Key:

t = value from t-test

df = degrees of freedom

sig = level of statistical significance (*denotes significant difference at 0.05 level)

3c – Differences between age groups (t-test)

Push with shoulder at 100% of shoulder height

Age (years)	2-5	6-10	11-15	16-20	21-30	31-50	51-60	61-70	71-80	81-90
2-5		*	*	*	*	*	*	*	*	*
6-10			*	*	*	*	X	X	X	X
11-15				X	*	X	X	X	*	*
16-20					X	X	*	*	*	*
21-30						X	*	*	*	*
31-50							X	X	X	*
51-60								X	X	*
61-70									X	*
71-80										X

Push with shoulder at 90% of shoulder height

Age (years)	2-5	6-10	11-15	16-20	21-30	31-50	51-60	61-70	71-80	81-90
2-5		*	*	*	*	*	*	*	*	*
6-10			*	*	*	*	*	*	X	X
11-15				X	*	*	X	X	*	*
16-20					X	X	X	*	*	*
21-30						X	*	*	*	*
31-50							X	*	*	*
51-60								X	*	*
61-70									X	*
71-80										X

Key:

* = significant difference at 0.05 level

X = no significant difference between age groups

3d – Differences between pushing at 100% and 90% of shoulder height (Paired samples test)

Action	t	df	Sig
Push 100% shoulder height – Push 90% shoulder height	10.316	139	0.000*

Key:

t = value from t-test

df = degrees of freedom

sig = level of statistical significance (*denotes significant difference at 0.05 level)

3e - Correlation between measurements (Pearson Correlation)

Action	Push at 100% shoulder height	Push at 90% shoulder height
Push at 100% shoulder height	1.00	0.48 **
Push at 90% shoulder height	0.48 **	1.00

* Correlation is significant at the 0.05 significant level

** Correlation is significant at the 0.01 significant level

Appendix 4 – Pull with different grips

4a - Anthropometric characteristics of subjects

Age (years)	Sex	No.	Stature		Weight		Elbow height		Hand length		Hand Breadth	
			Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
2-5	m	6	1101.67	56.36	19.53	2.55	660.00	51.77	112.17	2.04	53.50	1.97
	f	3	1060.00	26.46	17.00	0.69	646.67	37.86	116.33	5.13	52.67	5.51
6-10	m	5	1314.00	109.22	28.48	6.45	850.00	72.80	138.60	13.79	61.80	4.49
	f	8	1353.75	93.34	30.55	9.58	850.00	70.31	142.75	13.54	62.88	5.74
11-15	m	7	1648.57	63.62	51.03	6.18	1052.86	39.46	171.14	11.58	76.00	6.68
	f	5	1618.00	104.26	52.32	11.43	1040.00	70.71	165.80	9.81	70.40	3.29
16-20	m	14	1766.43	68.57	65.04	11.73	1102.14	52.21	180.86	5.05	81.36	5.15
	f	5	1628.00	75.96	59.28	16.45	1040.00	52.44	168.40	7.02	72.60	6.88
21-30	m	6	1878.33	76.27	76.75	13.92	1170.00	35.78	186.67	6.83	82.00	4.98
	f	9	1682.22	44.94	65.52	11.73	1060.00	43.87	170.78	5.78	71.22	4.79
31-50	m	7	1795.00	91.91	81.29	11.29	1150.00	57.45	188.00	8.14	85.43	2.99
	f	8	1655.00	91.03	76.88	28.33	1060.00	53.18	170.13	13.90	75.88	4.88
51-60	m	4	1802.50	20.62	83.95	20.07	1137.50	29.86	195.50	6.35	85.00	3.56
	f	4	1662.50	33.04	66.90	8.37	1045.00	36.97	177.50	4.04	76.25	2.36
61-70	m	4	1780.00	38.30	76.50	4.46	1125.00	20.82	193.75	12.09	88.50	2.65
	f	15	1632.67	87.22	63.84	13.27	1032.00	64.94	176.00	11.70	77.20	4.81
71-80	m	8	1747.50	55.23	81.10	8.02	1103.75	38.89	189.75	7.42	86.75	3.92
	f	14	1615.71	66.76	68.29	9.66	1031.43	52.46	175.93	8.70	76.86	4.55
81-90	m	2	1810.00	14.14	71.20	7.92	1140.00	0.00	182.00	2.83	83.50	0.71
	f	8	1640.00	105.02	59.77	10.63	1012.50	54.97	171.00	11.98	76.88	3.91

4b – Differences between males and females (t-test)

Age (years)	Sex	No.	Underhand handle - 1 hand			Underhand handle - 2 hands			Round handle - 1 hand			Round handle - 2 hands		
			t	df	Sig	t	df	Sig	t	df	Sig	t	df	Sig
2-5	m	6	0.006	7.000	0.995	0.014	7.000	0.989	0.021	7.000	0.984	0.420	7.000	0.687
	f	3												
6-10	m	5	-0.734	11.000	0.478	-3.961	8.410	0.004	-0.673	5.775	0.527	-1.304	11.000	0.219
	f	8												
11-15	m	7	0.869	10.000	0.405	-0.399	10.000	0.698	-1.534	10.000	0.156	-0.887	10.000	0.396
	f	5												
16-20	m	14	2.931	17.000	0.009*	1.340	16.334	0.199	0.547	17.000	0.592	0.928	17.000	0.366
	f	5												
21-30	m	6	1.907	13.000	0.079	-1.222	13.000	0.244	-1.955	13.000	0.072	-2.274	13.000	0.041*
	f	9												
31-50	m	7	2.788	8.382	0.023*	3.760	13.000	0.002	2.162	13.000	0.050	2.175	13.000	0.049*
	f	8												
51-60	m	4	2.634	6.000	0.039*	0.378	6.000	0.719	0.558	6.000	0.597	0.816	6.000	0.446
	f	4												
61-70	m	4	0.504	17.000	0.621	-0.972	17.000	0.345	-0.898	17.000	0.382	-1.046	17.000	0.310
	f	15												
71-80	m	8	3.534	20.000	0.002*	0.177	20.000	0.861	-0.001	20.000	0.999	0.123	20.000	0.903
	f	14												
81 to 90	m	2	0.717	1.040	0.600	1.604	8.000	0.147	0.861	8.000	0.414	0.731	1.274	0.576
	f	8												

Key:

t = value from t-test

df = degrees of freedom

sig = level of statistical significance (*denotes significant difference at 0.05 level)

4c – Differences between age groups (t-test)

Age (years)	2-5	6-10	11-15	16-20	21-30	31-50	51-60	61-70	71-80	81-90
2-5		* not u2 r1	* not u2 r1 r2	* not u2 r1 r2	* not u2 r1 r2	*	* not u2 r1 r2	* not u2	*	* not u2 r1
6-10			* not u2 r1 r2	* not u2 r1 r2	* not u2 r1 r2	* not r1	* not u2 r1 r2	* not u2	*	X
11-15				* not u2 r1 r2	* not u2 r1 r2	* not r1	X	* not u2 r1 r2	* not u1	* not u2 r1, r2
16-20					X	* not u1, r1 r2	X	* not u1 u2	* not u2	* not u2 r1, r2
21-30						X	X	X	* not u2 r1, r2	* not u2
31-50							* not u1	X	* not u2, r1 r1, r2	* not r1 not u2
51-60								* not u1, u2	*	* not u2, r1
61-70									* not u2, r1, r2	* not u2 r1, r2
71-80										X

Key:

* = significant difference at 0.05 level

X = no significant difference between age groups

u1 = Pulling underhand handle with one hand

u2 = Pulling underhand handle with two hands

r1 = Pulling round handle with one hand

r2 = Pulling round handle with two hands

4d – Differences between grip/handle used and number of hands used (Paired samples test)

Action	t	df	Sig
u1 – u2	-5.01	141.00	0.00*
u1 – r1	-10.35	141.00	0.00*
u1 – r2	-12.12	140.00	0.00*
u2 – r1	-14.23	141.00	0.00*
u2 – r2	-16.71	140.00	0.00*
r1 – r2	-10.11	140.00	0.00*

Key:

u1 = Pulling underhand handle with one hand

u2 = Pulling underhand handle with two hands

r1 = Pulling round handle with one hand

r2 = Pulling round handle with two hands

t = value from t-test

df = degrees of freedom

sig = level of statistical significance (*denotes significant difference at 0.05 level)

4e - Correlation between measurements (Pearson Correlation)

Action	Underhand grip 1 hand	Underhand grip 2 hands	Round handle 1 hand	Round handle 2 hands
Underhand grip 1 hand	1.00	0.28 **	0.18 *	0.23 **
Underhand grip 2 hands	0.28 **	1.00	0.90 **	0.91 **
Round handle 1 hand	0.18 *	0.90 **	1.00	0.96 **
Round handle 2 hands	0.23 **	0.91 **	0.96 **	1.00

* Correlation is significant at the 0.05 significant level

** Correlation is significant at the 0.01 significant level

Appendix 5 - Wrist-twisting and push-and-turn strength

5a - Anthropometric characteristics of subjects

Age (years)	Sex	No.	Stature		Weight		Elbow height		Hand length		Hand Breadth	
			Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
2-5	m	9	1060.00	88.88	18.53	2.87	638.89	70.61	108.22	9.69	54.22	4.09
	f	7	1002.86	44.61	15.17	1.87	15.17	29.92	112.86	8.38	50.57	3.21
6-10	m	5	1314.00	109.22	28.48	6.45	836.00	73.69	138.60	13.79	61.80	61.80
	f	8	1351.25	98.91	30.45	9.57	853.75	66.32	143.00	13.65	64.00	5.98
11-15	m	6	1651.67	60.47	48.20	7.64	1041.67	47.50	172.17	10.83	76.33	7.26
	f	6	1591.67	101.47	50.37	11.29	1053.33	52.03	164.50	9.33	69.00	4.52
16-20	m	7	1788.57	45.25	61.74	6.67	1117.14	34.98	183.71	8.73	82.14	5.70
	f	5	1642.00	29.50	54.40	5.61	1076.00	28.81	162.80	2.95	69.60	3.97
21-30	m	6	1876.67	76.33	79.02	13.63	1155.00	48.48	187.83	6.68	82.33	5.13
	f	7	1615.71	170.48	67.93	12.26	1077.14	40.30	170.00	6.11	70.43	4.69
31-50	m	8	1735.00	211.59	82.65	11.20	1137.50	43.01	188.38	9.05	84.75	2.71
	f	8	1657.50	87.95	76.43	28.70	1068.75	60.58	165.63	16.54	75.50	4.87
51-60	m	4	1802.50	34.03	83.95	20.07	1140.00	45.46	195.50	6.35	85.00	3.56
	f	4	1670.00	42.43	65.85	9.76	1060.00	35.59	175.00	4.97	76.75	2.22
61-70	m	4	1795.00	63.51	79.95	9.69	1135.00	59.72	193.50	11.90	85.75	2.87
	f	14	1624.29	51.25	61.71	10.66	1020.71	41.60	173.64	9.56	76.50	4.01
71-80	m	9	1748.89	42.85	81.00	7.20	1092.22	27.28	190.11	6.97	86.00	3.64
	f	12	1625.42	57.74	69.77	9.41	1047.50	41.15	176.17	9.43	77.67	4.33
81-90	m	5	1800.00	28.28	71.20	7.92	1115.00	21.21	182.00	2.83	83.50	0.71
	f	8	1598.75	72.79	59.77	10.63	1030.00	56.57	171.00	11.98	77.38	3.58

5b – Differences between males and females (t-test)

Circular Knob

Age (years)	Sex	No.	Circular knob horizontal			Circular knob vertical		
			t	df	Sig	t	df	Sig
2-5	m	9	0.388	14.000	0.704	-0.755	14.000	0.463
	f	7						
6-10	m	5	0.450	11.000	0.662	-0.264	11.000	0.797
	f	8						
11-15	m	6	1.014	10.000	0.335	0.593	10.000	0.566
	f	6						
16-20	m	7	0.849	10.000	0.416	1.145	10.000	0.279
	f	5						
21-30	m	6	1.905	6.524	0.101	2.841	11.000	0.016 *
	f	7						
31-50	m	8	0.661	14.000	0.519	1.550	13.790	0.144
	f	8						
51-60	m	4	1.726	6.000	0.135	2.423	6.000	0.052
	f	4						
61-70	m	4	1.735	16.000	0.102	3.833	16.000	0.001 *
	f	14						
71-80	m	9	2.269	19.000	0.035 *	0.951	19.000	0.353
	f	12						
81 to 90	m	2	0.775	8.000	0.460	-0.125	8.000	0.904
	f	8						

Push and turn knob

Age (years)	Sex	No.	Horizontal knob 10N resistance			Horizontal knob 20N resistance			Vertical knob 10N resistance			Vertical knob 20N resistance		
			t	df	Sig	t	df	Sig	t	df	Sig	t	df	Sig
2-5	m	9	0.043	13.000	0.966	1.052	13.000	0.312	0.572	13.000	0.577	0.106	12.000	0.917
	f	7												
6-10	m	5	0.029	11.000	0.977	-0.722	11.000	0.485	-0.692	11.000	0.503	-0.990	11.000	0.343
	f	8												
11-15	m	6	2.310	10.000	0.044*	1.765	10.000	0.108	1.413	10.000	0.188	0.716	7.101	0.497
	f	6												
16-20	m	7	5.519	10.000	0.000*	3.048	10.000	0.012*	3.562	10.000	0.005	3.264	10.000	0.009*
	f	5												
21-30	m	6	2.122	11.000	0.057	3.059	11.000	0.011*	3.785	11.000	0.003*	5.978	11.000	0.000*
	f	7												
31-50	m	8	3.468	11.353	0.005*	4.203	14.000	0.001*	4.215	14.000	0.001*	3.197	14.000	0.006*
	f	8												
51-60	m	4	3.898	6.000	0.008*	4.862	6.000	0.003*	2.513	6.000	0.046*	2.750	6.000	0.033*
	f	4												
61-70	m	4	4.619	16.000	0.000*	2.560	16.000	0.021*	3.177	16.000	0.006*	2.572	16.000	0.020*
	f	14												
71-80	m	9	4.068	19.000	0.001*	3.055	19.000	0.007*	3.774	19.000	0.001*	3.177	19.000	0.005*
	f	12												
81 to 90	m	2	0.703	1.053	0.605	0.107	1.022	0.932	0.836	1.033	0.553	0.900	1.048	0.528
	f	8												

Key:

t = value from t-test

df = degrees of freedom

sig = level of statistical significance (*denotes significant difference at 0.05 level)

5c – Differences between age groups (t-test)

Age (years)	2-5	6-10	11-15	16-20	21-30	31-50	51-60	61-70	71-80	81-90
2-5		*	*	*	*	*	*	*	*	*
					not cv		not cv, ch	not cv, ch	not cv, ch	not cv, ch
6-10			*	*	*	*	*	*	*	*
			not cv, ch	not cv, ch		not cv, ch				not r10v, r20v
11-15				X	*	*	*	*	*	*
					not cv, ch	not cv, ch	not cv, ch r10v r20v	not cv, ch	not cv, r10h r10v r20v	not cv, r10h r20h r10v
16-20					X	*	X	*	*	*
						not cv, ch r10v		not r10h r20h, r20v	not cv, r10h r20h, r10v r20v	not cv, r10h r20h
21-30						*	X	*	*	*
						not ch r10v, r20v		not cv, ch r10h, r20h	not cv, ch r10h, r20h	not cv
31-50							not ch, r10h r20h, r10v, r20v	*	*	*
51-60								*	*	*
								not cv, ch, r10h, r20h	not ch, cv, r10h, r20h r10v	not cv
61-70									X	*
										not cv, r10h r10v, r20v
71-80										*
										not ch, cv, r20v

Key:

* = significant difference at 0.05 level

X = no significant difference between age groups

ch = circular knob in horizontal position

cv = circular knob in vertical position

r10h = ridged push and turn knob, 10N resistance, in horizontal position

r20h = ridged push and turn knob, 20N resistance, in horizontal position

r10v = ridged push and turn knob, 10N resistance, vertical position

r20v = ridged push and turn knob, 20N resistance, vertical position

5d – Differences between knob used and the resistance of the push and turn knob (Paired samples test)

Action	t	df	Sig
ch - r10h	-17.348	137	0.000*
ch- r20h	-16.153	137	0.000*
ch - r10v	-14.985	137	0.000*
ch - r20v	-13.892	136	0.000*
cv - r10h	-18.103	137	0.000*
cv - r20h	-17.012	137	0.000*
cv - r10v	-15.821	137	0.000*
cv - r20v	-14.673	136	0.000*
r10h - r20h	2.750	137	0.007*
r10h - r10v	8.932	137	0.000*
r10h - r20v	10.371	136	0.000*
r20h - r10v	6.020	137	0.000*
r10v - r20v	2.945	136	0.004*
r20h - r20v	7.645	136	0.000*

Key:

ch = circular knob in horizontal position

cv = circular knob in vertical position

r10h = ridged push and turn knob, 10N resistance, in horizontal position

r20h = ridged push and turn knob, 20N resistance, in horizontal position

r10v = ridged push and turn knob, 10N resistance, vertical position

r20v = ridged push and turn knob, 20N resistance, vertical position

t = value from t-test

df = degrees of freedom

sig = level of statistical significance (*denotes significant difference at 0.05 level)

5e - Correlation between measurements (Pearson Correlation)

	Circular knob horizontal	Circular knob vertical	Push-turn knob 10N resistance horizontal	Push-turn knob 20N resistance horizontal	Push-turn knob 10N resistance vertical	Push-turn knob 20N resistance vertical
Circular knob horizontal	1.00	0.72 **	0.26 **	0.18 *	0.27 **	0.29**
Circular knob vertical	0.72**	1.00	0.30**	0.23**	0.32**	0.33**
Push-turn knob 10N resistance horizontal	0.26 **	0.30**	1.00	0.94**	0.91 **	0.89**
Push-turn knob 20N resistance horizontal	0.18 *	0.23 **	0.94 **	1.00	0.88**	0.86**
Push-turn knob 10N resistance vertical	0.27 **	0.32**	0.91**	0.88**	1.00	0.93**
Push-turn knob 20N resistance vertical	0.29 **	0.33 **	0.89**	0.86**	0.93**	1.00

* Correlation is significant at the 0.05 significant level

** Correlation is significant at the 0.01 significant level

Appendix 6 – Pull on a can ring-pull

6a - Anthropometric characteristics of subjects

Age (years)	Sex	No.	Stature		Weight		Hand length		Hand breadth	
			Mean	SD	Mean	SD	Mean	SD	Mean	SD
2-5	m	9	1060.00	88.88	18.53	46.50	107.89	9.48	54.22	4.09
	f	7	1002.86	44.61	15.17	1.87	112.86	8.38	50.57	3.21
6-10	m	6	1314.00	109.22	28.48	6.45	138.60	13.79	61.80	4.49
	f	8	1351.25	98.91	30.45	9.57	143.00	13.65	64.00	5.98
11-15	m	6	1651.67	60.47	48.20	7.64	172.17	10.83	76.33	7.26
	f	6	1591.67	101.47	50.37	11.29	172.17	10.83	76.33	7.26
16-20	m	6	1788.57	45.25	61.74	6.67	183.71	8.73	82.14	5.70
	f	5	1642.00	29.50	54.40	5.61	162.80	2.95	69.60	3.97
21-30	m	6	1876.67	76.33	79.02	13.63	187.83	6.68	82.33	5.13
	f	7	1615.71	170.48	67.93	12.26	170.00	6.11	70.43	4.69
31-50	m	8	1735.00	211.59	82.65	11.20	188.38	9.05	84.75	2.71
	f	8	1657.50	87.95	76.43	28.70	165.63	16.54	75.50	4.87
51-60	m	4	1802.50	34.03	83.95	20.07	195.50	6.35	85.00	3.56
	f	4	1670.00	42.43	65.85	9.76	175.00	4.97	76.75	2.22
61-70	m	4	1795.00	63.51	79.95	9.69	193.50	11.90	85.75	2.87
	f	14	1624.29	51.25	61.71	10.66	173.64	9.56	76.50	4.01
71-80	m	9	1748.89	42.85	81.00	7.20	190.11	6.97	86.00	3.64
	f	12	1625.42	57.74	69.77	9.41	176.17	9.43	77.67	4.33
81-90	m	2	1800.00	28.28	71.20	7.92	182.00	2.83	83.50	0.71
	f	8	1598.75	72.79	59.77	10.63	171.00	11.98	77.38	3.58

6b – Differences between males and females (t-test)

Age (years)	Sex	No.	Horizontal ring-pull			Vertical ring-pull		
			t	df	Sig	t	df	Sig
2-5	m	9	2.243	8.756	0.052	1.137	14.000	0.275
	f	7						
6-10	m	5	1.307	11.000	0.218	0.525	11.000	0.610
	f	8						
11-15	m	6	-0.222	10.000	0.829	1.139	10.000	0.281
	f	6						
16-20	m	7	2.580	10.000	0.027*	3.478	10.000	0.006*
	f	5						
21-30	m	6	2.780	6.549	0.029*	5.096	11.000	0.000*
	f	7						
31-50	m	8	2.582	8.752	0.030*	1.149	14.000	0.270
	f	8						
51-60	m	4	2.908	3.118	0.059	3.583	6.000	0.012*
	f	4						
61-70	m	4	2.258	16.000	0.038*	3.069	16.000	0.007*
	f	14						
71-80	m	9	1.675	19.000	0.110	1.989	19.000	0.061
	f	12						
81 to 90	m	2	-0.325	8.000	0.753	1.226	1.026	0.432
	f	8						

Key:

t = value from t-test

df = degrees of freedom

sig = level of statistical significance (*denotes significant difference at 0.05 level)

6c – Differences between age groups (t-test)

Age (years)	2-5	6-10	11-15	16-20	21-30	31-50	51-60	61-70	71-80	81-90
2-5		*	*	*	*	*	*	*	*	*
6-10			* not v	*	*	*	X	* not v	* not v	X
11-15				X	X	* not h	X	X	X	*
16-20					X	X	X	* not h	X	*
21-30						* not h	X	X	X	*
31-50							X	*	*	*
51-60								X	X	* not h
61-70									X	*
71-80										*

Key:

* = significant difference at 0.05 level

X = no significant difference between age groups

v = vertical ring-pull

h = horizontal ring-pull

6d – Differences between the position of the ring-pull (Paired samples test)

Action	t	df	Sig
Horizontal ring pull – Vertical ring pull	-12.443	138	0.000*

Key:

t = value from t-test

df = degrees of freedom

sig = level of statistical significance (*denotes significant difference at 0.05 level)

6e - Correlation between measurements (Pearson Correlation)

	Horizontal ring-pull	Vertical ring-pull
Horizontal ring-pull	1.00	0.61**
Vertical ring-pull	0.61**	1.00

** Correlation is significant at the 0.01 significant level

Appendix 7 – Press and lift with the foot

7a - Anthropometric characteristics of subjects

Age (years)	Sex	No.	Stature		Weight		Instep height		Foot length		Foot breadth	
			Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
2-5	m	9	1066.67	86.02	18.38	2.72	63.89	6.51	191.22	11.13	72.44	3.78
	f	8	1023.75	64.57	16.38	3.43	59.38	4.17	177.38	14.28	66.75	5.42
6-10	m	5	1314.00	109.22	28.48	6.45	77.00	4.47	236.40	21.30	83.20	6.18
	f	8	1353.75	101.13	30.55	9.58	81.88	15.10	221.50	14.87	78.00	3.51
11-15	m	7	1653.57	55.43	50.83	6.20	92.86	9.51	278.57	11.22	97.57	5.94
	f	5	1610.00	100.75	53.68	8.77	98.00	13.04	242.80	13.10	86.60	3.85
16-20	m	7	1788.57	45.25	66.03	8.10	101.43	8.52	298.29	4.68	108.29	6.63
	f	5	1646.00	36.47	60.32	16.58	91.60	10.74	245.00	21.42	91.80	10.92
21-30	m	7	1860.00	82.46	77.67	12.94	99.29	6.07	323.43	47.28	107.57	5.32
	f	6	1613.33	187.90	68.47	13.15	95.83	8.61	253.83	16.65	96.00	8.20
31-50	m	9	1746.67	201.00	81.20	11.29	97.78	13.25	293.33	9.46	104.33	4.95
	f	8	1656.25	87.00	76.15	28.93	95.00	13.89	255.13	20.68	255.13	14.47
51-60	m	4	1802.50	34.03	83.95	20.07	92.50	9.57	291.25	11.73	104.00	6.48
	f	4	1670.00	42.43	65.85	9.76	87.50	6.45	251.50	4.80	88.25	4.86
61-70	m	5	1798.00	55.41	80.36	8.44	100.00	0.00	277.00	46.66	100.60	8.44
	f	14	1623.57	51.38	61.71	10.66	88.57	6.63	251.50	14.74	84.93	9.20
71-80	m	9	1748.89	42.85	81.00	7.20	97.22	7.55	290.44	12.13	98.44	4.07
	f	13	1622.69	56.15	69.37	9.12	88.46	11.44	257.77	9.88	90.69	8.42
81-90	m	2	1800.00	28.28	71.20	7.92	102.50	3.54	282.50	0.71	93.00	5.66
	f	5	1618.00	75.96	60.08	7.72	75.00	16.20	252.60	5.55	87.40	5.59

7b – Differences between males and females (t-test)

Age (years)	Sex	No.	Press bar with foot			Lift bar with foot			Press pedal with foot			Lift pedal with foot		
			t	df	Sig	t	df	Sig	t	df	Sig	t	df	Sig
2-5	m	9	0.567	15.000	0.579	-0.286	15.000	0.779	-0.068	15.000	0.947	1.532	15.000	0.146
	f	8												
6-10	m	5	-1.321	9.106	0.219	-1.931	11.000	0.080	-0.354	11.000	0.730	-1.401	11.000	0.189
	f	8												
11-15	m	7	0.775	6.736	0.464	1.242	10.000	0.243	1.548	10.000	0.153	0.902	10.000	0.388
	f	5												
16-20	m	7	3.492	10.000	0.006*	3.736	10.000	0.004*	2.044	10.000	0.068	2.739	10.000	0.021*
	f	5												
21-30	m	7	2.260	7.759	0.055	2.045	11.000	0.066	1.848	11.000	0.092	1.070	11.000	0.308
	f	6												
31-50	m	9	1.928	15.000	0.073	3.755	15.000	0.002*	1.567	15.000	0.138	4.372	15.000	0.001*
	f	8												
51-60	m	4	2.572	6.000	0.042*	3.009	6.000	0.024*	-0.928	6.000	0.389	2.998	6.000	0.024*
	f	4												
61-70	m	5	4.133	17.000	0.001*	4.314	17.000	0.000*	2.709	17.000	0.015*	3.505	17.000	0.003*
	f	14												
71-80	m	9	1.549	20.000	0.137	2.189	20.000	0.041*	-0.287	20.000	0.777	0.188	20.000	0.853
	f	13												
81 to 90	m	2	0.475	5.000	0.655	1.447	5.000	0.208	0.922	1.064	0.518	0.529	5.000	0.619
	f	5												

Key:

t = value from t-test

df = degrees of freedom

sig = level of statistical significance (*denotes significant difference at 0.05 level)

7c – Differences between age groups (t-test)

Age (years)	2-5	6-10	11-15	16-20	21-30	31-50	51-60	61-70	71-80	81-90
2-5		*	*	*	*	*	*	*	*	*
6-10			*	*	*	*	*	*	*	X
11-15				X	*	* not bp, pp pl	X not pp, pl	X	* not bp, pp pl	* not pl
16-20					X	X	X	* not pl	* not pp, pl	* not pl
21-30						X	X	* not pl	* not pl	* not pl
31-50							X	*	*	*
51-60								X	X	* not pl
61-70									X	* not pp, pl
71-80										* not bl, pp pl

Key:

* = significant difference at 0.05 level

X = no significant difference between age groups

bp = pressing bar with foot

bl = lifting bar with foot

pp = pressing pedal with foot

pl = lifting pedal with foot

7d – Differences between the pedal/bar and lifting and pressing (Paired samples test)

Action	t	df	Sig
bp – bl	19.560	139.000	0.000*
bp – pp	14.345	139.000	0.000*
bp – pl	19.450	139.000	0.000*
bl – pp	-5.400	139.000	0.000*
bl – pl	11.747	139.000	0.000*
pp – pl	13.155	139.000	0.000*

Key:

bp = pressing bar with foot

bl = lifting bar with foot

pp = pressing pedal with foot

pl = lifting pedal with foot

t = value from t-test

df = degrees of freedom

sig = level of statistical significance (*denotes significant difference at 0.05 level)

7e - Correlation between measurements (Pearson Correlation)

	Press bar with foot	Lift bar with foot	Press pedal with foot	Lift pedal with foot
Press bar with foot	1.00	0.88**	0.71**	0.79**
Lift bar with foot	0.88**	1.00	0.75	0.82
Press pedal with foot	0.71**	0.75**	1.00	0.73**
Lift pedal with foot	0.79**	0.82**	0.73**	1.00

** Correlation is significant at the 0.01 significant level

Appendix 8 – Pull on 20mm knob

8a - Anthropometric characteristics of subjects

Age (years)	Sex	No.	Stature		Weight		Elbow height		Hand length		Hand breadth	
			Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
2-5	m	9	1066.67	86.02	18.38	2.72	596.67	171.83	107.67	9.55	53.22	1.92
	f	8	1023.75	64.57	16.38	3.43	631.25	45.18	116.63	5.97	51.50	4.07
6-10	m	5	1314.00	109.22	28.48	6.45	828.00	77.59	138.60	13.79	61.80	4.49
	f	8	1353.75	101.13	30.53	9.59	871.25	92.35	142.00	12.17	63.63	5.71
11-15	m	7	1653.57	55.43	50.83	6.20	1064.29	28.78	171.57	5.68	75.86	6.74
	f	6	1590.00	102.57	50.37	11.29	1056.67	56.45	164.50	8.32	72.33	9.33
16-20	m	8	1765.00	78.74	64.90	8.15	1132.50	51.20	181.25	11.35	79.75	8.58
	f	4	1657.50	29.86	61.15	19.02	1070.00	18.26	153.50	21.70	69.25	3.86
21-30	m	7	1860.00	82.46	77.67	12.94	1167.14	45.36	189.86	8.11	82.43	4.69
	f	6	1613.33	187.90	68.47	13.15	1083.33	38.82	173.00	5.18	72.83	4.96
31-50	m	9	1746.67	201.00	81.20	11.29	1154.44	38.12	188.89	8.55	85.22	2.73
	f	8	1656.25	87.00	76.15	28.93	1057.50	62.05	165.25	16.17	74.88	4.97
51-60	m	4	1802.50	34.03	83.95	20.07	1150.00	8.16	195.50	6.35	85.00	3.56
	f	4	1670.00	42.43	65.85	9.76	1070.00	36.51	175.00	4.97	76.75	2.22
61-70	m	5	1798.00	55.41	292.92	473.60	1144.00	42.78	195.60	11.33	86.60	3.13
	f	14	1623.57	51.38	61.71	10.66	1027.86	39.45	181.57	35.85	78.21	8.38
71-80	m	9	1748.89	42.85	81.00	7.20	1097.78	36.32	190.11	6.97	86.89	2.62
	f	13	1622.69	56.15	69.37	9.12	1038.46	35.32	176.08	9.03	77.08	4.66
81-90	m	2	1800.00	28.28	71.20	7.92	1105.00	21.21	1105.00	2.83	83.50	0.71
	f	4	1622.00	71.90	60.08	7.72	1044.00	51.28	170.60	14.33	77.40	2.30

8b – Differences between males and females (t-test)

Age (years)	Sex	No.	One hand			Two hands		
			t	df	Sig	t	df	Sig
2-5	m	9	0.134	15.000	0.895	0.795	11.358	0.443
	f	8						
6-10	m	5	0.651	11.000	0.529	0.178	10.000	0.862
	f	8						
11-15	m	7	-0.406	11.000	0.693	0.093	11.000	0.928
	f	6						
16-20	m	8	4.057	10.000	0.002*	3.924	10.000	0.003*
	f	4						
21-30	m	7	2.986	11.000	0.012*	1.302	11.000	0.220
	f	6						
31-50	m	9	-0.024	15.000	0.981	-0.865	15.000	0.400
	f	8						
51-60	m	4	0.770	6.000	0.470	0.966	6.000	0.371
	f	4						
61-70	m	5	-0.466	17.000	0.647	0.394	17.000	0.698
	f	14						
71-80	m	9	1.742	10.392	0.111	1.620	20.000	0.121
	f	13						
81 to 90	m	2	1.507	4.000	0.206	0.543	1.009	0.683
	f	5						

Key:

t = value from t-test

df = degrees of freedom

sig = level of statistical significance (*denotes significant difference at 0.05 level)

8c – Differences between age groups (t-test)

Age (years)	2-5	6-10	11-15	16-20	21-30	31-50	51-60	61-70	71-80	81-90
2-5		*	*	*	*	*	*	*	*	*
6-10			X	* not 2h	* not 2h	* not 2h	* not 2h	* not 2h	* not 2h	X
11-15				* not 2h	X	* not 2h	X	X	X	X
16-20					X	X	X	X	X	X
21-30						X	X	X	X	X
31-50							X	X	X	X
51-60								X	X	X
61-70									X	X
71-80										X

Key:

* = significant difference at 0.05 level

X = no significant difference between age groups

2h = two hands

8d – Differences between number of hands used (Paired samples test)

Action	t	df	Sig
One hand – two hands	-9.015	139	0.000*

Key:

t = value from t-test

df = degrees of freedom

sig = level of statistical significance (*denotes significant difference at 0.05 level)

8e - Correlation between measurements (Pearson Correlation)

	Pull with one hand	Pull with two hands
Pull with one hand	1.00	0.77**
Pull with two hands	0.77**	1.00

** Correlation is significant at the 0.01 significant level

Appendix 9 – Correlation between measurements

Appendix 9 - Correlation between measurements

		Push and pull strength							
		Horizontal push one hand	Vertical push one hand	Horizontal push two hands	Vertical push two hands	Horizontal pull one hand	Vertical pull one hand	Horizontal pull two hands	Vertical pull two hands
Push and pull strength	Horizontal push one hand	1.00	0.93**	0.92**	0.91**	0.87**	0.82**	0.81**	0.80**
	Vertical push one hand	0.93**	1.00	0.90**	0.96**	0.84**	0.84**	0.79**	0.81**
	Horizontal push two hands	0.92**	0.90**	1.00	0.92**	0.84**	0.81**	0.80**	0.79**
	Vertical push two hands	0.91**	0.96**	0.92**	1.00	0.87**	0.86**	0.81**	0.83**
	Horizontal pull one hand	0.87**	0.84**	0.84**	0.87**	1.00	0.92**	0.93**	0.90**
	Vertical pull one hand	0.82**	0.84**	0.81**	0.86**	0.92**	1.00	0.91**	0.96**
	Horizontal pull two hands	0.81**	0.79**	0.80**	0.81**	0.93**	0.91**	1.00	0.93**
	Vertical pull two hands	0.80**	0.81**	0.79**	0.83**	0.90**	0.96**	0.93**	1.00
Push with the thumb or 2 or more fingers	Push with fingers forwards	0.27**	0.24**	0.30**	0.23**	0.24**	0.17*	0.20*	0.16
	Push with fingers down	0.28**	0.24**	0.30**	0.23**	0.25**	0.18*	0.21*	0.16*
	Push with thumb down	0.24**	0.22**	0.28**	0.21*	0.19*	0.15	0.16*	0.12
Push with the Shoulder	Push 100%	0.19*	0.19*	0.18*	0.15	0.18*	0.11	0.15	0.10
	Push 90%	0.02	0.03	-0.03	0.03	0.02	-0.01	-0.01	-0.03
Pull with different grips	Underhand 1 hand	-0.01	0.01	0.03	0.01	0.07	0.04	0.04	0.03
	Underhand 2 hands	0.01	0.06	0.09	0.08	0.09	0.05	0.09	0.07
	Round handle 1 hand	-0.03	0.02	0.04	0.03	0.05	0.00	0.07	0.02
	Round handle 2 hands	0.00	0.05	0.09	0.07	0.08	0.02	0.08	0.04
Wrist twisting and push & turn strength	Circular knob horizontal	0.01	-0.05	-0.01	-0.03	0.01	0.03	0.02	0.05
	Circular knob vertical	0.00	0.00	0.03	0.00	0.04	0.07	0.03	0.08
	Push-turn knob 10N horizontal	0.02	-0.01	-0.02	-0.05	-0.02	-0.03	-0.04	-0.06
	Push-turn knob 20N horizontal	0.03	0.00	-0.03	-0.05	-0.05	-0.04	-0.05	-0.09
	Push-turn knob 10N vertical	0.05	0.01	0.00	-0.02	0.04	0.05	0.02	0.01
	Push-turn knob 20N vertical	0.04	-0.01	-0.02	-0.04	-0.01	0.02	-0.02	-0.02
Pull on can ring pull	Horizontal pull	0.04	0.04	-0.01	0.00	0.06	0.06	0.06	0.03
	Vertical pull	0.05	0.01	0.00	-0.01	0.07	0.07	0.08	0.02
Press & lift with the foot	Press bar with foot	0.12	0.12	0.07	0.06	0.10	0.15	0.08	0.09
	Lift bar with foot	0.11	0.12	0.10	0.07	0.12	0.15	0.08	0.09
	Press pedal with foot	0.09	0.06	0.05	0.03	0.06	0.09	0.02	0.04
	Lift pedal with foot	0.09	0.09	0.08	0.05	0.07	0.06	0.05	0.01
Pull on 20mm knob	Pull with one hand	0.05	0.05	0.04	0.04	0.02	0.03	0.05	0.04
	Pull with two hands	0.05	0.04	0.03	0.02	-0.02	-0.01	0.00	0.00

* Denotes significant correlation at 0.05 level

** Denotes significant correlation at 0.01 level

		Push with the thumb or 2 or more fingers		
		Push with fingers forwards	Push with fingers down	Push with thumb down
Push and pull strength	Horizontal push one hand	0.27 **	0.28 **	0.24 **
	Vertical push one hand	0.24 **	0.24**	0.22 **
	Horizontal push two hands	0.30**	0.30**	0.28 **
	Vertical push two hands	0.23**	0.23**	0.21 *
	Horizontal pull one hand	0.24**	0.25**	0.19 *
	Vertical pull one hand	0.17*	0.18*	0.15
	Horizontal pull two hands	0.20*	0.21*	0.16*
	Vertical pull two hands	0.16	0.16*	0.12
Push with the thumb or 2 or more fingers	Push with fingers forwards	1.00	0.96	0.89 **
	Push with fingers down	0.96**	1.00	0.89 **
	Push with thumb down	0.89**	0.89**	1.00
Push with the Shoulder	Push 100%	0.08	0.07	0.04
	Push 90%	-0.27 **	-0.26 **	-0.25 **
Pull with different grips	Underhand 1 hand	-0.08	-0.07	-0.09
	Underhand 2 hands	0.00	0.04	0.03
	Round handle 1 hand	0.02	0.04	0.05
	Round handle 2 hands	0.04	0.05	0.07
Wrist twisting and push & turn strength	Circular knob horizontal	0.04	0.07	0.03
	Circular knob vertical	0.07	0.10	0.05
	Push-turn knob 10N horizontal	0.00	0.03	-0.03
	Push-turn knob 20N horizontal	-0.03	-0.01	-0.07
	Push-turn knob 10N vertical	0.07	0.12	0.08
Pull on can ring pull	Push-turn knob 20N vertical	0.00	0.04	-0.01
	Horizontal pull	0.06	0.10	0.05
Press & lift with the foot	Vertical pull	0.04	0.09	0.09
	Press bar with foot	0.13	0.17	0.18 *
	Lift bar with foot	0.24 **	0.28 **	0.30 **
	Press pedal with foot	0.13	0.13	0.17 *
Pull on 20mm knob	Lift pedal with foot	0.11	0.14	0.15
	Pull with one hand	-0.18 **	-0.16	-0.14
	Pull with two hands	-0.17	-0.15	-0.12

* Denotes significant correlation at 0.05 level

** Denotes significant correlation at 0.01 level

		Push with the shoulder	
		Push 100%	Push 90%
Push and pull strength	Horizontal push one hand	0.19 *	0.02
	Vertical push one hand	0.19 *	0.03
	Horizontal push two hands	0.18 *	-0.03
	Vertical push two hands	0.15	0.03
	Horizontal pull one hand	0.18 *	0.02
	Vertical pull one hand	0.11	-0.01
	Horizontal pull two hands	0.15	-0.01
	Vertical pull two hands	0.10	-0.03
Push with the thumb or 2 or more fingers	Push with fingers forwards	0.08	-0.27 **
	Push with fingers down	0.07	-0.26 **
	Push with thumb down	0.04	-0.25 **
Push with the Shoulder	Push 100%	1.00	0.48 **
	Push 90%	0.48 **	1.00
Pull with different grips	Underhand 1 hand	0.35 **	0.59 **
	Underhand 2 hands	0.08	0.09
	Round handle 1 hand	0.03	0.00
	Round handle 2 hands	0.05	0.02
Wrist twisting and push & turn strength	Circular knob horizontal	-0.08	0.05
	Circular knob vertical	-0.02	0.14
	Push-turn knob 10N horizontal	-0.14	-0.04
	Push-turn knob 20N horizontal	-0.09	0.01
	Push-turn knob 10N vertical	-0.14	-0.07
	Push-turn knob 20N vertical	-0.11	-0.01
Pull on can ring-pull	Horizontal pull	-0.08	-0.03
	Vertical pull	-0.07	0.03
Press & lift with the foot	Press bar with foot	-0.15	0.02
	Lift bar with foot	-0.14	0.02
	Press pedal with foot	-0.11	-0.02
	Lift pedal with foot	-0.09	0.05
Pull on 20mm knob	Pull with one hand	0.02	0.17 *
	Pull with two hands	0.13	0.19 *

* Denotes significant correlation at 0.05 level

** Denotes significant correlation at 0.01 level

		Pull with different grips			
		Underhand 1 hand	Underhand 2 hands	Round handle 1 hand	Round handle 2 hands
Push and pull strength	Horizontal push one hand	-0.01	0.01	-0.03	0.00
	Vertical push one hand	0.01	0.06	0.02	0.05
	Horizontal push two hands	0.03	0.09	0.04	0.09
	Vertical push two hands	0.01	0.08	0.03	0.07
	Horizontal pull one hand	0.07	0.09	0.05	0.08
	Vertical pull one hand	0.04	0.05	0.00	0.02
	Horizontal pull two hands	0.04	0.09	0.07	0.08
	Vertical pull two hands	0.03	0.07	0.02	0.04
Push with the thumb or 2 or more fingers	Push with fingers forwards	-0.08	0.00	0.02	0.04
	Push with fingers down	-0.07	0.04	0.04	0.05
	Push with thumb down	-0.09	0.03	0.05	0.07
Push with the Shoulder	Push 100%	0.35 **	0.08	0.03	0.05
	Push 90%	0.59 **	0.09	0.00	0.02
Pull with different grips	Underhand 1 hand	1.00	0.28 **	0.18 *	0.23 **
	Underhand 2 hands	0.28 **	1.00	0.90 **	0.91 **
	Round handle 1 hand	0.18 *	0.90 **	1.00	0.96 **
	Round handle 2 hands	0.23 **	0.91 **	0.96 **	1.00
Wrist twisting and push and turn strength	Circular knob horizontal	0.00	-0.03	-0.06	-0.10
	Circular knob vertical	0.12	0.01	-0.07	-0.08
	Push-turn knob 10N horizontal	-0.10	-0.03	0.04	0.00
	Push-turn knob 20N horizontal	-0.05	0.01	0.09	0.05
	Push-turn knob 10N vertical	-0.12	-0.09	-0.05	-0.09
	Push-turn knob 20N vertical	-0.07	-0.11	-0.07	-0.11
Pull on can ring-pull	Horizontal pull	-0.05	-0.06	-0.03	-0.07
	Vertical pull	-0.05	-0.09	-0.08	-0.12
Press and lift with the foot	Press bar with foot	-0.16	-0.01	0.01	-0.02
	Lift bar with foot	-0.14	-0.08	-0.07	-0.10
	Press pedal with foot	-0.14	-0.14	-0.12	-0.13
	Lift pedal with foot	-0.12	0.02	0.05	0.02
Pull on 20mm knob	Pull with one hand	0.19 *	-0.04	-0.08	-0.08
	Pull with two hands	0.11	0.01	0.00	-0.03

* Denotes significant correlation at 0.05 level

** Denotes significant correlation at 0.01 level

		Wrist twisting and push and turn strength					
		Circular knob horizontal	Circular knob vertical	Push-turn knob 10N resistance horizontal	Push-turn knob 20N resistance horizontal	Push-turn knob 10N resistance vertical	Push-turn knob 20N resistance vertical
Push and pull strength	Horizontal push one hand	0.01	0.00	0.02	0.03	0.05	0.04
	Vertical push one hand	-0.05	0.00	-0.01	0.00	0.01	-0.01
	Horizontal push two hands	-0.01	0.03	-0.02	-0.03	0.00	-0.02
	Vertical push two hands	-0.03	0.00	-0.05	-0.05	-0.02	-0.04
	Horizontal pull one hand	0.01	0.04	-0.02	-0.05	0.04	-0.01
	Vertical pull one hand	0.03	0.07	-0.03	-0.04	0.05	0.02
	Horizontal pull two hands	0.02	0.03	-0.04	-0.05	0.02	-0.02
	Vertical pull two hands	0.05	0.08	-0.06	-0.09	0.01	-0.02
Push with the thumb or 2 or more fingers	Push with fingers forwards	0.04	0.07	0.00	-0.03	0.07	0.00
	Push with fingers down	0.07	0.10	0.03	-0.01	0.12	0.04
	Push with thumb down	0.03	0.05	-0.03	-0.07	0.08	-0.01
Push with the Shoulder	Push 100%	-0.08	-0.02	-0.14	-0.09	-0.14	-0.11
	Push 90%	0.05	0.14	-0.04	0.01	-0.07	-0.01
Pull with different grips	Underhand 1 hand	0.00	0.12	-0.10	-0.05	-0.12	-0.07
	Underhand 2 hands	-0.03	0.01	-0.03	0.01	-0.09	-0.11
	Round handle 1 hand	-0.06	-0.07	0.04	0.09	-0.05	-0.07
	Round handle 2 hands	-0.10	-0.08	0.00	0.05	-0.09	-0.11
Wrist twisting and push and turn strength	Circular knob horizontal	1.00	0.72 **	0.26 **	0.18 *	0.27 **	0.29**
	Circular knob vertical	0.72**	1.00	0.30**	0.23**	0.32**	0.33**
	Push-turn knob 10N horiz	0.26 **	0.30**	1.00	0.94**	0.91**	0.89**
	Push-turn knob 20N horiz	0.18 *	0.23 **	0.94 **	1.00	0.88**	0.86**
	Push-turn knob 10N vertical	0.27 **	0.32**	0.91**	0.88**	1.00	0.93**
	Push-turn knob 20N vertical	0.29 **	0.33 **	0.89**	0.86**	0.93**	1.00
Pull on can ringipull	Horizontal pull	0.38**	0.43**	0.73**	0.72**	0.74**	0.75**
	Vertical pull	0.41**	0.44**	0.64**	0.61**	0.69**	0.60**
Press and lift with the foot	Press bar with foot	0.13	0.16	0.53**	0.52**	0.57**	0.54**
	Lift bar with foot	0.20 *	0.23**	0.51**	0.46 **	0.55**	0.51**
	Press pedal with foot	0.21 *	0.16	0.44**	0.38**	0.46**	0.44**
	Lift pedal with foot	0.10	0.13	0.56 **	0.53**	0.55**	0.53**
Pull on 20mm knob	Pull with one hand	-0.12	-0.12	-0.15	-0.11	-0.17	-0.17*
	Pull with two hands	-0.14	-0.16	-0.14	-0.09	-0.15	-0.16

* Denotes significant correlation at 0.05 level

** Denotes significant correlation at 0.01 level

		Pull on can ring-pull	
		Horizontal ring-pull	Vertical ring-pull
Push and pull strength	Horizontal push one hand	0.04	0.05
	Vertical push one hand	0.04	0.01
	Horizontal push two hands	-0.01	0.00
	Vertical push two hands	0.00	-0.01
	Horizontal pull one hand	0.06	0.07
	Vertical pull one hand	0.06	0.07
	Horizontal pull two hands	0.06	0.08
	Vertical pull two hands	0.03	0.02
Push with the thumb or 2 or more fingers	Push with fingers forwards	0.06	0.04
	Push with fingers down	0.10	0.09
	Push with thumb down	0.05	0.09
Push with the Shoulder	Push 100%	-0.08	-0.07
	Push 90%	-0.03	0.03
Pull with different grips	Underhand 1 hand	-0.05	-0.05
	Underhand 2 hands	-0.06	-0.09
	Round handle 1 hand	-0.03	-0.08
	Round handle 2 hands	-0.07	-0.12
Wrist twisting and push and turn strength	Circular knob horizontal	0.38 **	0.41 **
	Circular knob vertical	0.43 **	0.44 **
	Push-turn knob 10N horizontal	0.73 **	0.64**
	Push-turn knob 20N horizontal	0.72**	0.61**
	Push-turn knob 10N vertical	0.74**	0.69**
	Push-turn knob 20N vertical	0.75**	0.60**
Pull on can ring-pull	Horizontal pull	1.00	0.61**
	Vertical pull	0.61**	1.00
Press and lift with the foot	Press bar with foot	0.38**	0.45**
	Lift bar with foot	0.42**	0.46**
	Press pedal with foot	0.32**	0.43**
	Lift pedal with foot	0.44**	0.48**
Pull on 20mm knob	Pull with one hand	-0.19 *	-0.13
	Pull with two hands	-0.17*	-0.13

* Denotes significant correlation at 0.05 level

** Denotes significant correlation at 0.01 level

		Press and lift with the foot			
		Press bar with foot	Lift bar with foot	Press pedal with foot	Lift pedal with foot
Push and pull strength	Horizontal push one hand	0.12	0.11	0.09	0.09
	Vertical push one hand	0.12	0.12	0.06	0.09
	Horizontal push two hands	0.07	0.10	0.05	0.08
	Vertical push two hands	0.06	0.07	0.03	0.05
	Horizontal pull one hand	0.10	0.12	0.06	0.07
	Vertical pull one hand	0.15	0.15	0.09	0.06
	Horizontal pull two hands	0.08	0.08	0.02	0.05
	Vertical pull two hands	0.09	0.09	0.04	0.01
Push with the thumb or 2 or more fingers	Push with fingers forwards	0.13	0.24**	0.13	0.11
	Push with fingers down	0.17	0.28**	0.13	0.14
	Push with thumb down	0.18	0.30**	0.17*	0.15
Push with the Shoulder	Push 100%	-0.15	-0.14	-0.11	-0.09
	Push 90%	0.02	0.02	-0.02	0.05
Pull with different grips	Underhand 1 hand	-0.16	-0.14	-0.14	-0.12
	Underhand 2 hands	-0.01	-0.08	-0.14	0.02
	Round handle 1 hand	0.01	-0.07	-0.12	0.05
	Round handle 2 hands	-0.02	-0.10	-0.13	0.02
Wrist twisting and push and turn strength	Circular knob horizontal	0.13	0.20*	0.21*	0.10
	Circular knob vertical	0.16	0.23**	0.16	0.13
	Push-turn knob 10N horizontal	0.53**	0.51**	0.44**	0.56**
	Push-turn knob 20N horizontal	0.52**	0.46**	0.38**	0.53**
	Push-turn knob 10N vertical	0.57**	0.55**	0.46**	0.55**
	Push-turn knob 20N vertical	0.54**	0.51**	0.44**	0.53**
Pull on can ring-pull	Horizontal pull	0.38**	0.42**	0.32**	0.44**
	Vertical pull	0.45**	0.46**	0.43**	0.48**
Press and lift with the foot	Press bar with foot	1.00	0.88**	0.71**	0.79**
	Lift bar with foot	0.88**	1.00	0.75	0.82
	Press pedal with foot	0.71**	0.75**	1.00	0.73**
	Lift pedal with foot	0.79**	0.82**	0.73**	1.00
Pull on 20mm knob	Pull with one hand	-0.07	-0.05	-0.07	-0.06
	Pull with two hands	-0.10	-0.10	-0.10	-0.06

* Denotes significant correlation at 0.05 level

** Denotes significant correlation at 0.01 level

		Pull on 20mm knob	
		Pull with one hand	Pull with two hands
Push and pull strength	Horizontal push one hand	0.05	0.05
	Vertical push one hand	0.05	0.04
	Horizontal push two hands	0.04	0.03
	Vertical push two hands	0.04	0.02
	Horizontal pull one hand	0.02	-0.02
	Vertical pull one hand	0.03	-0.01
	Horizontal pull two hands	0.05	0.00
	Vertical pull two hands	0.04	0.00
Push with the thumb or 2 or more fingers	Push with fingers forwards	-0.18	-0.17
	Push with fingers down	-0.16	-0.15
	Push with thumb down	-0.14	-0.12
Push with the Shoulder	Push 100%	0.02	0.13
	Push 90%	0.17*	0.19*
Pull with different grips	Underhand 1 hand	0.19*	0.11
	Underhand 2 hands	-0.04	0.01
	Round handle 1 hand	-0.08	0.00
	Round handle 2 hands	-0.08	-0.03
Wrist twisting and push & turn strength	Circular knob horizontal	-0.12	-0.14
	Circular knob vertical	-0.12	-0.16
	Push-turn knob 10N horizontal	-0.15	-0.14
	Push-turn knob 20N horizontal	-0.11	-0.09
	Push-turn knob 10N vertical	-0.17	-0.15
	Push-turn knob 20N vertical	-0.17*	-0.16
Pull on can ring pull	Horizontal pull	-0.19*	-0.17*
	Vertical pull	-0.13	-0.13
Press & lift with the foot	Press bar with foot	-0.07	-0.10
	Lift bar with foot	-0.05	-0.10
	Press pedal with foot	-0.07	-0.10
	Lift pedal with foot	-0.06	-0.06
Pull on 20mm knob	Pull with one hand	1.00	0.77**
	Pull with two hands	0.77**	1.00

* Denotes significant correlation at 0.05 level

** Denotes significant correlation at 0.01 level

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