Appendix Table A1. Area under the curve (AUC), specificity, sensitivity, and effect size between acute cases and uninjured adolescents for each of the 13 metrics significantly different between groups.

	Acute vs. Uninjured			
	AUC (95% CI)	**Specificity**	**Sensitivity**	**Effect Size (95% CI)**
left.pupilsizemean	0.75 (0.69, 0.80)	0.77	0.67	0.84 (0.61, 1.08)
left.pupilsizemedian	0.75 (0.66, 0.86)	0.86	0.58	0.85 (0.61, 1.08)
right.pupilsizemean	0.75 (0.69, 0.81)	0.78	0.65	0.87 (0.63, 1.11)
right.pupilsizemedian	0.75 (0.70, 0.81)	0.81	0.63	0.87 (0.63, 1.10)
left.pupilsizemaxabs	0.70 (0.65, 0.76)	0.82	0.54	0.72 (0.48, 0.95)
right.pupilsizemaxabs	0.71 (0.65, 0.77)	0.9	0.44	0.75 (0.52, 0.98)
left.pupilsizeminabs	0.65 (0.59, 0.72)	0.4	0.9	0.58 (0.34, 0.81)
right.pupilsizeminabs	0.69 (0.59, 0.72)	0.45	0.9	0.74 (0.50, 0.97)
conj.pupilsizediffmean	0.66 (0.59, 0.72)	0.6	0.69	0.49 (0.26, 0.72)
conj.pupilsizediffmedian	0.65 (0.59, 0.71)	0.6	0.67	0.49 (0.26, 0.72)
conj.pupilsizediffvar	0.72 (0.66, 0.78)	0.75	0.65	0.37 (0.15, 0.60)
conj.varYbot	0.62 (0.55, 0.68)	0.66	0.58	0.10 (-0.12, 0.33)
conj.varYtopbotRatio	0.7 (0.55, 0.68)	0.44	0.8	0.25 (0.02, 0.48)

Appendix Table A2. Area under the curve (AUC), specificity, sensitivity, and effect size between persistent cases and uninjured adolescents for each of the 13 metrics significantly different between groups.

	Persistent vs. Uninjured			
	AUC (95% CI)	**Specificity**	**Sensitivity**	**Effect Size (95% CI)**
left.pupilsizemean	0.78 (0.73, 0.84)	0.8	0.67	1.06 (0.79, 1.33)
left.pupilsizemedian	0.79 (0.73, 0.84)	0.78	0.69	1.06 (0.80, 1.34)
right.pupilsizemean	0.80 (0.74, 0.85)	0.81	0.7	1.16 (0.88, 1.43)
right.pupilsizemedian	0.80 (0.74, 0.85)	0.83	0.68	1.16 (0.88, 1.43)
left.pupilsizemaxabs	0.73 (0.67, 0.79)	0.89	0.48	0.83 (0.56, 1.09)
right.pupilsizemaxabs	0.75 (0.6, 0.81)	0.88	0.53	0.93 (0.66, 1.20)
left.pupilsizeminabs	0.74 (0.67, 0.80)	0.71	0.7	0.94 (0.67, 1.20)
right.pupilsizeminabs	0.78 (0.72, 0.85)	0.72	0.82	1.14 (0.86, 1.41)
conj.pupilsizediffmean	0.65 (0.58, 0.72)	0.56	0.71	0.57 (0.32, 0.84)
conj.pupilsizediffmedian	0.65 (0.58, 0.72)	0.52	0.71	0.54 (0.28, 0.80)
conj.pupilsizediffvar	0.72 (0.66, 0.78)	0.76	0.63	0.41 (0.15, 0.67)
conj.varYbot	0.71 (0.64, 0.78)	0.78	0.58	0.02 (-0.24, 0.27)
conj.varYtopbotRatio	0.65 (0.58, 0.72)	0.73	0.59	0.29 (0.03, 0.54)

Appendix Table A3. Area under the curve (AUC), specificity, sensitivity, and effect size between acute and persistent cases for each of the 13 metrics significantly different between groups.

	Acute vs. Persistent			
	AUC (95% CI)	**Specificity**	**Sensitivity**	**Effect Size (95% CI)**
left.pupilsizemean	0.56 (0.48, 0.64)	0.68	0.51	0.22 (0.05, 0.49)
left.pupilsizemedian	0.56 (0.49, 0.64)	0.72	0.46	0.23 (0.05, 0.50)
right.pupilsizemean	0.58 (0.50, 0.66)	0.79	0.36	0.27 (0.00, 0.55)
right.pupilsizemedian	0.58 (0.50, 0.66)	0.75	0.42	0.27 (0.00, 0.55)
left.pupilsizemaxabs	0.54 (0.46, 0.61)	0.82	0.3	0.10 (-0.17, 0.38)
right.pupilsizemaxabs	0.55 (0.47, 0.63)	0.75	0.38	0.17 (-0.10, 0.44)
left.pupilsizeminabs	0.58 (0.50, 0.66)	0.85	0.3	0.27 (0.00, 0.54)
right.pupilsizeminabs	0.59 (0.52, 0.67)	0.54	0.69	0.30 (0.03, 0.57)
conj.pupilsizediffmean	0.51 (0.43, 0.59)	0.72	0.36	0.11 (-0.16, 0.38)
conj.pupilsizediffmedian	0.51 (0.43, 0.58)	0.62	0.46	0.10 (-0.20, 0.34)
conj.pupilsizediffvar	0.51 (0.43, 0.58)	0.85	0.26	0.25 (-0.02, 0.52)
conj.varYbot	0.61 (0.53, 0.68)	0.76	0.44	0.38 (0.11, 0.66)
conj.varYtopbotRatio	0.52 (0.44, 0.59)	0.4	0.73	0.08 (-0.20, 0.35)

Appendix Table A4. Demographics and clinical characteristics of female participants.

	Acute Concussion Symptoms (N = 62)	Persistent Concussion Symptoms (N = 62)	Uninjured (N = 95)	*P*-value	Post-hoc Test *P*-values
Age	15.6 (14.5, 17.3)	16.0 (14.8, 16.8)	15.0 (14.3, 16.1)	**0.02**	Acute v. Persistent: .98 Acute v. Uninjured: **.04** Persistent v. Uninjured: .07
Days Following Injury	4.5 (6.0, 20.8)	51.0 (38.2, 67.5)			
PCSI Total Score*	40.0 (18.0, 60.5)	34.0 (10.2, 52.0)	4.5 (0.0, 8.0)	**<.001**	Acute v. Persistent: 0.37 Acute v. Uninjured: **< .001** Persistent v. Uninjured: **< .001**
Race/ethnicity				.06	
Hispanic	2 (3.2%)	4 (6.5%)	3 (3.2%)		
NH black	4 (6.5%)	8 (12.9%)	11 (11.6%)		
NH white	49 (79.0%)	48 (77.4%)	62 (65.3%)		
NH other/Unknown/Not Reported	7 (11.3%)	2 (3.2%)	19 (20.0%)		
Prior History of Concussion**	24 (38.7%)	26 (42.6%)	25 (26.6%)	.09	

*A total of 59 with acute concussion symptoms, 60 with persistent concussion symptoms, and 82 uninjured completed PCSI.
**One with acute concussion symptoms and one with persistent concussion symptoms did not report on prior history of concussion.

Appendix Table A5. Demographics and clinical characteristics of male participants.

	Acute Concussion Symptoms (N = 68)	**Persistent Concussion Symptoms (N = 27)**	**Uninjured (N = 83)**	***P*-value**	**Post-hoc Test *P*-values**
Age	15.6 (14.5, 16.6)	16.2 (14.5, 17.3)	15.2 (14.2, 16.4)	.24	
Days Following Injury	9.0 (3.0, 17.2)	56.0 (46.5, 67.5)			
PCSI Total Score*	16.0 (3.5, 41.0)	16.0 (3.5, 41.0)	1.0 (0.0, 5.2)	**<.001**	Acute v. Persistent: 0.78 Acute v. Uninjured: **< .001** Persistent v. Uninjured: **< .001**
Race/ethnicity				.77	
Hispanic	3 (4.4%)	1 (3.7%)	5 (6.0%)		
NH black	5 (7.4%)	3 (11.1%)	5 (6.0%)		
NH white	53 (77.9%)	21 (77.8%)	59 (71.1%)		
NH other/Unknown/Not Reported	7 (10.3%)	2 (7.4%)	14 (16.9%)		
Prior History of Concussion	33 (48.5%)	11 (40.7%)	25 (30.1%)	.06	

*A total of 63 with acute concussion symptoms, 25 persistent concussion symptoms, and 66 uninjured completed Post-Concussion Symptom Inventory. Bold numbers are significant.

Appendix Table A6. Contribution of each variable to the first four principal components.

	PC1	PC2	PC3	PC4
left.pupilsizemean	13.24	0.26	0.01	0.01
left.pupilsizemedian	12.72	2.37	0.08	0.01
right.pupilsizemean	13.20	0.26	0.01	0.00
right.pupilsizemedian	12.67	2.37	0.07	0.02
left.pupilsizemaxabs	7.60	0.10	5.43	3.18
right.pupilsizemaxabs	7.64	1.60	2.00	1.16
left.pupilsizeminabs	12.31	0.15	0.20	0.03
right.pupilsizeminabs	11.97	2.45	0.37	0.02
conj.pupilsizediffmean	3.30	41.51	0.92	0.51
conj.pupilsizediffmedian	3.09	40.43	2.10	0.60
conj.pupilsizediffvar	1.58	7.36	19.78	0.48
conj.varYbot	0.01	0.71	46.05	32.17
conj.varYtopbotRatio	0.67	0.42	23.06	61.82

Appendix Table A7. Logistic regression results for the null model, where age, sex, Post-Concussion Symptom Inventory (PCSI) total score, and self-reported prior history of concussion are predictor variables and concussion status is the outcome variable.

Outcome measure	β coefficient	Standard error	95% Confidence Interval	P value	Odds Ratio (95% CI)
Age	0.12	0.09	0.94, 1.35	.21	1.12 (0.94, 1.35)
Sex	0.53	0.28	0.98, 2.92	.05	1.70 (0.99, 2.92)
PCSI total score	0.09	0.01	1.07, 1.13	**< .001**	1.10 (1.07, 1.13)
Prior history of concussion	0.75	0.28	1.22, 3.70	**.007**	2.13 (1.22, 3.70)

Bold values are significant.

Appendix Table A8. Logistic regression results for the model where age, sex, Post-Concussion Symptom Inventory (PCSI) total score, self-reported prior history of concussion, and the first four principal components of the eye tracking metrics are predictor variables and concussion status is the outcome variable.

Outcome measure	β coefficient	Standard error	95% Confidence Interval	P value	Odds Ratio (95% CI)
Age	0.20	0.10	1.00, 1.49	**.04**	1.22 (1.00, 1.49)
Sex	0.47	0.30	0.88, 2.89	.12	1.60 (0.88, 2.90)
PCSI total score	0.09	0.01	1.07, 1.12	**< .001**	1.10 (1.07, 1.12)
Prior history of concussion	0.59	0.31	0.99, 3.35	.05	1.82 (0.99, 3.36)
PC1	-0.38	0.07	0.59, 0.78	**< .001**	0.68 (0.60, 0.78)
PC2	-0.03	0.12	0.76, 1.23	.79	0.97 (0.76, 1.23)
PC3	-0.24	0.21	0.53, 1.18	.24	0.79 (0.53, 1.18)
PC4	0.28	0.19	0.91, 1.92	.14	1.32 (0.91, 1.92)

Bold values are significant.

Appendix Table A9. Median interquartile range (IQR) values for variables found to be significantly different between concussed participants and uninjured participants for prior studies for acute, persistent, and uninjured participants.

	Acute Concussion Symptoms (N = 130)	**Persistent Concussion Symptoms (N = 89)**	**Uninjured (N = 178)**
BOX Score	3.9 (2.0, 8.0)	5.6 (2.5, 10.7)	3.8 (2.0, 8.6)
left.distLeft	0.002 (0.002, 0.003)	0.002 (0.002, 0.003)	0.002 (0.002, 0.003)
right.distRight	0.002 (0.002, 0.003)	0.002 (0.002, 0.003)	0.002 (0.002, 0.003)
conj.varXtopbotRatio	1.39 (0.77, 2.36)	1.23 (0.57, 2.48)	1.61 (0.93, 2.85)
left.varYtop	0.011 (0.006, 0.016)	0.012 (0.007, 0.020)	0.009 (0.006, 0.017)

Appendix Table A10. Area under the curve (AUC), specificity, sensitivity, and effect size between acute cases and uninjured adolescents for metrics found to be significantly different between concussed and uninjured participants in prior studies.

	Acute vs. Uninjured			
	AUC (95% CI)	**Specificity**	**Sensitivity**	**Effect Size (95% CI)**
BOX Score	0.49 (0.43, 0.56)	0.87	0.21	0.06 (-0.17, 0.29)
left.distLeft	0.55 (0.49, 0.62)	0.90	0.21	0.14 (-0.09, 0.36)
right.distRight	0.55 (0.48, 0.61)	0.36	0.78	0.01 (-0.22, 0.24)
conj.varXtopbotRatio	0.55 (0.48, 0.62)	0.65	0.43	0.09 (-0.14, 0.32)
left.varYtop	0.51 (0.45, 0.58)	0.61	0.5	0.11 (-0.11, 0.34)

Appendix Table A11. Area under the curve (AUC), specificity, sensitivity, and effect size between persistent cases and uninjured adolescents for metrics found to be significantly different between concussed and uninjured participants in prior studies.

	Persistent vs. Uninjured			
	AUC (95% CI)	**Specificity**	**Sensitivity**	**Effect Size (95% CI)**
BOX Score	0.56 (0.50, 0.65)	0.56	0.61	0.23 (-0.02, 0.45)
left.distLeft	0.59 (0.52, 0.66)	0.72	0.45	0.29 (0.03, 0.54)
right.distRight	0.56 (0.49, 0.63)	0.88	0.28	0.00 (-0.25, 0.25)
conj.varXtopbotRatio	0.59 (0.51, 0.66)	0.63	0.58	0.00 (-0.25, 0.26)
left.varYtop	0.58 (0.51, 0.65)	0.67	0.50	0.20 (-0.05, 0.46)

APPENDIX TABLE A12. Area under the curve (AUC), specificity, sensitivity, and effect size between acute and persistent cases for metrics found to be significantly different between concussed and uninjured participants in prior studies.

	Acute vs. Persistent			
	AUC (95% CI)	**Specificity**	**Sensitivity**	**Effect Size (95% CI)**
BOX Score	0.59 (0.51, 0.67)	0.64	0.56	0.30 (0.03, 0.57)
left.distLeft	0.54 (0.46, 0.61)	0.46	0.66	0.16 (-0.11, 0.43)
right.distRight	0.51 (0.44, 0.60)	0.26	0.87	0.02 (-0.25, 0.29)
conj.varXtopbotRatio	0.54 (0.46, 0.62)	0.52	0.63	0.07 (-0.21, 0.34)
left.varYtop	0.57 (0.49, 0.64)	0.23	0.90	0.31 (0.04, 0.58)