

Difficulties Initiating and Maintaining Sleep in Young Adults: Insufficient Sleep or Insomnia?

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Background

- DIS and DMS are core manifestations of insomnia.
- However, the prevalence of DIS is higher than that of DMS among young populations (Ohayon et al, 2000).
- Our previous studies on young adults suggested that DIS and DMS could differ in their association with the various markers of
 - insufficient sleep (Vela-Bueno et al, 2008) or
 - insomnia (Fernandez-Mendoza et al, 2009).
- To date, the differential nighttime and daytime correlates of these complaints among young adults have not yet been addressed.

Characteristics of the sample

N = 1,271			
		%	Mean \pm SD
Gender	Males	35.5	---
	Females	64.5	
Age		---	18.8 \pm 1.4
Body Mass Index		---	21.4 \pm 2.7

Characteristics of the sample

	N = 1,271	
	%	Mean \pm SD
Morningness-Eveningness score	---	50.7 \pm 7.9
Morningness-Eveningness types		
M-type	15.7	---
N-type	71.4	---
E-type	12.9	---
College Schedule		
Morning	74.7	---
Afternoon	25.3	---

Characteristics of the sample

	N = 1,271	
	%	Mean \pm SD
Sleep Duration (weekdays)		
Total Sleep Time	---	448 \pm 62.1
Desired Sleep Time	---	544 \pm 85.2
Perceived Sleep Debt	---	100 \pm 71.9
Sleep Duration (weekends)		
Total Sleep Time	---	499 \pm 92.4
Desired Sleep Time	---	587 \pm 90.7
Perceived Sleep Debt	---	98.4 \pm 89.2

Characteristics of the sample

	%
Bedtime on weekdays	
21:00 – 23:59	33.2
24:00 – 24:59	48.5
1:00 – 1:59	13.9
≥ 2:00	4.4
Waketime on weekdays	
5:15 – 6:59	8.9
7:00 – 7:59	47.2
8:00 – 8:59	23.1
9:00 – 9:59	13.5
≥ 10:00	7.3
Bedtime on weekends	
23:00 – 1:59	19.4
2:00 – 2:59	22.1
3:00 – 3:59	22.7
4:00 – 4:59	16.3
≥ 5:00	19.4
Waketime on weekends	
6:00 – 9:59	17.0
10:00 – 11:59	49.9
12:00 – 13:59	25.6
≥ 14:00	7.5

Characteristics of the sample

	N = 1,271	
	%	Mean \pm SD
Epworth Sleepiness Scale score	---	8.8 \pm 3.3
Epworth Sleepiness Scale > 10	29.2	---
Irregular Sleep Pattern	8.5	
Delayed Sleep Pattern	30.5	---

Prevalence of sleep difficulties

	%
Difficulty Initiating Sleep	28.3
Difficulty Maintaining Sleep	9.9
Early Morning Awakening	28.3
Non-restorative Sleep	24.1
Insomnia Complaint	9.7

Nighttime Sleep: DIS

			95% CI	
	P	OR	Lower	Upper
Delayed Sleep Pattern	.0001*	4.212	2.775	6.394
Irregular Sleep Pattern	.545	1.225	.635	2.360

Adjusted for potential confounders (i.e., gender, age, BMI, and MEQ)

Nighttime Sleep: DIS

			95% CI	
	P	OR	Lower	Upper
Sleep Quality	.0001*	2.358	1.809	3.074
Sleep Depth	.223	1.134	.926	1.388
Restorative Sleep	.005*	1.383	1.105	1.732

Adjusted for potential confounders (i.e., gender, age, BMI, and MEQ)

Nighttime Sleep: DIS

			95% CI	
	P	OR	Lower	Upper
SOL weekdays	.0001*	1.030	1.020	1.049
SOL weekends	.691	1.001	.986	1.009
TST weekdays	.041*	1.060	1.000	1.009
TST weekends	.429	.999	.997	1.001
PSD weekdays	.358	1.001	.998	1.005
Bedtime on weekdays	.338	1.153	.861	1.545

Adjusted for potential confounders (i.e., gender, age, BMI, and MEQ)

Daytime Functioning: DIS

			95% CI	
	P	OR	Lower	Upper
College schedule	.043*	1.612	1.015	2.561
ESS > 10	.062*	1.420	.983	2.050

Adjusted for potential confounders (i.e., gender, age, BMI, and MEQ)

Daytime Functioning: DIS

			95% CI	
	P	OR	Lower	Upper
Tobacco	.859	1.020	.818	1.272
Coffee	.528	1.064	.878	1.290
Cannabis	.514	1.103	.819	1.485
Alcohol	.142	1.176	.946	1.461
Hypnotics	.001*	3.773	1.763	8.076
Cola	.172	1.162	.966	1.398

Adjusted for potential confounders (i.e., gender, age, BMI, and MEQ)

Daytime Functioning: DIS

			95% CI	
	P	OR	Lower	Upper
Anxiety symptoms	.825	1.015	.891	1.156
Depression symptoms	.001*	1.165	1.068	1.272

Adjusted for potential confounders (i.e., gender, age, BMI, and MEQ)

Daytime Functioning: DIS

			95% CI	
	P	OR	Lower	Upper
Non-Napping	.416	1.149	.821	1.607
Fatigue	.382	1.232	.772	1.964
Miss classes due to oversleep	.397	1.203	.785	1.843
Miss classes due to tiredness	.010*	1.666	1.130	2.455
Fall asleep in class	.544	1.209	.654	2.235
Restlessness in class	.114	1.290	.941	1.767
Feeling irritable in class	.977	1.005	.715	1.412
Decreased ability to concentrate	.027*	1.877	1.074	3.279
Poor memory	.343	1.193	.828	1.719

Adjusted for potential confounders (i.e., gender, age, BMI, and MEQ)

Nighttime Sleep: DMS

			95% CI	
	P	OR	Lower	Upper
Delayed Sleep Pattern	.521	1.114	.802	1.547
Irregular Sleep Pattern	.115	1.885	.857	4.144

Adjusted for potential confounders (i.e., gender, age, BMI, and MEQ)

Nighttime Sleep: DMS

			95% CI	
	P	OR	Lower	Upper
SOL weekdays	.676	1.002	.986	1.009
SOL weekends	.479	1.006	.979	1.010
TST weekdays	.742	1.001	.995	1.007
TST weekends	.308	1.002	.998	1.005
PSD weekdays	.964	1.000	.995	1.005
Bedtime on weekdays	.248	1.266	.849	1.888

Adjusted for potential confounders (i.e., gender, age, BMI, and MEQ)

Nighttime Sleep: DMS

			95% CI	
	P	OR	Lower	Upper
Sleep Quality	.0001*	2.593	1.753	3.836
Sleep Depth	.0001*	2.461	1.832	3.306
Restorative Sleep	.039*	1.693	1.058	3.110

Adjusted for potential confounders (i.e., gender, age, BMI, and MEQ)

Daytime Functioning: DMS

			95% CI	
	P	OR	Lower	Upper
College schedule	.358	1.316	.733	2.362
ESS > 10	.986	1.005	.589	1.714

Adjusted for potential confounders (i.e., gender, age, BMI, and MEQ)

Daytime Functioning: DMS

			95% CI	
	P	OR	Lower	Upper
Tobacco	.815	1.038	.757	1.422
Coffee	.346	1.145	.864	1.518
Cannabis	.296	1.253	.821	1.913
Alcohol	.838	1.034	.747	1.432
Hypnotics	.0001*	3.636	1.845	7.167
Cola	.209	1.191	.905	1.567

Daytime Functioning: DMS

			95% CI	
	P	OR	Lower	Upper
Anxiety symptoms	.726	1.034	.858	1.245
Depression symptoms	.061*	1.103	.978	1.245

Adjusted for potential confounders (i.e., gender, age, BMI, and MEQ)

Daytime Functioning: DMS

			95% CI	
	P	OR	Lower	Upper
Non-Napping	.001*	2.451	1.443	4.166
Fatigue	.017*	2.647	1.190	5.886
Miss classes due to oversleep	.439	1.310	.660	2.604
Miss classes due to tiredness	.592	.847	.642	2.169
Fall asleep in class	.736	1.117	.586	2.132
Restlessness in class	.032*	1.676	1.044	2.690
Feeling irritable in class	.913	1.029	.621	1.704
Decreased ability to concentrate	.086*	1.648	.932	2.912
Poor memory	.317	1.307	.773	2.207

Adjusted for potential confounders (i.e., gender, age, BMI, and MEQ)

Profiles of Depressive Symptoms

	DIS	DMS
	OR (95%CI)	OR (95%CI)
Anxiety	---	--
Depression		
Fatigue or loss of energy	---	1.91 (1.20-3.04)**
Feelings of sadness	1.46 (1.09-1.96)*	---
Poor concentration	---	1.70 (1.07-2.67)*
Irritability	---	---
Guilty feelings	---	---
Weight change	---	---
Diminished pleasure	1.70 (1.14-2.55)**	---
Feelings of worthlessness	---	---
Somatic		
Headache	1.40 (1.08-1.84)*	---
Muscle aches	---	---
Diarrhea	1.49 (1,00-2,22)*	2.07 (1.25-3.44)**

OR are mutually adjusted among predictors; * P < .05; **P < .01

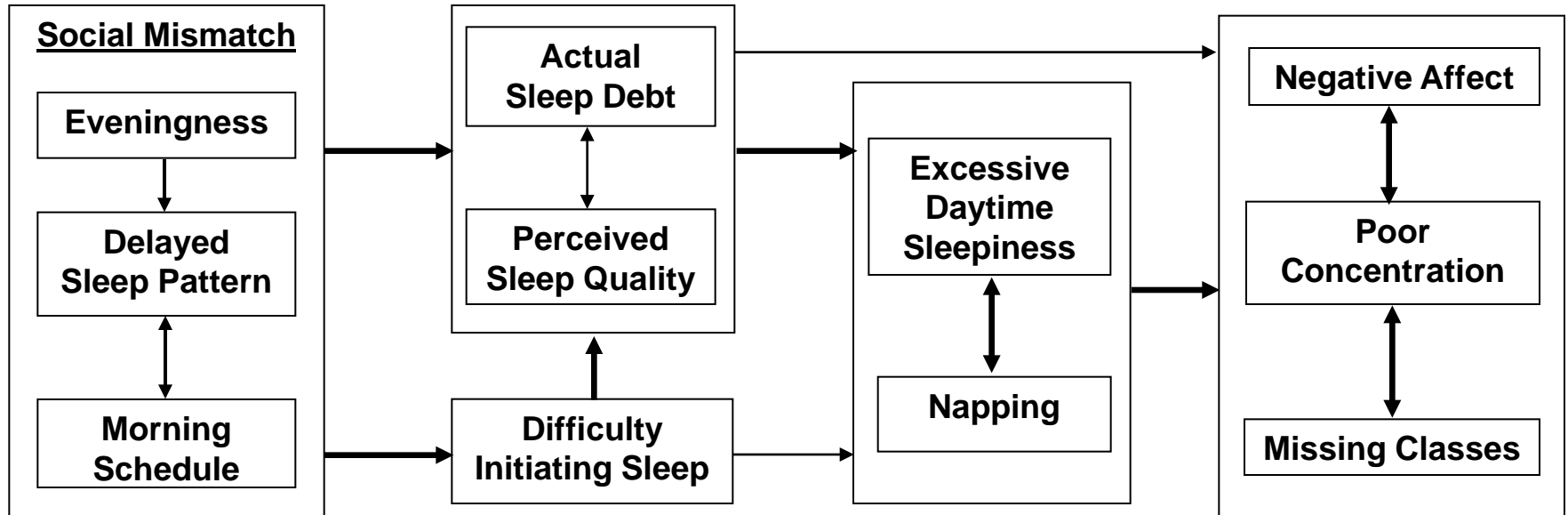
Diagnosed Medical Disorders

	DIS			DMS		
	%	OR (95%CI)	P	%	OR (95%CI)	P
Psychiatric	2.2	1.57 (0.65-3.82)	.316	4.1	2.97 (1.07-8.25)	.029*
Neurologic	2.0	1.19 (0.48-2.94)	.706	2.4	1.55 (0.45-5.35)	.481
Respiratory	7.6	0.99 (0.62-1.58)	.977	5.7	0.72 (0.33-1.60)	.425
Cardiovascular	2.8	1.50 (0.68-3.32)	.308	4.1	2.25 (0.83-6.08)	.101
Digestive	3.1	1.57 (0.73-3.36)	.242	4.9	2.60 (1.03-6.53)	.048*
Urinary	0.8	2.55 (0.51-12.71)	.236	0.0	1.01 (1.00-1.01)	.383
Reproductive/gynecologic	0.9	0.51 (0.15-1.76)	.276	0.0	1.02 (1.01-1.02)	.245
Dermatologic	9.5	1.51 (0.97-2.34)	.067	9.0	1.31 (0.68-2.53)	.424
Hematologic	2.2	1.36 (0.57-3.23)	.487	4.1	2.63 (0.96-7.22)	.065
Endocrine	0.8	0.69 (0.19-2.49)	.568	1.6	1.33 (0.30-5.90)	.664
Metabolic	0.0	1.00 (0.99-1.00)	.374	0.0	1.00 (0.99-1.00)	.642
Tumor	0.3	0.84 (0.09-8.15)	.884	0.0	1.00 (1.00-1.01)	.568
Immune	1.7	1.02 (0.39-2.64)	.974	1.6	0.97 (0.22-4.22)	.969
Ophthalmologic	10.4	0.89 (0.60-1.32)	.567	11.4	1.02 (0.57-1.83)	.946
ORL	2.8	1.01 (0.48-2.13)	.972	1.6	0.54 (0.13-2.26)	.388
Bones	4.5	1.20 (0.66-2.21)	.548	6.6	1.88 (0.86-4.10)	.133
Hereditary	0.3	0.25 (0.03-1.97)	.155	0.8	0.92 (0.12-7.27)	.939
Degenerative	0.0	1.00 (0.99-1.00)	.530	0.0	1.00 (0.99-1.00)	.742

Summary

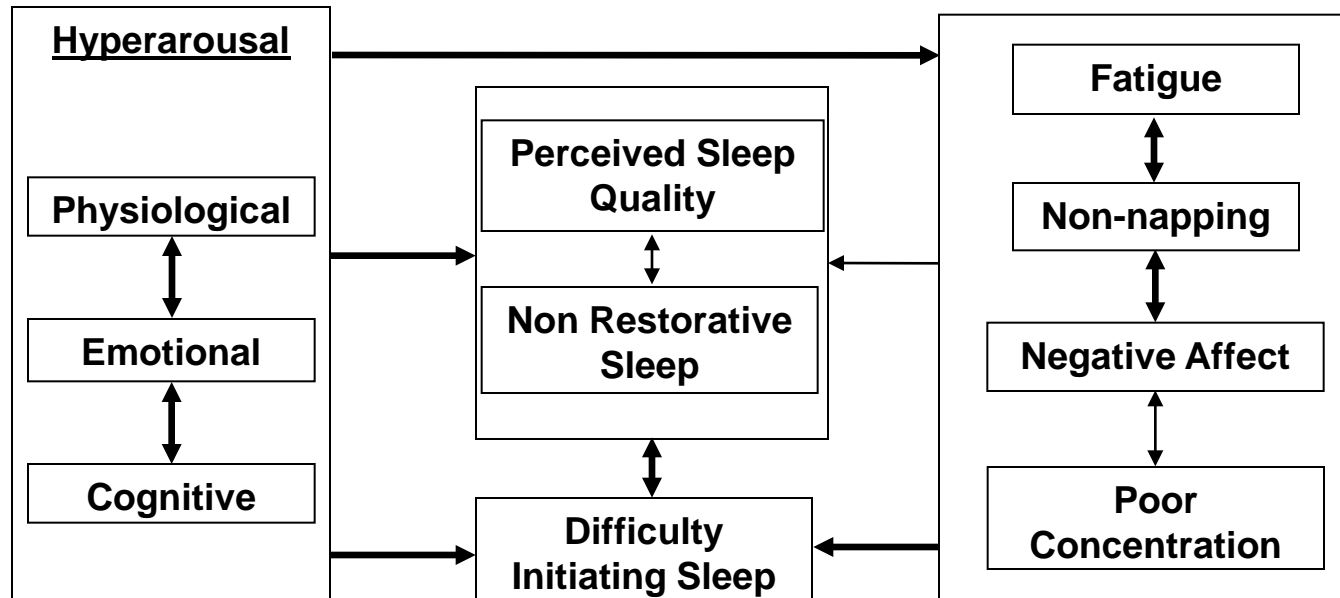
- The complaint of DIS is associated with the nighttime and daytime clinical characteristics of
 - insufficient sleep and
 - insomnia.
- The complaint of DMS is associated with those of insomnia.
- Key measures:
 - Sleepiness
 - Fatigue
 - Napping
 - Sleep quality

DIS: Insufficient Sleep



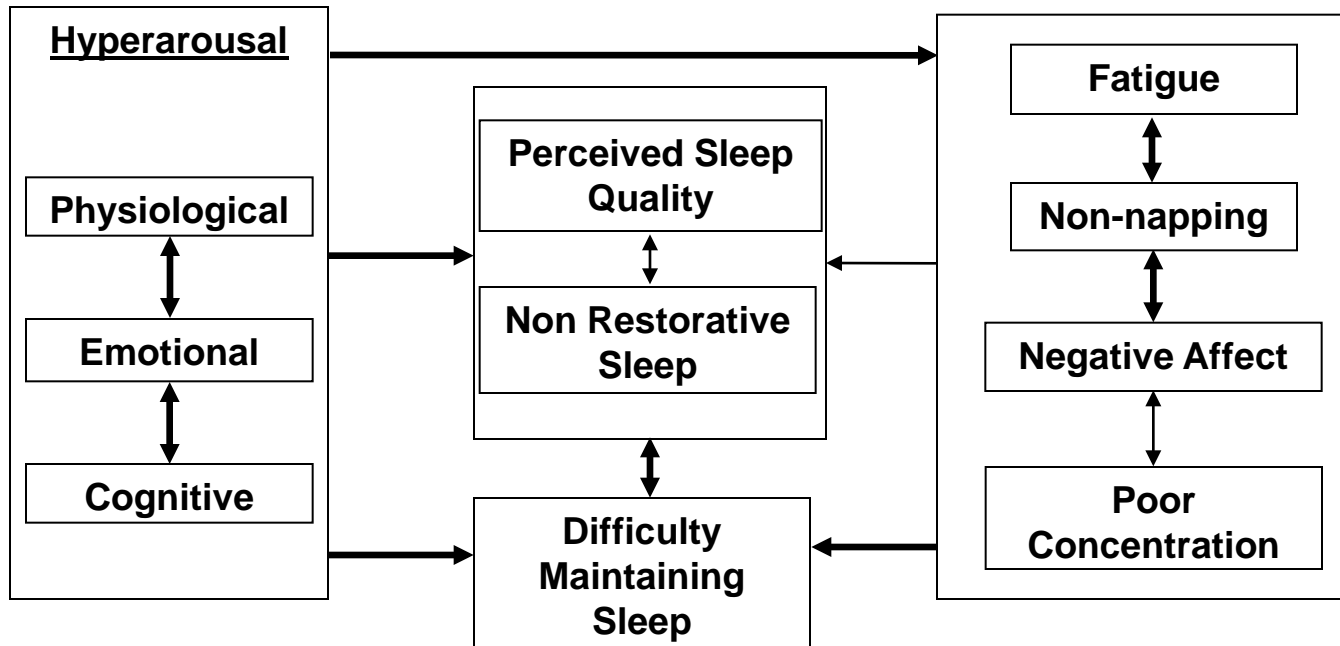
- In the majority of cases, DIS could be explained by an “insufficient sleep model”, in which the joint effect of a delayed sleep pattern and attending a morning college schedule might lead to DIS and short sleep duration (i.e. sleep debt) and the ensuing EDS (i.e. ESS scores, inability to concentrate, missing classes due to tiredness, napping).

DIS: Insomnia



- In some individuals, the complaint of DIS could be also explained by an “insomnia model”.
- A model that was revealed by the correlates of DMS.

DMS: Insomnia



- The clear-cut presence of markers of hyperarousal (i.e. non-napping, fatigue, restlessness, negative affect, and reports of inadequate sleep quality vs. sleep quantity) suggest that this mechanism could be viewed as the main causative factor of the complaint of DMS and its daytime correlates.