
[Mental Activities]

How much time today did you do these *mental activities*: (HH:MM)

- Low difficulty (watching TV, movies, listening to music) ___ HRS ___ MIN
- Moderate (texting, online activities, video games) ___ HRS ___ MIN
- High (reading, homework, studying, test-taking) ___ HRS ___ MIN

[Physical Activities]

Did you do the following *physical activities* today (only consider things you did for at least 10 minutes)

- *Vigorous* (made you breathe much harder than normal; heavy lifting, fast biking, etc)
Yes / No
 - [*if Yes*] For how long [HH:MM]
- *Moderate* (made you breathe somewhat harder than normal; carrying light loads, biking at a regular pace, etc, but not walking). Yes / No
 - [*if Yes*] For how long [HH:MM]
- *Walking* only for recreation, sport, or exercise. Yes / No
 - [*if Yes*] For how long [HH:MM]
- How much time did you spend *sitting* today (at home, school, or any time) [HH:MM]

Supplemental Figure. Mobile application activity questions. Adapted from the International Physical Activity Questionnaire (<https://sites.google.com/site/theipaq/>). Abbreviations: HH, hours; MM, minutes; TV, television; HRS, hours; MIN, minutes.

Supplemental Table 1. Unadjusted Commercial Actigraph-Recorded Activity Metrics, Mean ± SD (Effect Size)

Activity Metric	Group				
	Concussed, Days				Control, Weeks ^a
	0–2 (n = 16)	3–6 (n = 23)	7–10 (n = 23)	11–14 (n = 21)	1–2 (n = 15)
Step-based physical activity					
Min/d					
Sedentary ^b	1055.4 ± 268.9 ^f (0.82)	870.3 ± 205.8 (0.13)	841.8 ± 243.3 (0.00)	883.1 ± 223.5 (0.18)	840.7 ± 240.5
Lightly active	146.2 ± 68.6 ^f (-0.97)	212.1 ± 70.9 (-0.06)	208.7 ± 71.1 (-0.11)	179.3 ± 73.6 (-0.50)	216.5 ± 72.1
Fairly active	9.0 ± 10.5 ^f (-0.91)	22.3 ± 22.9 (0.04)	25.5 ± 21.6 (0.20)	20.5 ± 17.8 (-0.06)	21.5 ± 15.9
Very active	16.3 ± 24.7 (-0.59)	26.7 ± 32.4 (-0.15)	32.3 ± 28.0 (0.04)	27.6 ± 29.4 (-0.13)	31.2 ± 24.6
Moderate to vigorous ^c	25.3 ± 33.2 ^f (-0.73)	49.1 ± 53.3 (-0.07)	57.9 ± 48.5 (0.11)	48.1 ± 44.7 (-0.11)	52.7 ± 39.6
Count/d					
Step count	6464 ± 2620 ^g (-1.37)	9530 ± 2696 (-0.40)	9924 ± 2936 (-0.26)	8831 ± 2195 ^f (-0.68)	10 748 ± 3442
Heart-rate–based physical activity, min/d					
Out of range ^d	602.4 ± 371.6 ^f (-0.97)	977.3 ± 331.4 (0.06)	962.2 ± 311.5 (0.01)	980.2 ± 256.0 (0.07)	957.8 ± 340.5
Fat burn	44.7 ± 57.0 (0.02)	74.1 ± 80.5 (0.45)	93.9 ± 119.3 (0.52)	83.6 ± 93.4 (0.52)	43.6 ± 33.1
Cardio	6.8 ± 23.4 (0.30)	3.4 ± 9.0 (0.25)	4.3 ± 15.3 (0.22)	4.2 ± 8.6 (0.37)	1.6 ± 2.2
Peak	0.0 ± 0.0 (-0.64)	0.2 ± 0.4 (0.30)	0.4 ± 1.4 (0.26)	0.5 ± 1.5 (0.34)	0.1 ± 0.2
Moderate to vigorous ^e	6.8 ± 23.4 (0.29)	3.6 ± 9.3 (0.25)	4.7 ± 16.6 (0.23)	4.6 ± 9.7 (0.38)	1.7 ± 2.2

^a Control-group activity was averaged across the entire 2-week assessment period.

^b Duration was estimated by subtracting the time in the other 3 activity zones from the estimated wear time.

^c Combination of the highest 2 physical activity zones for each metric: fairly active and very active.

^d Time refers to time when heart rate was less than the fat burn range.

^e Combination of the highest 2 physical activity zones: cardio and peak.

^f $P < .05$.

^g $P < .01$.

Supplemental Table 2. Group Comparisons of Clinical Assessments, Mean ± SD

Clinical Assessment	Group		P Value
	Concussed (n = 25)	Control (n = 15)	
Sport Concussion Assessment Tool 3 symptom score			
Baseline	2.88 ± 5.74	1.29 ± 1.98	.32
Days 0–2	16.79 ± 18.49 ^b	0.80 ± 1.61	<.001 ^f
Day 8	4.91 ± 16.40 ^c	0.43 ± 0.76	.32
Day 15	0.91 ± 2.78 ^c	1.23 ± 4.15	.79
Standardized Assessment of Concussion total score			
Baseline	26.12 ± 2.24	25.14 ± 1.79	.17
Days 0–2	26.20 ± 2.52	26.60 ± 2.06 ^d	.61
Day 8	26.91 ± 1.98	26.50 ± 1.99	.54
Day 15	27.48 ± 1.81 ^{c,d}	26.38 ± 2.29	.12
Balance Error Scoring System total score			
Baseline	11.72 ± 4.84	12.27 ± 3.54	.71
Days 0–2	12.76 ± 4.68	9.21 ± 3.97 ^d	.02 ^f
Day 8	11.91 ± 5.12	9.07 ± 4.20 ^d	.09
Day 15	10.13 ± 4.62 ^c	8.23 ± 4.23 ^d	.23
King-Devick Test			
Baseline ^a	48.77 ± 9.53	44.00 ± 7.26	.23
Days 0–2	55.44 ± 14.24 ^b	44.99 ± 5.86	.02 ^f
Day 8	48.15 ± 9.39 ^c	42.83 ± 6.24	.16
Day 15	47.26 ± 9.12 ^{c,e}	42.40 ± 5.76	.16
Immediate Post-Concussion Assessment and Cognitive Test			
Visual memory			
Baseline	71.71 ± 12.10	73.00 ± 20.10	.80
Days 0–2	71.33 ± 13.79	76.53 ± 13.07	.25
Day 8	73.76 ± 14.00	78.86 ± 13.00	.29
Day 15	71.95 ± 13.03	76.08 ± 13.37	.39
Verbal memory			
Baseline	83.58 ± 11.36	81.47 ± 14.53	.61

Days 0–2	80.17 ± 10.95	87.73 ± 11.71	.048 ^f
Day 8	82.14 ± 12.01	87.00 ± 11.01	.24
Day 15	84.91 ± 10.66	90.83 ± 10.91 ^d	.13
Visual motor speed			
Baseline	36.32 ± 5.77	36.74 ± 6.70	.84
Days 0–2	38.10 ± 6.06	40.94 ± 6.30 ^d	.17
Day 8	38.95 ± 5.15	41.44 ± 5.69 ^d	.19
Day 15	38.76 ± 6.48 ^d	42.32 ± 5.78 ^d	.12
Reaction time			
Baseline	0.58 ± 0.06	0.59 ± 0.06	.76
Days 0–2	0.59 ± 0.13	0.58 ± 0.05	.84
Day 8	0.60 ± 0.06 ^b	0.57 ± 0.05	.13
Day 15	0.62 ± 0.09	0.55 ± 0.04	.007 ^f

^a A subset of the sample (12 in the concussed group, 9 in the control group) was assessed at baseline with the King-

Devick Test, which limits the number of participants available for within-subjects comparisons to baseline performance.

^b Worse than baseline.

^c Improved relative to days 0–2.

^d Improved relative to baseline.

^e Improved relative to day 8.

^f Group difference ($P < .05$).