

Table S1. Summary of daily group averages for each parameter. Values represent the calculated group average \pm standard error.

	Pre-Injury			Day +1			Day +4			Day +7		
	Sham	Singl e	Multi ple	Sham	Singl e	Multi ple	Sham	Singl e	Multi ple	Sham	Singl e	Multi ple
Number of Stances	21.87 ± 0.63	22.2 \pm 0.67	16.7 \pm 0.68	21.75 \pm 1.27	19.3 \pm 0.97	23.71 ± 1.30	18.87 ± 0.58	18.5 \pm 0.65	20.71 ± 0.91	18.12 ± 0.74	17 ± 0 . 45	18.28 ± 0.56
Gait Time (s)	2.35 \pm 0.17	2.74 \pm 0.19	2.72 \pm 0.24	2.31 ± 0 .25	3.39 \pm 0.50	6.79 \pm 2.21	1.96 \pm 0.12	2.32 \pm 0.17	2.54 \pm 0.15	1.79 \pm 0.12	2.10 \pm 0.11	2.24 \pm 0.25
Velocity (cm/s)	80.68 ± 5.62	67.59 ± 4.38	70.25 ± 6.42	84.57 \pm 10.1	60.16 ± 5.66	42.21 ± 10.2	97.37 ± 5.62	79.99 ± 4.77	76.35 ± 4.42	102 ± 7 .83	88.5 \pm 5.46	77.05 ± 4.90
Cycle Time (s)	0.47 \pm 0.03	0.54 \pm 0.03	0.54 \pm 0.04	0.47 ± 0 .03	0.64 \pm 0.06	1.20 \pm 0.34	0.44 \pm 0.01	0.51 \pm 0.02	0.57 \pm 0.03	0.43 \pm 0.01	0.50 \pm 0.02	0.55 \pm 0.039
Cycles Per Minute	133 ± 8 .29	114.6 ± 6.7	116 ± 7 .5	134.3 \pm 10.8	100 ± 6 .9	74 ± 13 .9	140.6 2 ± 5.8	121.3 ± 5.6	116.7 ± 8.5	142.3 ± 5.1	122.7 ± 5.0	114.3 ± 7.9
Stance Time (s)	0.23 \pm 0.01	0.26 \pm 0.00	0.31 \pm 0.01	0.23 ± 0 .01	0.28 \pm 0.01	0.67 \pm 0.08	0.21 \pm 0.01	0.26 \pm 0.01	0.28 \pm 0.01	0.21 \pm 0.00	0.26 \pm 0.00	0.30 \pm 0.01
Stride Length (LF, cm)	36.99 ± 0.34	35.74 ± 0.30	36.63 ± 0.65	37.56 \pm 0.63	36.06 ± 0.46	30.94 ± 1.34	42.03 ± 0.39	39.97 ± 0.31	41.37 ± 0.58	43.89 ± 0.69	43.60 ± 0.38	42.06 ± 0.43
Stride Length (RF, cm)	36.81 ± 0.28	35.86 ± 0.32	37.10 ± 0.68	37.50 \pm 0.64	36.14 ± 0.47	30.89 ± 1.34	42.19 ± 0.40	39.93 ± 0.30	41.47 ± 0.56	43.93 ± 0.66	43.77 ± 0.30	41.94 ± 0.44
Stride Length (LH, cm)	35.23 ± 0.37	32.35 ± 0.47	34.11 ± 0.90	35.74 \pm 0.86	32.15 ± 0.65	28.76 ± 1.41	42.20 ± 0.48	36.76 ± 0.39	38.64 ± 0.50	42.09 ± 0.76	40.35 ± 0.53	40.94 ± 0.50
Stride Length (RH, cm)	34.68 ± 0.41	32.13 ± 0.45	34.71 ± 0.90	35.58 \pm 0.89	32.36 ± 0.60	27.66 ± 1.64	41.59 ± 0.55	36.72 ± 0.41	38.89 ± 0.49	42.89 ± 0.74	41.29 ± 0.49	41.07 ± 0.46

Table S2. Comparison between pediatric studies and single and multiple RNR injury models.

	Pediatric Patients			Piglets (vs. SHAM)	
	<i>Paper</i>	<i>TBI Children vs. Healthy Controls</i>	<i>Time Post-injury</i>	<i>SINGLE</i>	<i>MULTIPLE</i>
Gait Velocity % Decrease	Katz-Leurer et al. 2008 [59]	(27.74 %)	3-12 months	(29 %) (1-day post)	(50 %) (1-day post)
	Kuhtz-Buschbeck et al. 2003 [9]	(20 %)	12.1 months		
	Katz-Leurer et al. 2011 [10]	(50 %)	3.5 years		
	Kuhtz-Buschbeck et al. 2003 [7]	(23 %)	2.8 months		
		(7.05 %)	7.8 months		
	Beretta et al. 2009 [66]	(46.15 %)	1.4 months	(18 %) (4-day post)	(22 %) (4-day post)
		(38.46%)	5.5 months		
	Abdul-Rahman et al. 2021 [65]	(5.84 %) (Single task)	2.43 years		
		(12.45 %) (Concurrent motor task)			
		(11.84 %) (Concurrent cognitive task)			
Howell et al. 2017 [67] (1 concussion)	(1.72 %) (Single task)	10.7 days			
	(3.30 %)				

		(Double task)		(13 %) (7-day post)	(24 %) (7-day post)
	Howell et al. 2017 [67] (≥ 2 concussions)	(7.76 %) (Single task)	8.6 days		
		(12.08 %) (Double task)			
	Berkner et al. 2017 [13]	(6.78 %) (Single task)	9.5 days		
		(8.70 %) (Double task)			
	Katz-Leurer et al. 2011 [58]	(7.69 %) (Usual walking)	3.5 years		
		(38.46 %) (Dual-task numbers)			
		(36.36 %) (Dual-task sounds)			
Cadence % Decrease	Kuhtz-Buschbeck et al. 2003 [9]	(6.88 %)	12.1 months	(26 %) (1-day post)	(45 %) (1-day post)
	Kuhtz-Buschbeck et al. 2003 [7]	(13.25 %)	2.8 months		
		(5.56 %)	7.8 months		
	Abdul-Rahman et al. 2021 [65]	(5.3 %) (Single task)	2.43 years	(14 %) (4-day post)	(17 %) (4-day post)
		(9.14 %) (Concurrent motor task)			
		(10.46 %) (Concurrent cognitive task)			
	Howell et al. 2017 [67] (1 concussion)	(0.4 %) (Single task)	10.7 days		
		(1.40 %) (Double task)			
	Howell et al. 2017 [67] (≥ 2 concussions)	0.089 % (Single task)	8.6 days		
		(3.81 %) (Double task)			
	Berkner et al. 2017 [13]	0.089 % (Single task)	9.5 days	(14 %) (7-day post)	(20 %) (7-day post)
		(1.31 %) (Double task)			
	Abdul-Rahman et al. 2018 [68]	(5.69 %) (Single task)	2.4 years		
		(5.08 %) (Dual-motor task)			
		(9.57 %) (Dual-cognitive task)			
*** Stride Length % Decrease	Kuhtz-Buschbeck et al. 2003 [9]	(13.21 %)	12.1 months	(7 %) (1-day post)	(19 %) (1-day post)
	Kuhtz-Buschbeck et al. 2003 [7]	(16 %)	2.8 months		
		(7.88 %)	7.8 months		
	Abdul-Rahman et al. 2021 [65]	(2.25 %) (Single task)	2.43 years	(9 %) (4-day post)	(5 %) (4-day post)
		(6.92 %) (Concurrent motor task)			
		(3.98 %)			

		(Concurrent cognitive task)					
	Howell et al. 2017 [67] (1 concussion)	(1.63 %) (Single task)	10.7 days				
		(0.93 %) (Double task)					
	Howell et al. 2017 [67] (≥ 2 concussions)	(8.13 %) (Single task)	8.6 days			(2 %) (7-day post)	(4 %) (7-day post)
		(9.26 %) (Double task)					
	Berkner et al. 2017 [13]	(7.2 %) (Single task)	9.5 days				
		(7.3 %) (Double task)					
Cycle Time % Increase	Howell et al. 2017 [67] (1 concussion)	0.93 % (Single task)	10.7 days	37 % (1-day post)	152 % (1-day post)		
		1.64 % (Double task)		16 % (4-day post)	30 % (4-day post)		
	Howell et al. 2017 [67] (≥ 2 concussions)	2.78 % (Single task)	8.6 days	18 % (7-day post)	30 % (7-day post)		
		6.56 % (Double task)					
Stance Time % Increase	Karunakaran et al. 2020 [56]	107.5 %	2.4 years	35 % (1-day post)	191 % (1-day post)		
				19 % (4-day post)	33 % (4-day post)		
				19 % (7-day post)	43 % (7-day post)		

*** Stride length represents average percent decrease for all legs (LF, LH, RF, RH).