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Epidemiology of Non- Restorative Sleep in the General Population

What is non-restorative sleep?

✓ For DSM-IV

- It is one of the four insomnia symptoms
- It is described as a feeling the sleep is restless, light or of poor quality

✓ For ICSD

- Insomnia is described as a complaint of insufficient amount of sleep or not feeling rested after the habitual sleep period

Non-restorative sleep

Sleep not enough

- Husby & Lingjaerde, 1992
Norway (Tromso)
- Ohayon et al., 1997, UK
- Ohayon et al., 1997, Ca (MTL)
- Ohayon et al., 2001 (Europe)

Prevalence:
20% to 41.7%

Poor sleep

- Lugaresi et al., 1983
San Marino, IT
- Kageyama et al., 1997 JP
- Asplund & Aberg, 1998 SE
(Jamtland county)
- Vela-Bueno et al., 1999 ES,
Madrid

Prevalence:
10% to 18.1%

Non-restorative sleep is poorly defined when using **sleeping not enough** or **complaining of a poor sleep**: the prevalence variation is too high

Definition of NRS

- ✓ NRS can be defined as :
 - a moderate to severe complaint of being unrefreshed upon awakening (even if the sleep duration is sufficient according to the subject) occurring at least 3 nights per week during a period of at least one month

Sample

- ✓ Targeted population:
 - Representative sample of the general population aged ≥ 18 years of California, New York and Texas (66 millions inhabitants)
 - Total sample: 8,937 non-institutionalized individuals
 - Average participation rate: 85.3%
- ✓ Telephone interviews using the Sleep-EVAL system

Information collected by Sleep-EVAL

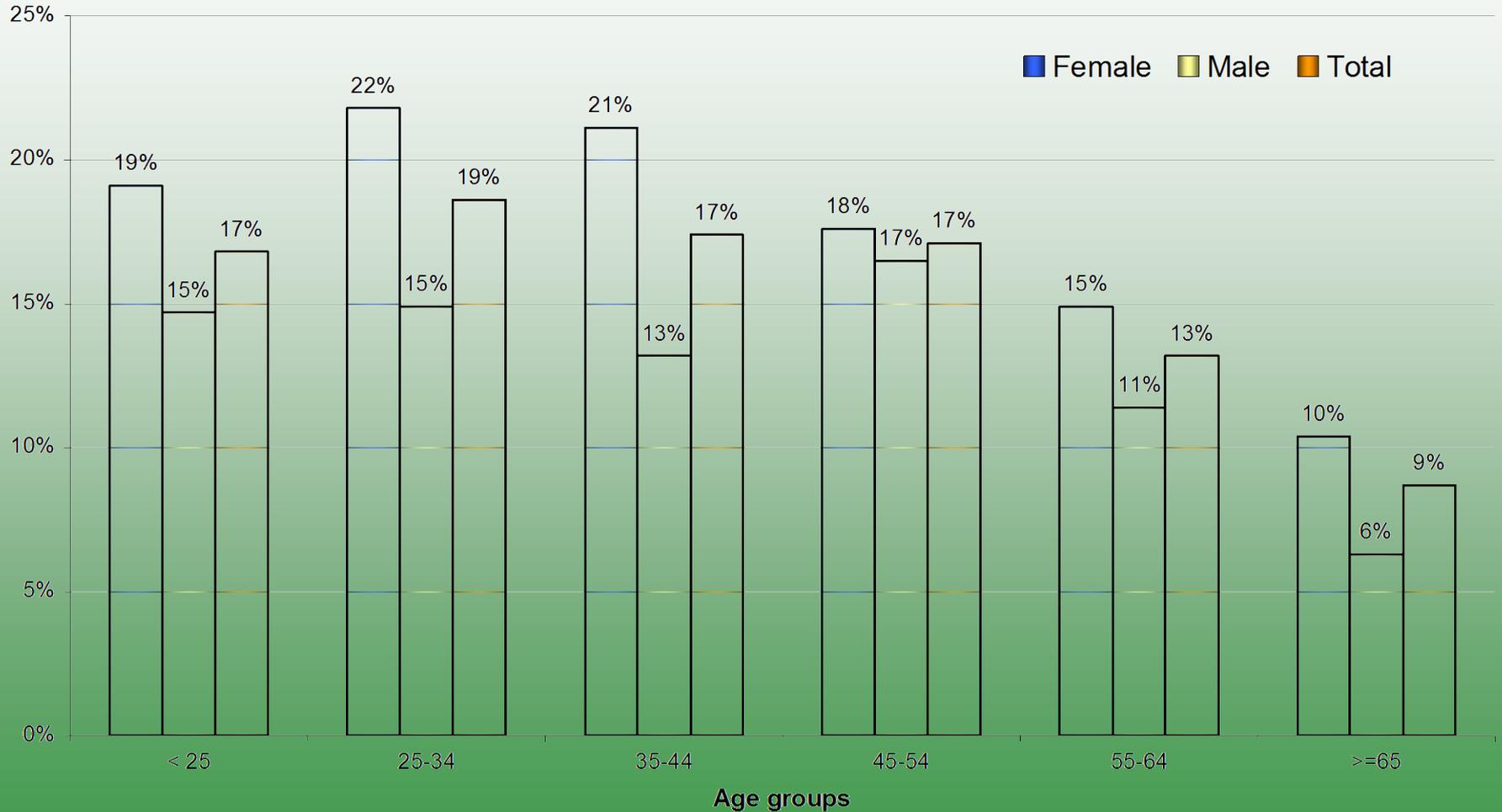
- ✓ Socio-demographics
- ✓ Symptoms of sleep, psychiatric and organic disorders
- ✓ Quality of life
- ✓ Daytime functioning
 - Fatigue
 - Daytime sleepiness
 - Social functioning
- ✓ Medical history
 - Consultations, hospitalizations, medications, diseases, etc.

Diagnoses collected by Sleep-EVAL

- ✓ Sleep disorder diagnoses according to DSM-IV and ICSD*
- ✓ Mental disorder diagnoses according to DSM-IV*
- ✓ Organic diseases according to ICD-10
- ✓ Psychotropic consumption according to the roster of pharmacological compounds

* Positive and differential diagnoses

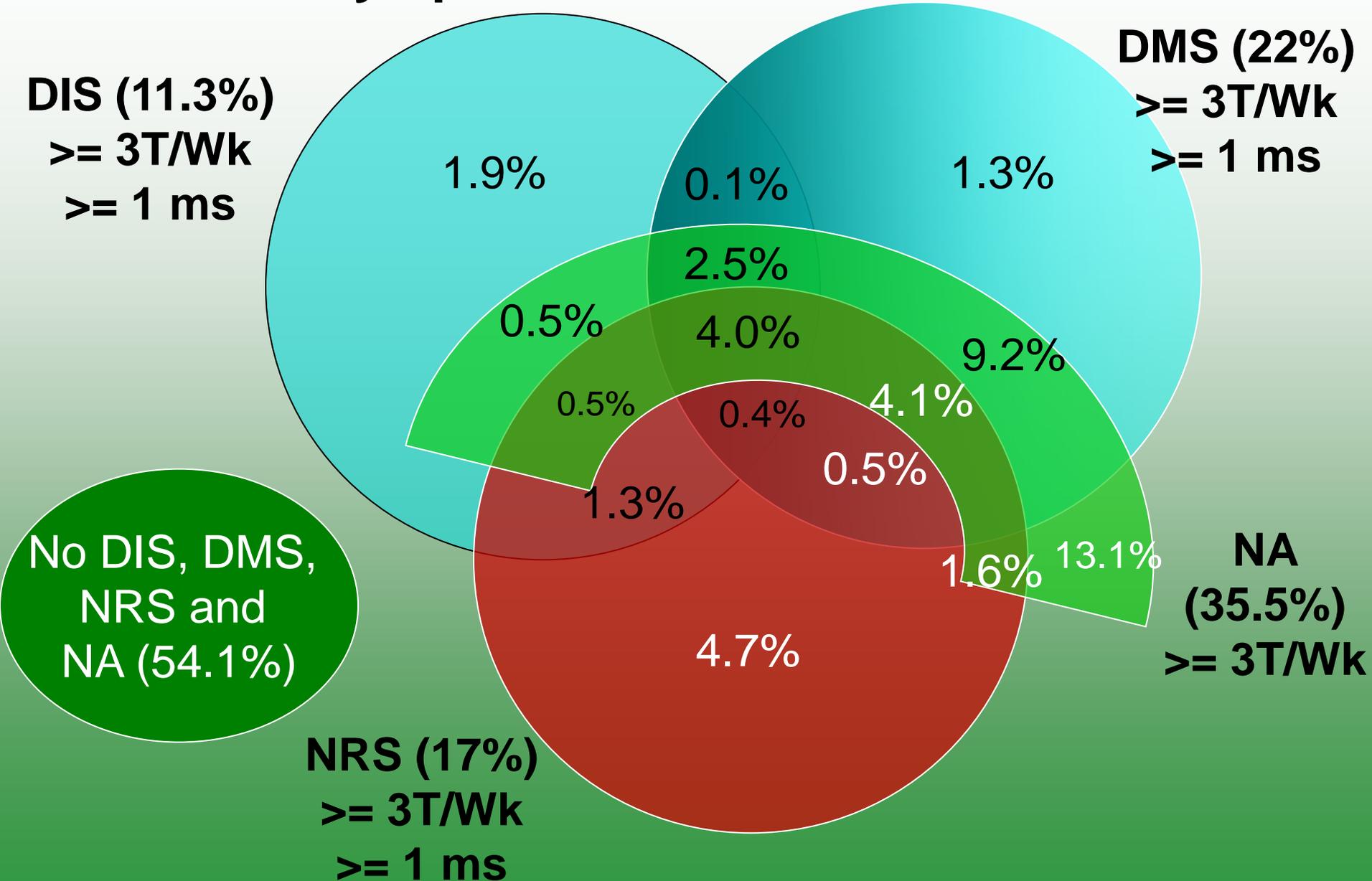
How frequent is NRS?

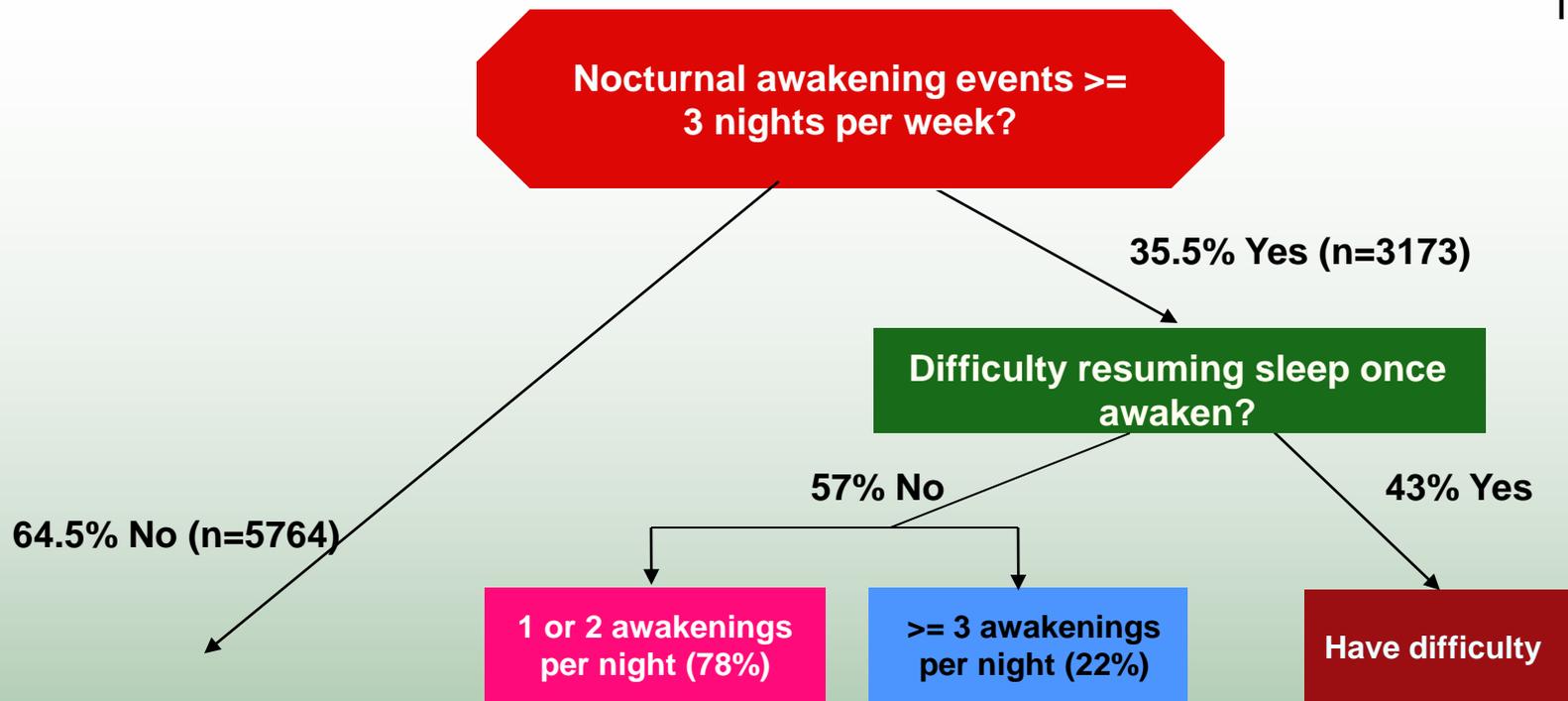


What is the duration of NRS?



Association between NRS and other insomnia symptoms





DIS?	33.5% (5.9%)	10.1% (7.2%)	5.9% (15.2%)	50.4% (37.4%)
NRS?	40.6% (10.8%)	13.6% (14.7%)	7.3% (28.5%)	38.6% (43.9%)
GSD?	36.6% (9.8%)	9.5% (10.9%)	8.3% (31.9%)	45.6% (50.4%)
Daytime impairment?	(36.9%)	(48.3%)	(65.1%)	(77.5%)

What factors are associated with NRS?

- ✓ Sleep/wake schedule?
- ✓ Mental disorders?
- ✓ Health factors?

Sleep/wake schedule

**Adjusted OR
(95% C.I.)**

Nighttime sleep duration

< 5:00	0.66 (0.46-0.94)
5:00-5:59	0.72 (0.55-0.94)
6:00-6:59	1.03 (0.85-1.24)
7:00-7:59	0.95 (0.80-1.13)
8:00-8:59	1.00
>=9:00	1.47 (1.12-1.92)

Sleep/wake schedule

**Adjusted OR
(95% C.I.)**

Sleep latency

<= 15 min.	1.00
16-30 min.	1.39 (1.23-1.57)
31-60 min.	3.04 (2.57-3.59)
>60 min.	4.79 (3.84-5.98)

Extra sleep on weekend and days off

0 minute	1.00
<= 60 min.	0.76 (0.64-0.90)
61 min. to 2 hrs	0.90 (0.77-1.05)
>2 hrs to 3 hrs	1.12 (0.91-1.38)
> 3 hrs	1.45 (1.17-1.79)

NRS: Association with mental disorders

	Odds ratio (95% CI)*	
	DIS/DMS no NRS	NRS
Major depressive disorder	1.9 (1.5-2.4)	4.3 (3.3-5.5)
Bipolar disorder	1.8 (1.2-2.8)	3.2 (2.0-5.1)
Anxiety disorder	1.4 (1.2-1.7)	2.1 (1.7-2.5)

*Reference: no insomnia subjects
Adjusted for age and gender

Physical Diseases

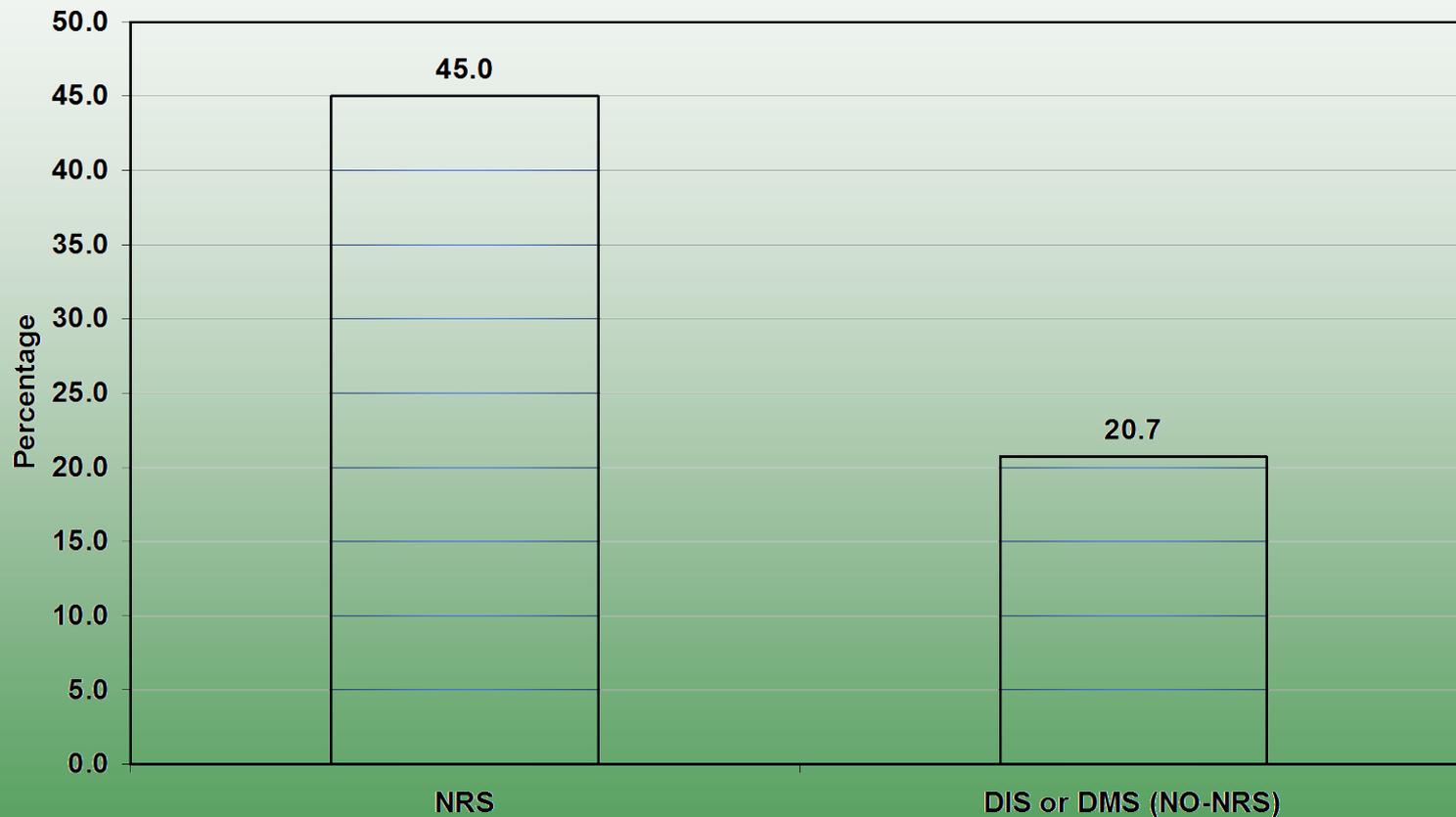
	Odds ratio (95% CI)*	
	DIS/DMS no NRS	NRS
Hypertension	1.6 (1.5-1.8)	1.4 (1.2-1.6)
Diabetes	1.6 (1.3-2.1)	2.8 (1.9-3.9)
Upper airway disease	1.9 (1.5-2.4)	2.0 (1.6-2.8)
Heart disease	3.3 (2.8-4.0)	2.2 (1.8-2.8)
Chronic pain	3.2 (2.8-3.5)	4.0 (3.5-4.6)
Other disease	1.7 (1.4-1.9)	2.1 (1.7-2.5)
Any disease	2.6 (2.4-2.8)	2.8 (2.6-3.1)

*Reference: no insomnia subjects
Adjusted for age and gender

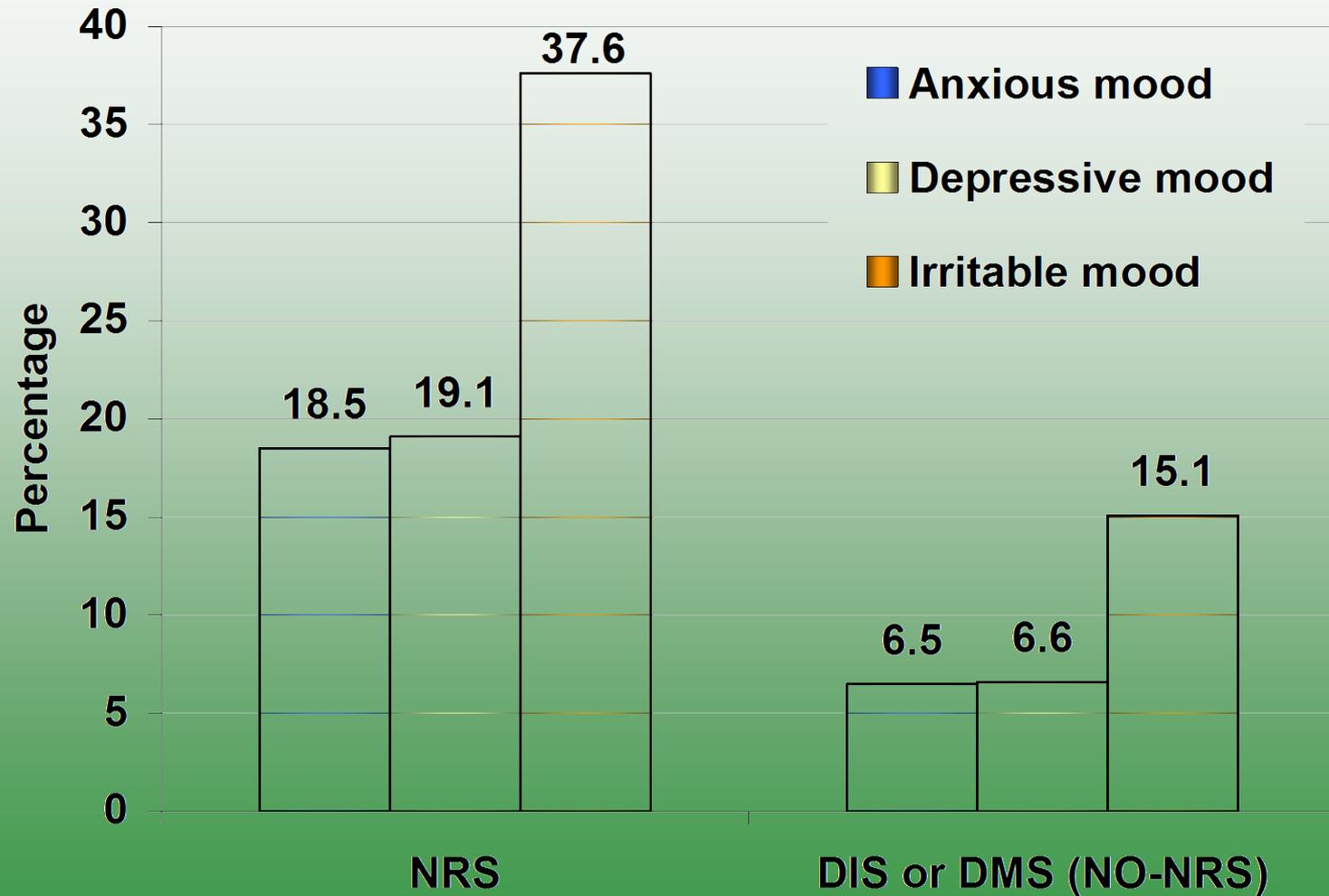
Daytime consequences

- ✓ Cognition
- ✓ Mood
- ✓ Fatigue
- ✓ Sleepiness
- ✓ Medical consultations for sleep problems
- ✓ Use of sleep medication

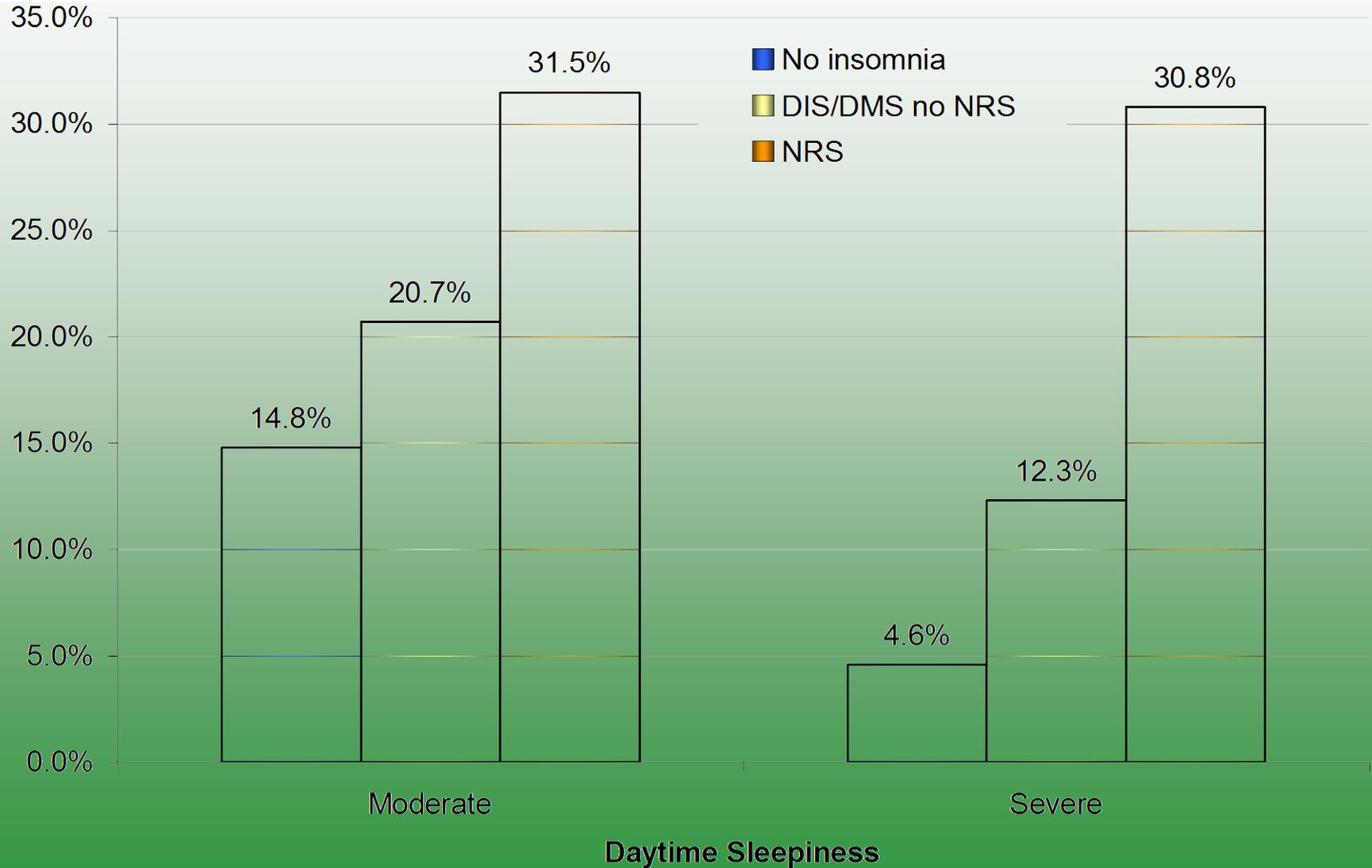
Is NRS causing more cognitive difficulties?



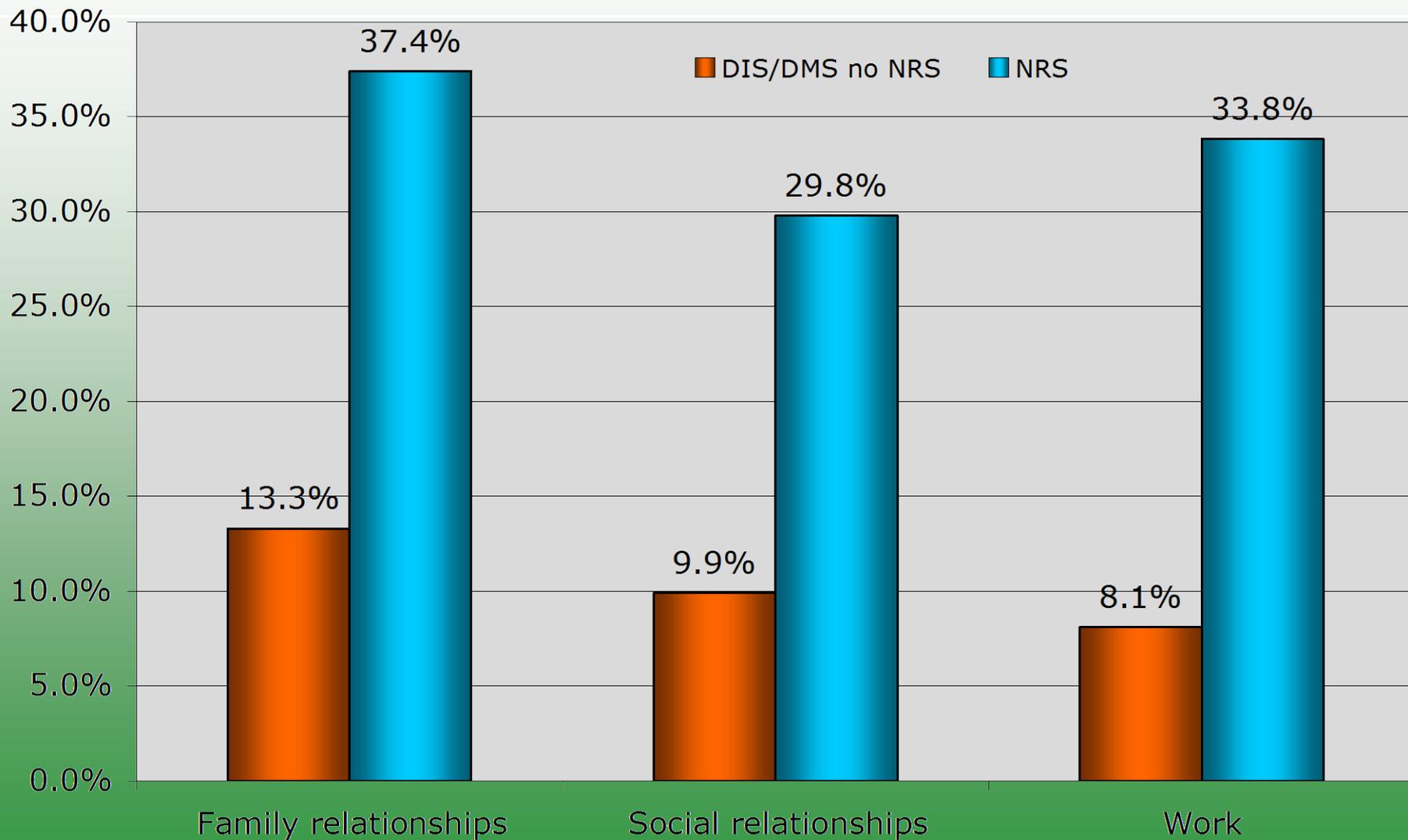
IS NRS causing more mood changes?



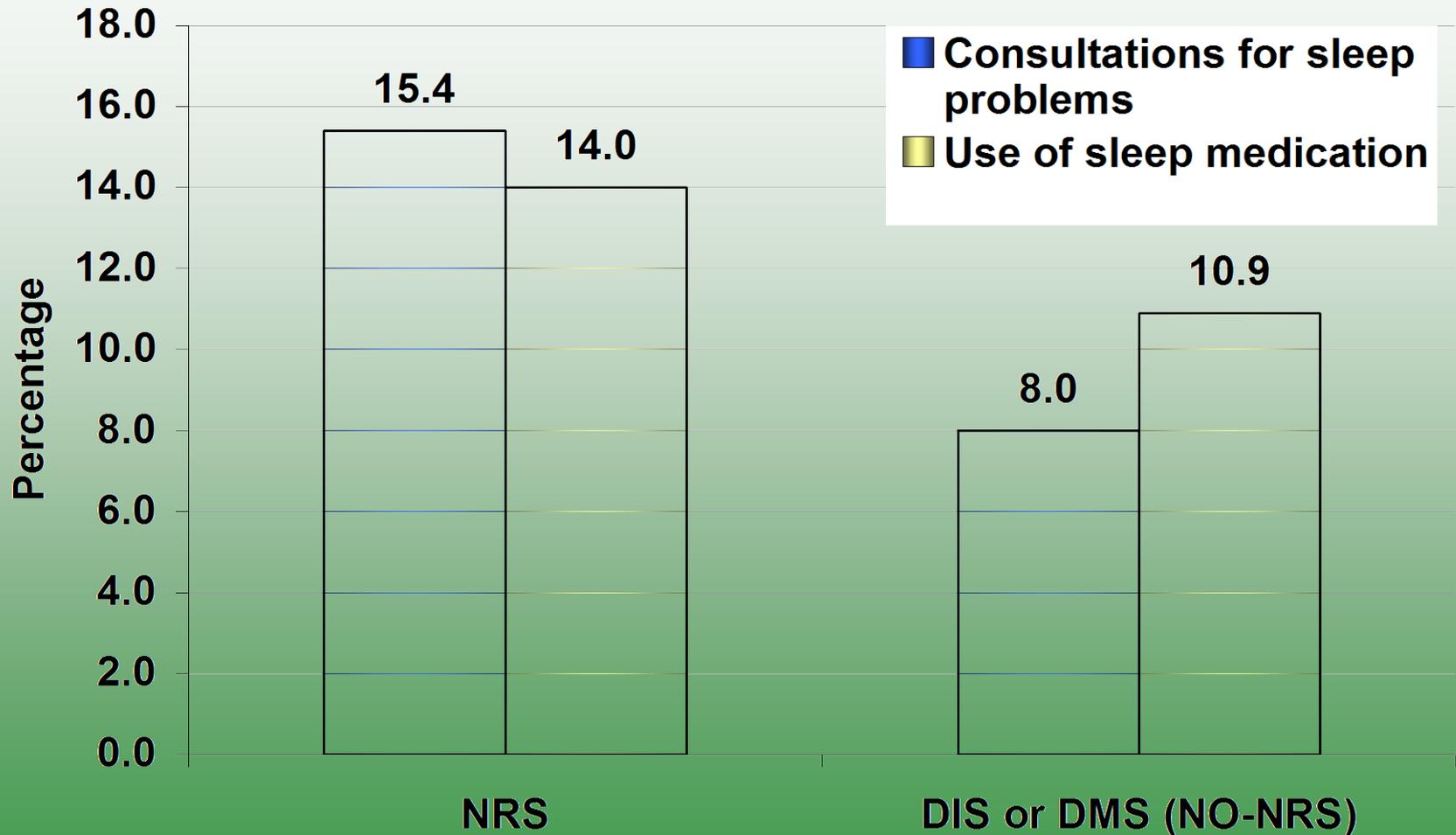
Is NRS causing more daytime sleepiness?



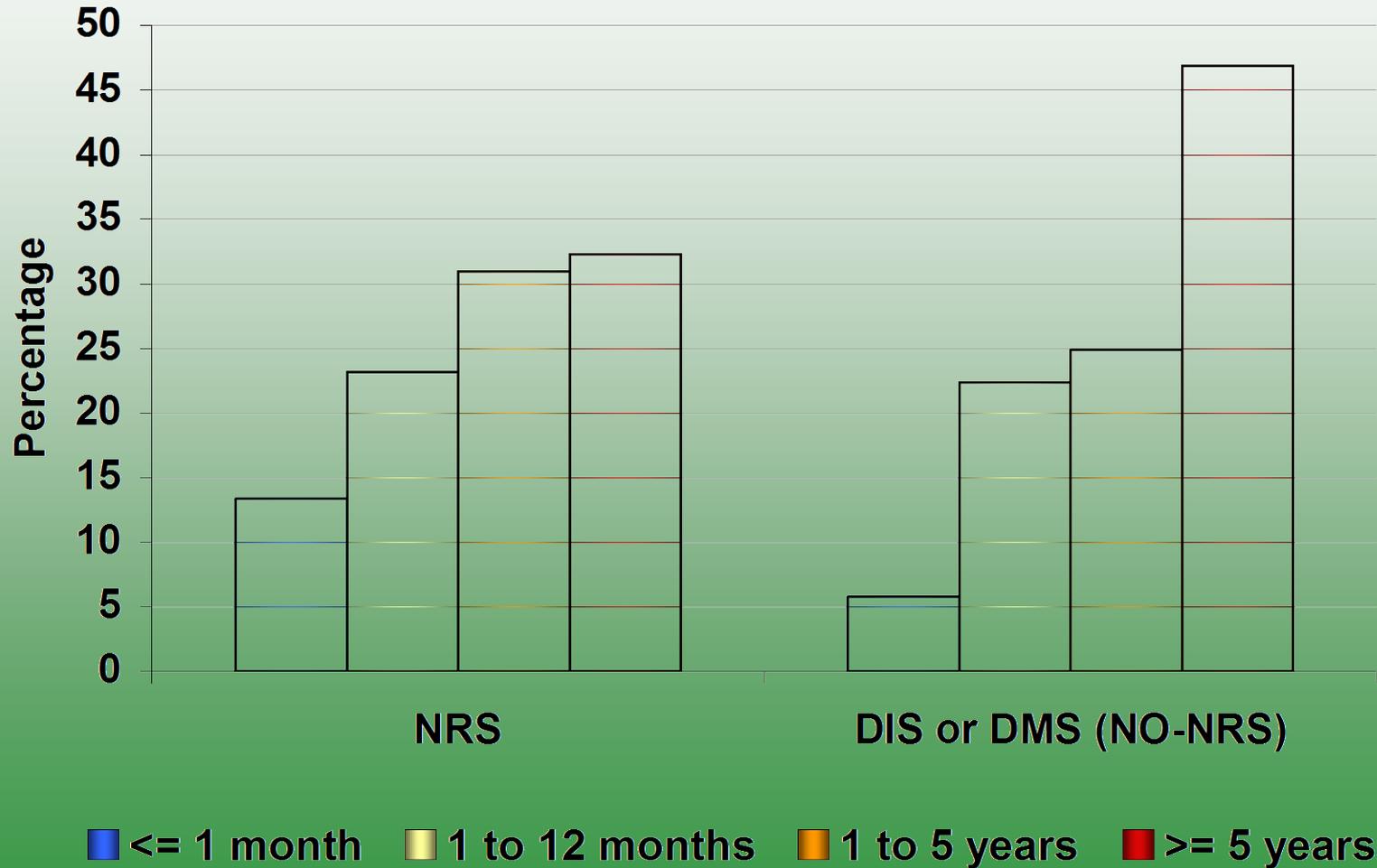
Negative impacts



Consultations & medication for sleep problems



Duration of sleep medication intake



Conclusions

- ✓ NRS is a symptom that must be taken seriously for several reasons:
 - Excessive daytime sleepiness more frequent in NRS
 - Mood swings and cognitive impairments more frequent in NRS
 - NRS more likely to seek help for their sleep problems
 - Therefore, the societal costs are important in terms of decreased productivity and diminished quality of life