Additional Figures and Tables

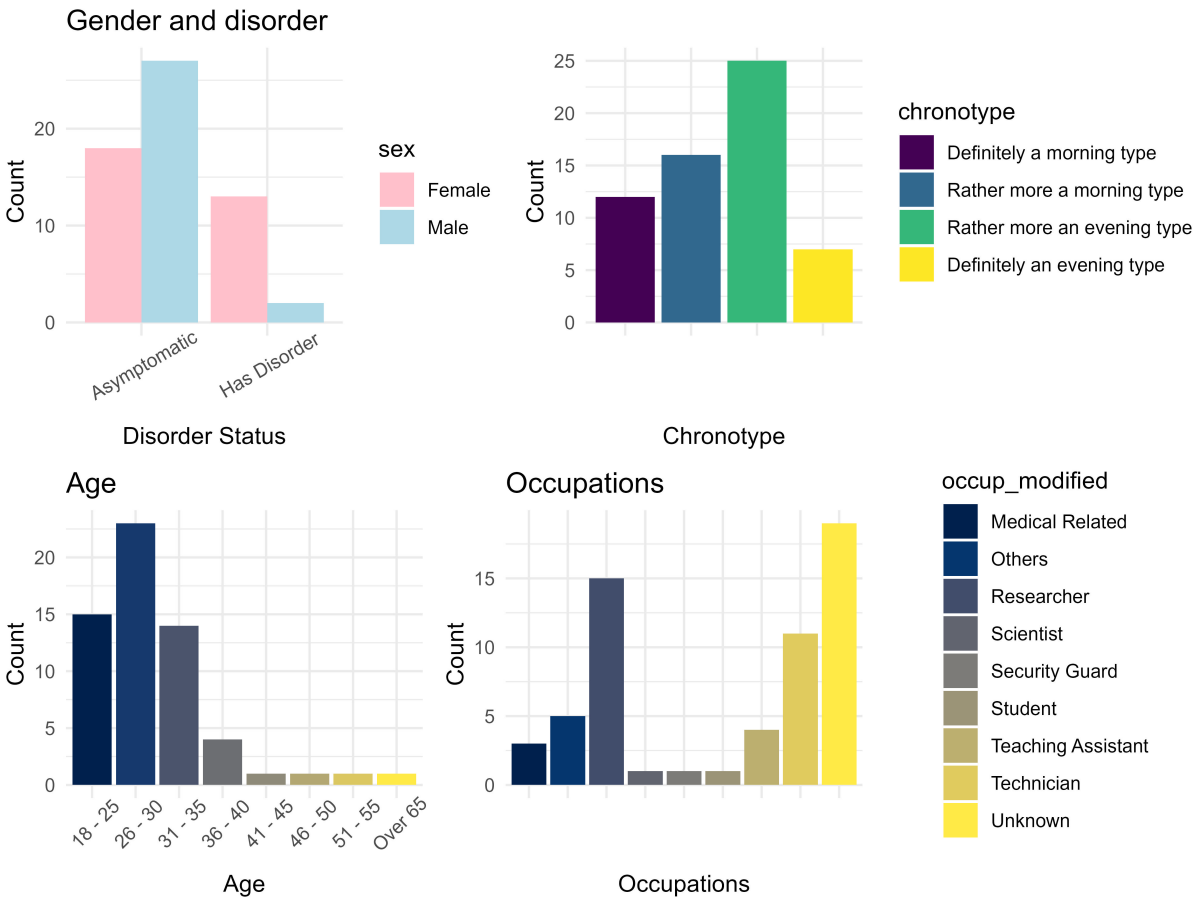

Figure 1: Information about the subjects. The gender distribution is even, with 29 male and 31 female. There are more female with mental disorder such as depression, anxiety, etc., brain disorder such as migraine than male subjects. There are more evening types than morning types. Most subjects has an age below 40. The occupations of the subjects were considerably disverse with most academic related like researchers and students.

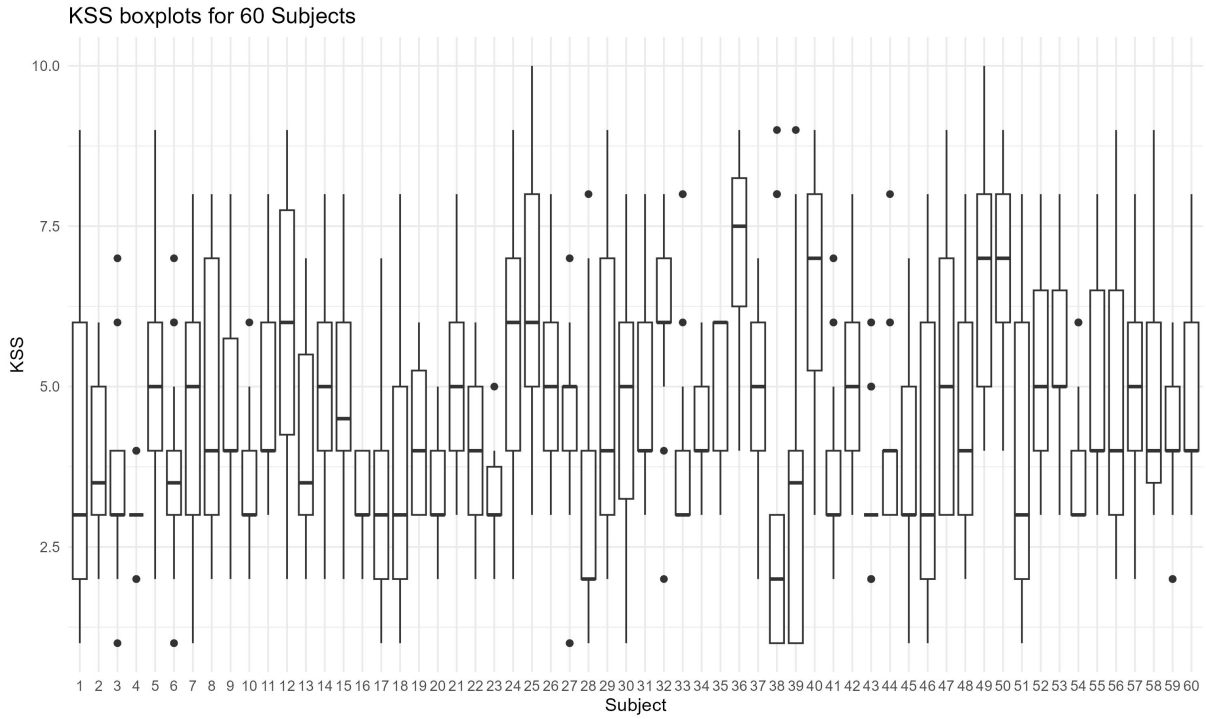

Figure 2: Boxplots of KSS for each subject, the range and mean varies significantly across subjects as KSS is a subjective measure that reflects on the psychological state of the subject.

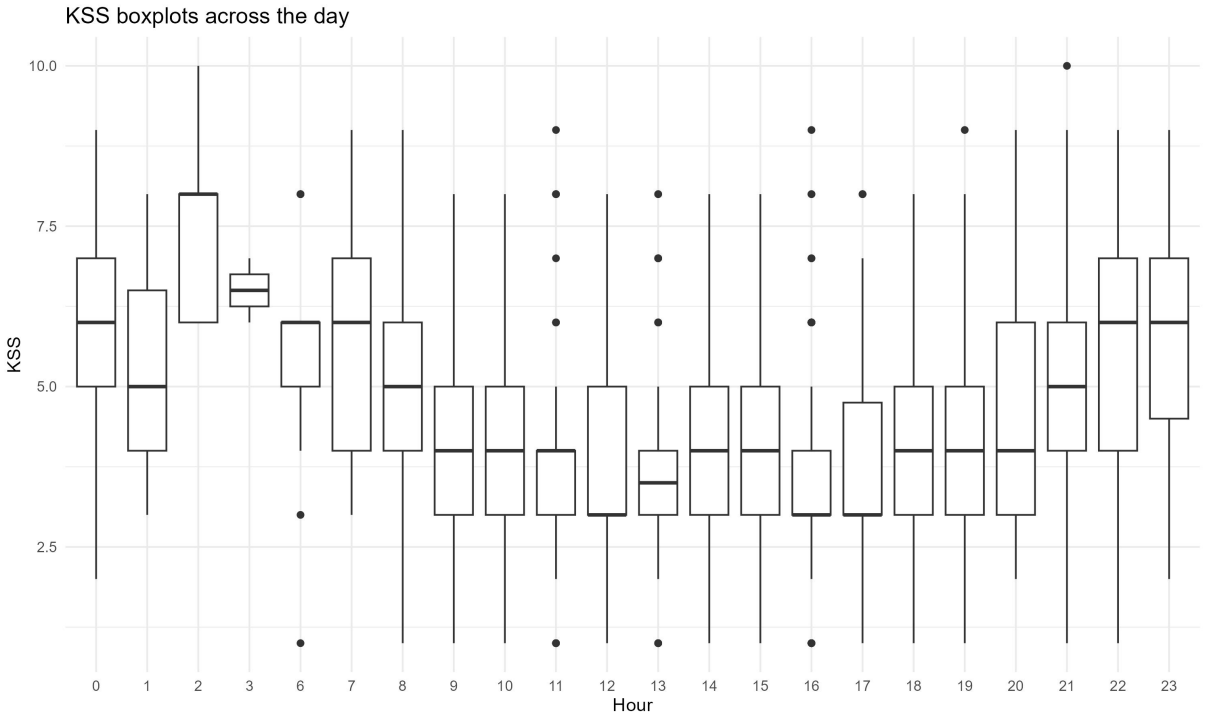

Figure 3: Boxplots of KSS across the day. Sleepiness is lower during daytime compared to nighttime. The mean KSS score from 9:00 till 19:00 is around 3 to 4; The mean KSS from 19:00 onwards shifts up.

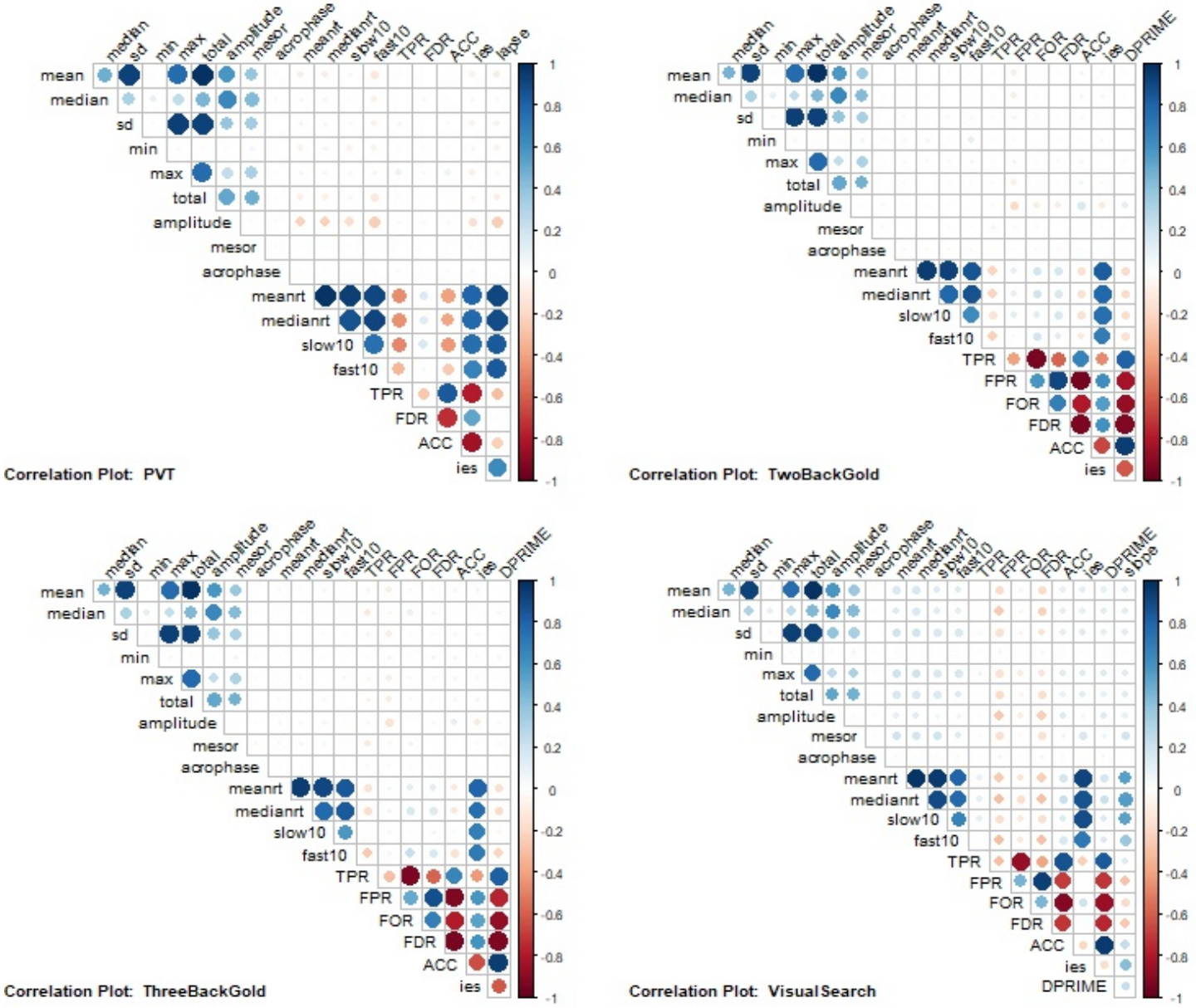

Figure 4: Heatmap of Pearson correlation coefficients for each task's specific results, the summary statistics and cosinor fit parameters of the past MEDI history. There are many similarities, strong positive correlation between mean, standard deviation as sd, and total; The mean reaction time as meanrt correlated with median, slowest, and fastest reaction time; The IES correlates with all reaction metric; Other performance metrics such as TPR and ACC are correlated similarly across the tasks. The performance metrics and MEDI variables are either independent or weakly correlated.

Table 1: The performance scores of the Random Forest models trained with observations of each task with features subject, and the MEDI history hourly mean up to 11 hours.

(a) PVT

	RMSE		R^2	
target	test	train	test	train
TPR	8.04	3.12	0.02	0.91
FDR	3.75	2.87	0.04	0.92
ACC	8.05	4.17	0.03	0.91
medianrt	77.23	33.28	0.07	0.94
meanrt	78.45	35.01	0.09	0.93
slow10	132.03	54.35	0.01	0.93
fast10	58.35	24.02	0.05	0.94
lapse	5.27	2.51	0.04	0.93

(b) Visual search

	RMSE		R^2	
target	test	train	test	train
TPR	13.04	6.05	0.02	0.93
FPR	7.98	3.72	0.23	0.93
FOR	10.00	4.59	0.01	0.94
FDR	11.54	4.17	0.08	0.93
ACC	9.09	4.09	0.00	0.93
medianrt	719.33	321.59	0.04	0.93
meanrt	719.60	317.23	0.01	0.94
slow10	1217.89	523.43	0.03	0.94
fast10	413.68	162.63	0.01	0.93
slope	477.65	220.49	0.00	0.94

(c) 2-back

	RMSE		R^2	
target	test	train	test	train
TPR	13.23	5.95	0.02	0.90
FPR	11.58	5.22	0.09	0.93
FOR	5.89	2.53	0.12	0.92
FDR	16.31	7.49	0.11	0.93
ACC	9.45	4.86	0.03	0.92
medianrt	206.46	83.47	0.01	0.95
meanrt	181.30	83.53	0.09	0.94
slow10	275.33	119.53	0.02	0.94
fast10	125.81	66.54	0.00	0.93
DPRIME	0.78	0.34	0.03	0.93

(d) 3-back

	RMSE		R^2	
target	test	train	test	train
TPR	18.08	8.94	0.00	0.94
FPR	13.26	6.22	0.22	0.94
FOR	8.34	3.64	0.02	0.93
FDR	21.13	9.11	0.03	0.94
ACC	12.86	5.63	0.06	0.94
medianrt	223.72	99.73	0.02	0.95
meanrt	205.11	94.83	0.02	0.95
slow10	296.50	131.97	0.02	0.95
fast10	162.13	82.19	0.05	0.93
DPRIME	0.97	0.40	0.04	0.95

Table 2: The performance scores of the Random Forest models trained with observations of each task with features subject, the MEDI history statistical summaries and cosinor parameters.

(a) PVT

	RMSE		R^2	
target	test	train	test	train
TPR	7.89	2.84	0.07	0.88
FDR	3.55	2.49	0.11	0.94
ACC	7.26	3.67	0.20	0.90
medianrt	59.08	26.63	0.46	0.93
meanrt	59.20	27.13	0.51	0.93
slow10	106.04	45.71	0.34	0.93
fast10	44.41	19.33	0.45	0.93
lapse	4.22	2.13	0.37	0.92

(b) Visual search

	RMSE		R^2	
target	test	train	test	train
TPR	10.78	5.74	0.31	0.91
FPR	6.18	2.83	0.55	0.93
FOR	9.19	4.13	0.15	0.91
FDR	10.14	3.70	0.30	0.89
ACC	7.48	3.42	0.22	0.92
medianrt	597.75	272.60	0.34	0.93
meanrt	602.77	261.59	0.28	0.93
slow10	1045.47	431.38	0.29	0.93
fast10	371.24	151.42	0.17	0.92
slope	464.14	215.95	0.04	0.91

(c) 2-back

	RMSE		R^2	
target	test	train	test	train
TPR	11.60	5.58	0.21	0.89
FPR	9.95	4.04	0.38	0.92
FOR	4.94	2.14	0.39	0.91
FDR	13.76	6.29	0.37	0.92
ACC	7.54	3.57	0.37	0.92
medianrt	174.72	74.70	0.28	0.92
meanrt	162.50	72.62	0.27	0.92
slow10	258.27	115.27	0.13	0.92
fast10	114.54	58.59	0.14	0.91
DPRIME	0.68	0.29	0.24	0.91

(d) 3-back

	RMSE		R^2	
target	test	train	test	train
TPR	17.00	8.30	0.09	0.92
FPR	11.57	4.97	0.39	0.92
FOR	7.52	3.24	0.19	0.92
FDR	17.30	7.62	0.35	0.92
ACC	10.00	4.71	0.47	0.92
medianrt	202.56	94.27	0.19	0.92
meanrt	190.59	86.64	0.14	0.92
slow10	279.98	122.99	0.12	0.92
fast10	141.55	78.08	0.28	0.90
DPRIME	0.77	0.35	0.40	0.93