Supplementary Material

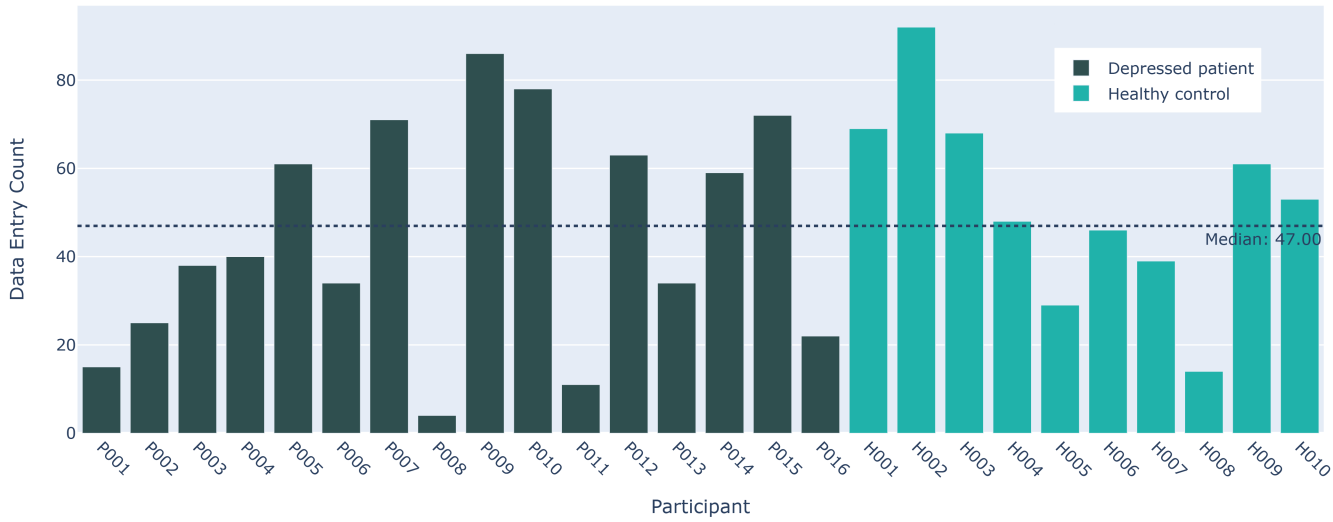

Figure S1: This bar plot illustrates the distribution of data points for each participant, denoted by 'P' for depressed patients and 'H' for healthy controls. Each bar represents an individual participant, with the height of the bar corresponding to the total number of data points. Data points are derived from instances where participants provided questionnaire responses and 24 hours of continuous patch data after cleaning and pre-processing. The median of all participants is shown as the dotted line.

Table S1: Linear mixed-effects model results: 24-hours time series difference between diagnosis group.

	HR		**RMSSD**		**SampEn**		**RR**		**Act**	
Hour	β	**p-value**	β	**p-value**	β	**p-value**	β	**p-value**	β	**p-value**
24	-3.888	0.153	41.911	0.218	-0.064	0.976	-1.790	0.143	6.717	0.850
23	-4.266	0.246	46.673	0.272	-0.050	0.976	-1.556	0.143	8.826	0.850
22	-5.131	0.166	61.525	0.102	-0.047	0.976	-1.359	0.179	5.531	0.908
21	-7.167	0.076	66.170	0.083	-0.066	0.976	-1.477	0.143	1.837	0.908
20	-4.346	0.180	69.443	0.083	-0.053	0.976	-1.332	0.179	8.759	0.908
19	-5.760	0.106	54.668	0.137	0.013	0.976	-1.092	0.216	-4.392	0.908
18	-6.167	0.096	43.357	0.185	-0.003	0.987	-1.366	0.143	-6.799	0.908
17	-5.881	0.106	36.279	0.253	0.009	0.976	-1.306	0.190	-1.561	0.908
16	-7.333	0.027	59.032	0.162	-0.021	0.976	-1.033	0.229	11.325	0.850
15	-3.727	0.166	46.934	0.218	-0.064	0.976	-1.124	0.216	2.339	0.908
14	-4.855	0.115	76.736	0.137	-0.036	0.976	-1.098	0.231	14.475	0.850
13	-5.795	0.100	32.892	0.436	0.016	0.976	-1.541	0.143	2.327	0.908
12	-5.936	0.092	34.046	0.512	-0.022	0.976	-1.888	0.143	2.994	0.908
11	-5.100	0.115	45.391	0.253	-0.033	0.976	-1.867	0.143	-1.145	0.908
10	-5.958	0.106	25.727	0.570	-0.048	0.976	-1.057	0.216	4.840	0.908
9	**-7.695**	**0.049**	34.484	0.272	0.016	0.976	-1.113	0.216	-0.668	0.908
8	**-9.615**	**0.010**	35.365	0.145	0.084	0.976	-0.919	0.320	2.717	0.908
7	**-10.933**	**0.002**	16.415	0.512	0.128	0.976	-1.376	0.216	1.768	0.908
6	**-10.199**	**0.002**	27.006	0.208	0.062	0.976	-1.498	0.216	2.718	0.908
5	**-9.537**	**0.002**	23.962	0.372	0.057	0.976	-1.459	0.216	6.884	0.850
4	**-8.430**	**0.004**	46.595	0.102	0.010	0.976	-1.461	0.229	9.311	0.850
3	**-7.932**	**0.005**	32.258	0.185	0.001	0.987	-1.732	0.216	9.832	0.850
2	**-9.097**	**0.002**	6.217	0.833	0.075	0.976	-1.728	0.216	9.332	0.850
1	**-9.533**	**0.002**	13.146	0.637	0.067	0.976	-2.417	0.143	3.632	0.908

HR: heart rate. RMSSD: root mean square of successive differences between normal heartbeats. SampEn: sample entropy of heart rate. RR: respiration rate. Act: Activity counts.

Table S2: Linear mixed-effects model results: 24-hours HR time series difference between valence levels in the morning and diagnosis group.

HR (group + valence level)					
Hour	**beta**	**p-value**	**Hour**	**beta**	**p-value**
24	-1.828	0.859	**12**	-1.136	0.859
23	-0.042	0.981	**11**	-0.979	0.859
22	0.142	0.974	**10**	1.190	0.859
21	0.958	0.859	**9**	1.755	0.859
20	1.018	0.859	**8**	0.897	0.859
19	1.733	0.859	**7**	0.092	0.974
18	2.062	0.859	**6**	0.878	0.859
17	2.356	0.859	**5**	-0.547	0.859
16	0.700	0.897	**4**	-1.022	0.859
15	0.391	0.974	**3**	-0.160	0.974
14	0.825	0.859	**2**	-0.084	0.974
13	0.492	0.974	**1**	-1.337	0.859

HR: heart rate.

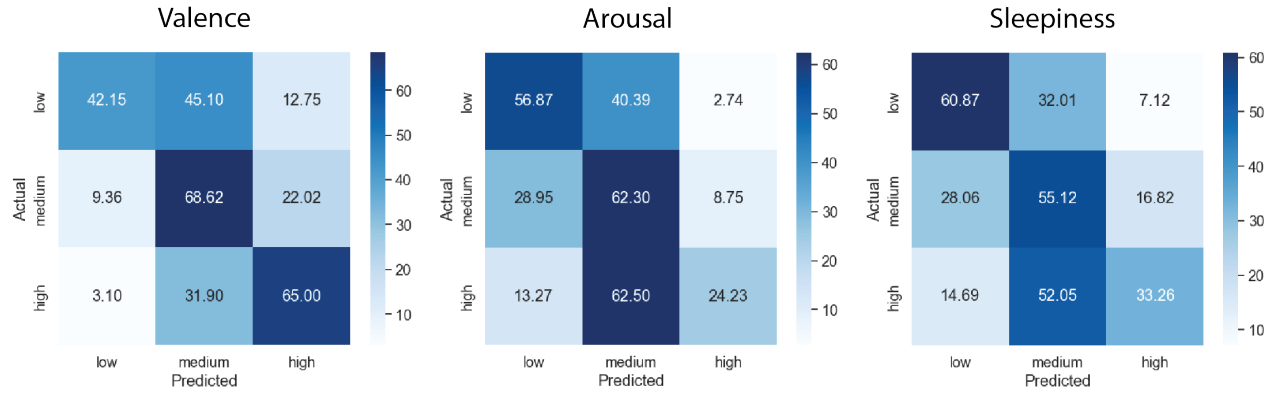

Figure S2: This figure presents the confusion matrices of the valence, arousal and sleepiness classification model that considers the combination of signals of the highest performance for each of them.

Table S3: F1, precision and recall results for the deep learning models classification

	Valence (24 hours)			**Arousal (12 hours)**			**Sleepiness (12 hours)**		
Modalities	**F1**	**Precision**	**Recall**	**F1**	**Precision**	**Recall**	**F1**	**Precision**	**Recall**
HR	.54 (.05)	.55 (.06)	.55 (.06)	.43 (.08)	.46 (.07)	.46 (.07)	.45 (.04)	.46 (.04)	.46 (.04)
RMSSD	.52 (.04)	.55 (.05)	.55 (.05)	.37 (.06)	.38 (.06)	.38 (.06)	.38 (.04)	.39 (.05)	.39 (.05)
SampEn	.51 (.03)	.54 (.04)	.54 (.04)	.38 (.03)	.39 (.04)	.39 (.04)	.43 (.05)	.45 (.06)	.45 (.06)
Act	.57 (.05)	.6 (.05)	.6 (.05)	.42 (.06)	.43 (.07)	.43 (.07)	.44 (.04)	.45 (.05)	.45 (.05)
RR	.56 (.05)	.58 (.05)	.58 (.05)	.42 (.06)	.45 (.1)	.45 (.1)	.44 (.05)	.45 (.06)	.45 (.06)
HR + RMSSD	.56 (.03)	.58 (.03)	.58 (.03)	.46 (.07)	.48 (.07)	.48 (.07)	.43 (.02)	.46 (.03)	.46 (.03)
HR + SampEn	.58 (.04)	.6 (.05)	.6 (.05)	.44 (.03)	.46 (.04)	.46 (.04)	.42 (.03)	.44 (.04)	.44 (.04)
HR + Act	.55 (.06)	.58 (.07)	.58 (.07)	.46 (.06)	.47 (.05)	.47 (.05)	.46 (.03)	.47 (.04)	.47 (.04)
HR + RR	.6 (.05)	**.63 (.06)**	.63 (.06)	.43 (.05)	.44 (.05)	.44 (.05)	.49 (.06)	.5 (.06)	.5 (.06)
HRV	.56 (.03)	.56 (.04)	.56 (.04)	.44 (.03)	.45 (.03)	.45 (.03)	.46 (.04)	.49 (.04)	.49 (.04)
HR + Activity + RR	.6 (.05)	.62 (.05)	.62 (.05)	.46 (.04)	.48 (.06)	.48 (.06)	**.5 (.06)**	**.51 (.06)**	**.51 (.06)**
HRV + Act	**.6 (.04)**	.62 (.04)	.62 (.04)	.45 (.05)	.46 (.05)	.46 (.05)	.47 (.04)	.5 (.05)	.5 (.05)
HRV + RR	.59 (.04)	.61 (.04)	.61 (.04)	**.48 (.05)**	**.5 (.05)**	**.5 (.05)**	.47 (.04)	.49 (.04)	.49 (.04)
HRV + Act + RR	.59 (.05)	.62 (.05)	**.62 (.05)**	.47 (.04)	.49 (.05)	.49 (.05)	.48 (.05)	**.51 (.06)**	**.51 (.06)**
Baseline	.22(.0)	.17(.0)	.33 (.0)	.22(.0)	.17(.0)	.33 (.0)	.22(.0)	.17(.0)	.33 (.0)

The reported values are represented as average (standard deviation) from the 10-fold cross-validation. HR: heart rate. RMSSD: root mean square of successive differences between normal heartbeats. SampEn: sample entropy of heart rate. Act: activity counts. RR: respiration rate. HRV: HR + RMSSD + SampEn. All: HRV + Act + RR. Baseline refers to a model that would always predict the neutral level class.