Conclusion

In a large homogeneous sample of bipolar I sample, we did not identify persisting sleep disturbances in bipolar patients other than related to increased depressive symptoms. The meta-analysis points in the direction of longer sleep duration, WASO and sleep onset latency and lower sleep efficiency in bipolar patients. The majority of these differences in the meta-analysis were however small, the overall number of participants limited and the question remains whether they reflect clinically significant sleep disturbances. Furthermore, non-affected siblings showed normal sleep-wake patterns. Overall in our data sleep disturbances are a state marker of mood symptomatology which underscores the need for further study of the persistence of disturbance in sleep-wake patterns in euthymic bipolar disorder patients and in patients before disease onset.

Supplementary Figures

Supplementary Figure 1 – *Actograms of a bipolar patient (A), non-affected sibling (B) and healthy control (C). Black lines indicate activity levels per minute. Dark blue intervals indicate sleep and lighter blue intervals indicate sleep onset latency (wake prior to sleep) or sleep inertia (wake after sleep).*

Supplementary table 1 – Analysis of variability in sleep measures

A	Patients			Siblings			Controls	
	M	*SD*		*M*	*SD*		*M*	*SD*
Sleep duration	82.49	41.0		67.29	24.83		76.12	33.32
Sleep onset	63.74	37.17		54.59	27.21		62.35	31.48
Sleep onset latency	9.81	10.90		10.26	14.99		12.16	29.70
Sleep efficiency	4.60	3.69		5.15	4.66		4.82	4.09
WASO	20.26	13.19		19.57	13.75		20.73	18.03
Sleep offset	71.49	34.90		57.35	24.98		68.39	35.45
Sleep inertia	9.42	11.45		10.13	10.53		8.73	14.15

B	Patients vs Siblings			Patients vs Controls			Siblings vs Controls	
	ß	*p*		*ß*	*p*		*ß*	*p*
Sleep duration	13.37	0.02		7.68	0.15		5.69	0.33

	β	p	β	p	β	p
Sleep onset	7.12	0.16	3.08	0.53	4.04	0.46
Sleep onset latency	-0.51	0.87	-2.26	0.45	1.75	0.59
Sleep efficiency	-0.59	0.36	-0.17	0.78	-0.41	0.54
WASO	0.17	0.94	-0.09	0.97	0.26	0.92
Sleep offset	11.42	0.03	5.38	0.27	6.04	0.25
Sleep inertia	-0.93	0.62	0.91	0.62	-1.84	0.36

C	Patients vs Siblings		Patients vs Controls		Siblings vs Controls	
	β	p	β	p	β	p
Sleep duration	8.38	0.15	1.93	0.74	6.44	0.26
Sleep onset	4.16	0.45	-0.21	0.97	4.37	0.42
Sleep onset latency	-0.51	0.87	-2.26	0.44	1.76	0.59
Sleep efficiency	-0.67	0.34	-0.26	0.70	-0.40	0.56
WASO	-2.68	0.26	-3.24	0.20	0.56	0.82
Sleep offset	9.14	0.10	2.84	0.59	6.30	0.23
Sleep inertia	-0.39	0.85	1.51	0.46	-1.90	0.34

Table A: Means and standard deviations of variability in sleep measures

Table B: *Beta (β) and p-values of patients vs siblings, patients versus controls and siblings versus controls; Random factor: relatedness; Covariates: age and gender*

Table C: *Beta (β) and p-values of patients vs siblings, patients versus controls and siblings versus controls; Random factor: relatedness; Covariates: age, gender and IDS-SR score*

Supplementary table 2 – Association of sleep with number of manic episodes, depressive episodes and rapid cycling

	Nr of manic episodes		Nr of depr episodes		Rapid cycling	
	β	p	β	p	β	p
Sleep duration	-0.03	0.76	-0.04	0.74	-0.03	0.74
Sleep onset	0.02	0.88	-0.03	0.79	0.09	0.39
Sleep onset latency	-0.21	0.04	-0.03	0.80	-0.10	0.36
Sleep efficiency	0.18	0.08	0.17	0.11	0.06	0.56
WASO	-0.16	0.13	-0.19	0.08	-0.02	0.85
Sleep offset	-0.02	0.88	-0.06	0.56	0.05	0.63
Sleep inertia	-0.15	0.15	-0.10	0.34	-0.13	0.20

Beta (β) and p-values of association between illness characteristics and sleep pattern