FOCUS ON:
I disturbi del sonno:
gestione clinica e comorbidità con i disturbi psichiatrici dell'età evolutiva

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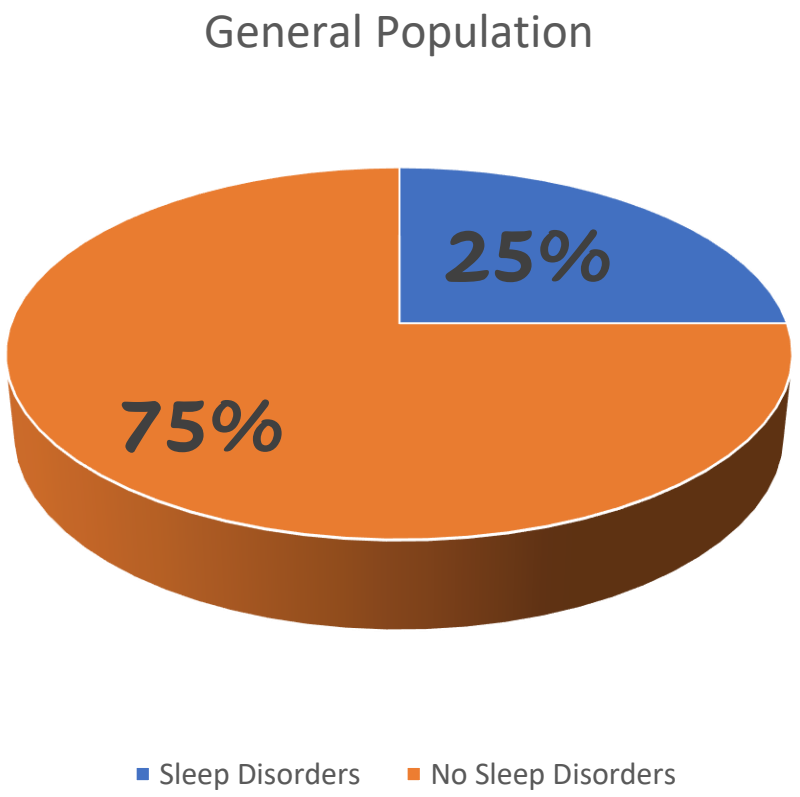
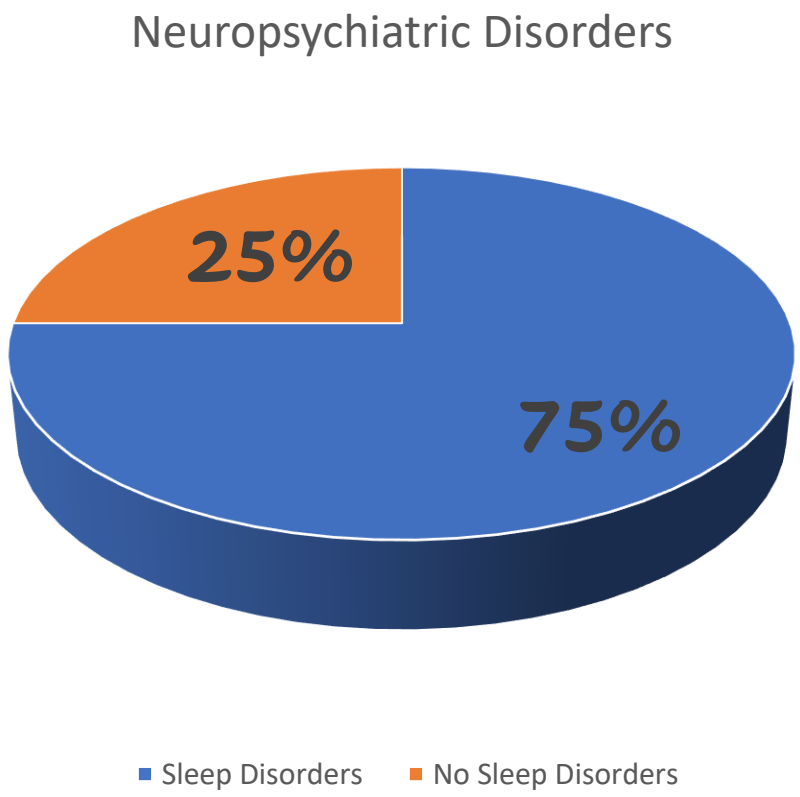
UO Neurologia dello Sviluppo, Ospedale Pediatrico Bambino Gesù, IRCCS, Roma

I disturbi del sonno in età pediatrica



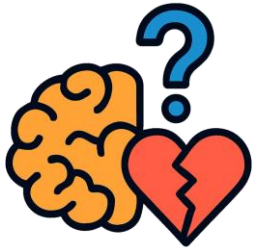


Maski and Owens, Lancet Neurol 2016

Sleep disorders effects

Sleepiness

Mood disturbances



Mental health difficulties

Behavioral problems

Weight gain

Immune system challenges

School-related negative consequences

Substance use and abuse

Accidental falls

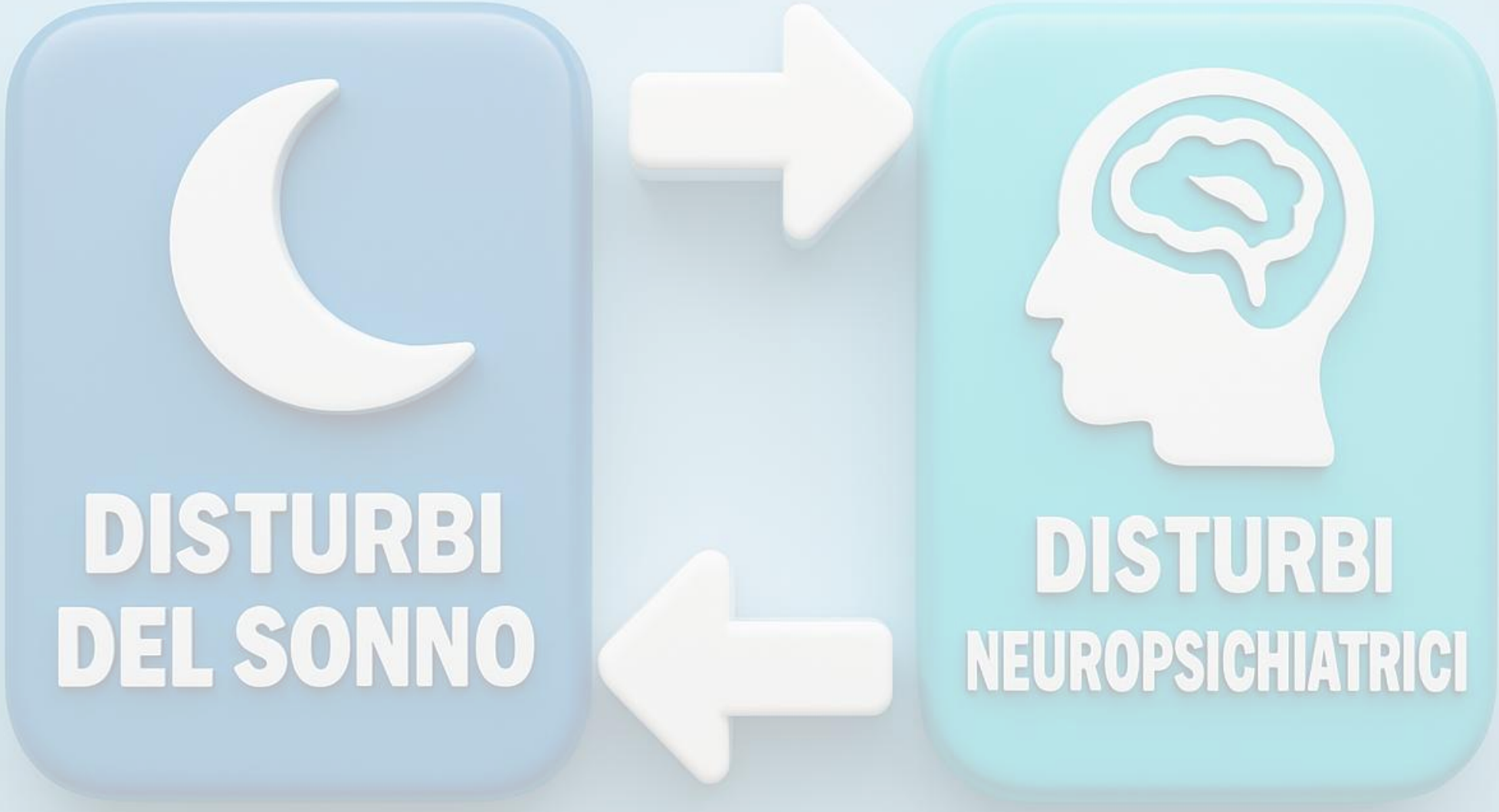
Burden on parents

Reis Boto et al, Sleep Med et al, 2012
Hagen et al, American J Epidemiol 2013

Crowley et al, J Adolesc. 2018
Castro Dias & Figueiredo, J Sleep Res 2021


DISTURBI
DEL SONNO
DISTURBI
NEUROPSICHIATRICI

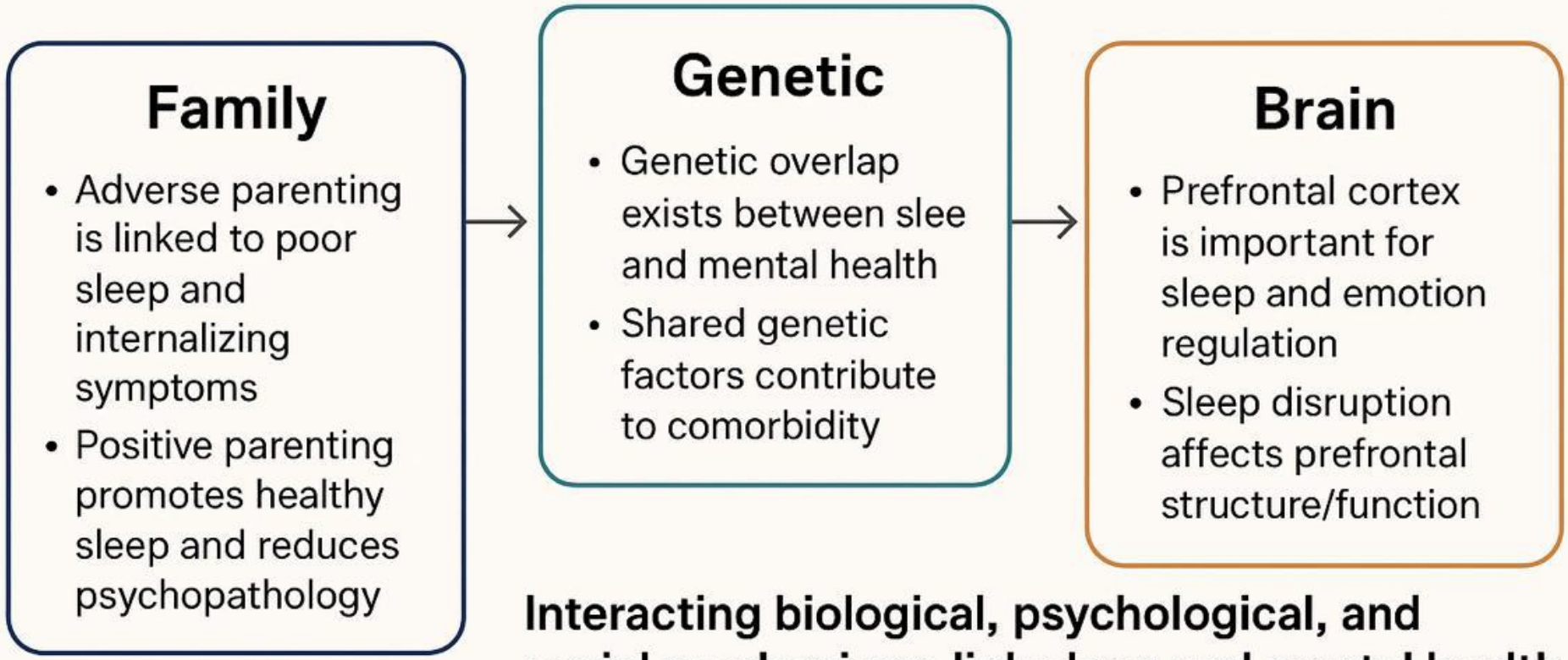
Sleep problems and mental health disorders are both **highly prevalent** in children and adolescents.



Their relationship is **complex and bidirectional** — sleep disturbances can precede, co-occur with, or result from psychiatric conditio

Sleep and Mental Health Problems in Children and Adolescents

Underlying Mechanisms

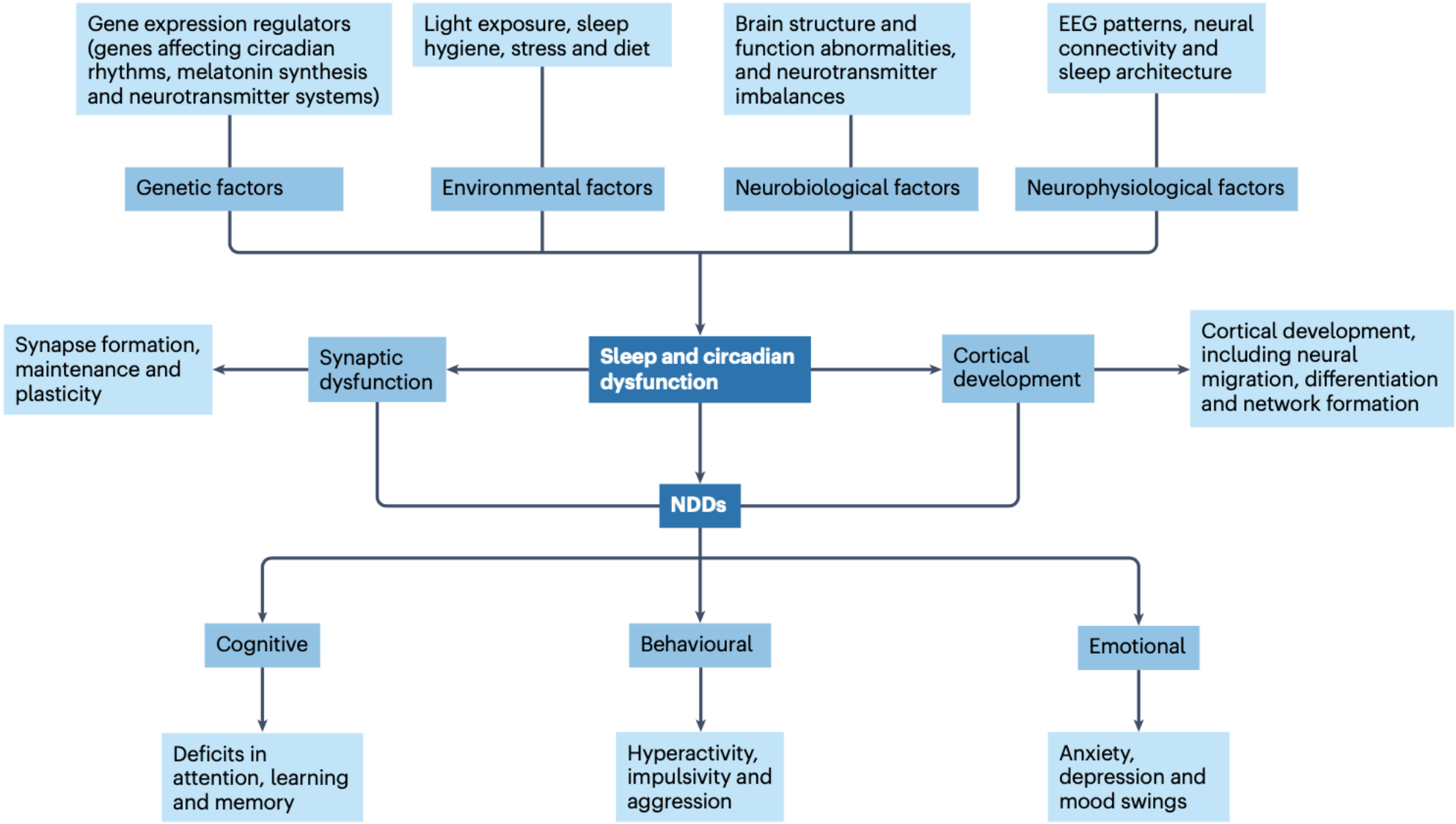


Interacting biological, psychological, and social mechanisms link sleep and mental health

Morales-Muñoz I & Gregory AM, Sleep Med Clin 18 (2023) 245-254

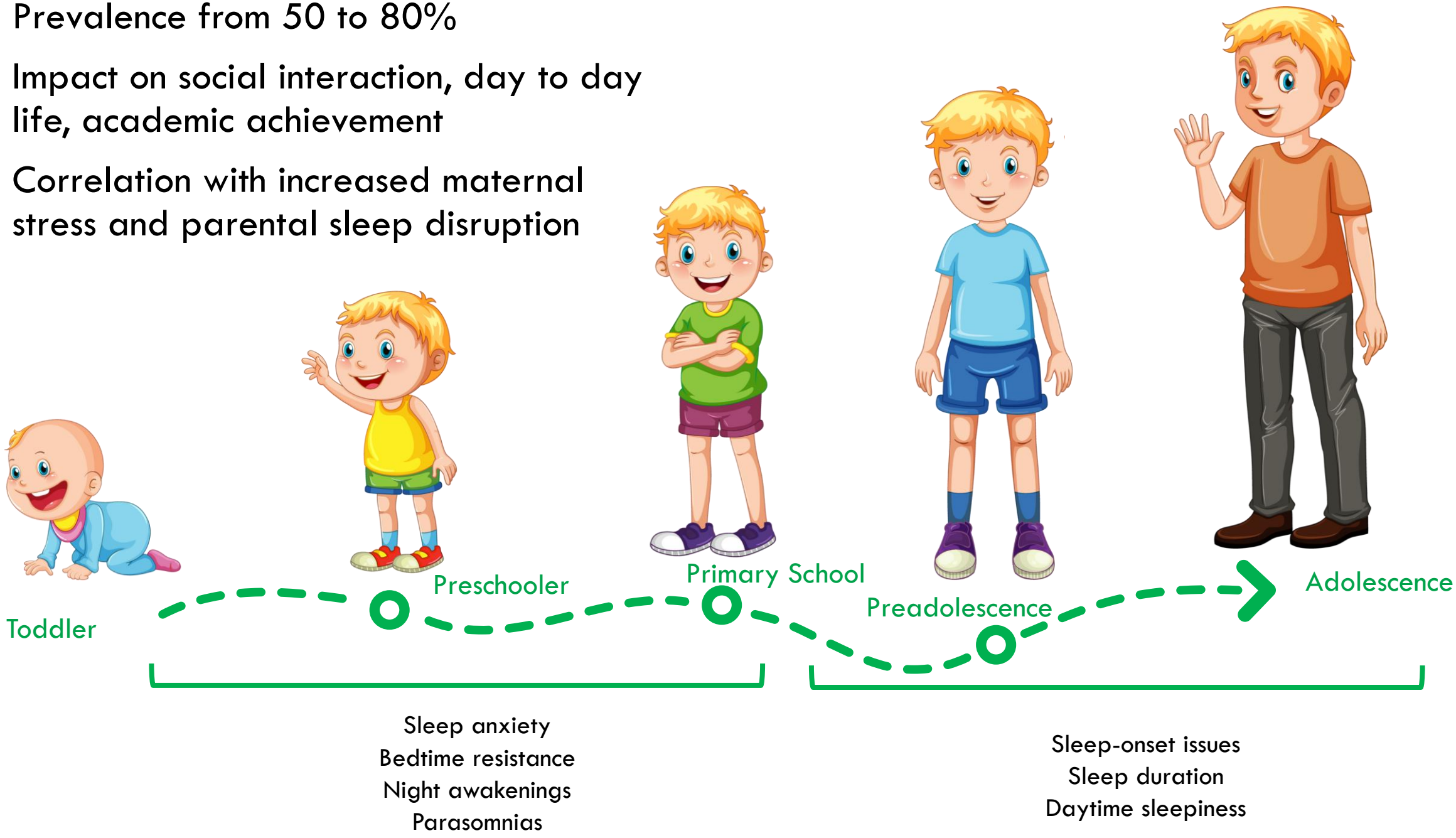
Sleep in Neurodevelopmental Disorders

Bruni O et al. Nature Reviews Neurology 2025; 21:103-120



Disturbi del sonno nell'autismo

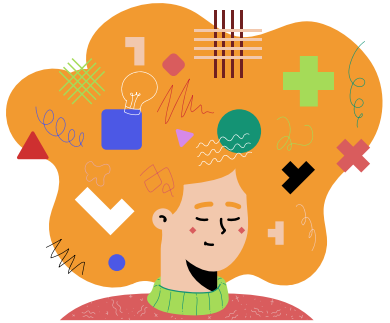
- Prevalence from 50 to 80%
- Impact on social interaction, day to day life, academic achievement
- Correlation with increased maternal stress and parental sleep disruption



Fenotipo clinico e Disturbi del Sonno

- Strong attachment to routines and rituals, such as bed time routine —> routine absence or distruption can delay sleep onset or cause insomnia.
- Perseveration in activities (e.g., time-consuming rituals) before bed time may delay bed time as well.

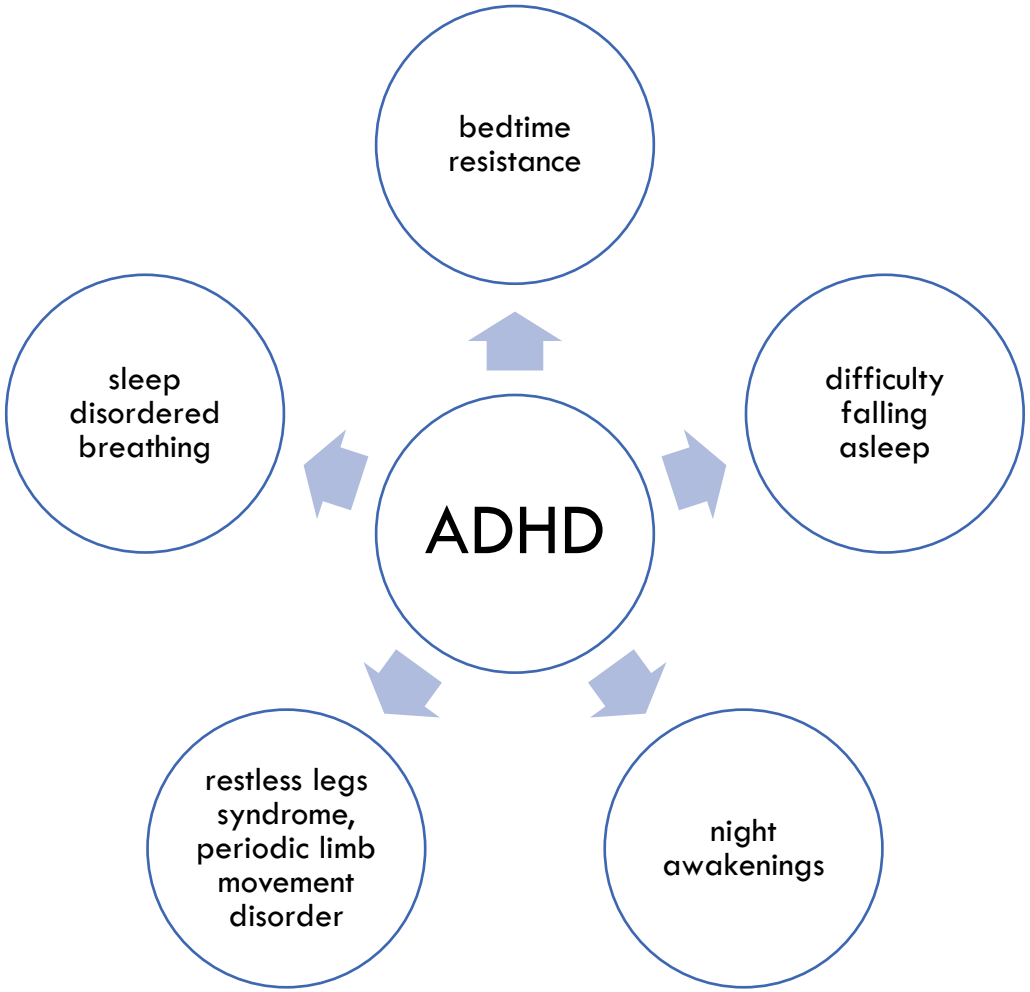
- Excessive and repetitive cognitive activities, including intrusive thoughts, may determine physiological hyperarousal and emotional hyper-reactivity, contributing to sleep onset delay.
- Sensory over-responsivity and hyperarousal are associated with sleep problems



Richdale et al, Sleep Med Rev 2009;
Reynolds and Malow, Pediatr Clin N Am 2011;
Reynolds et al, OTJR 2012;
Mazurek and Petroski, Sleep Med 2015


ADHD

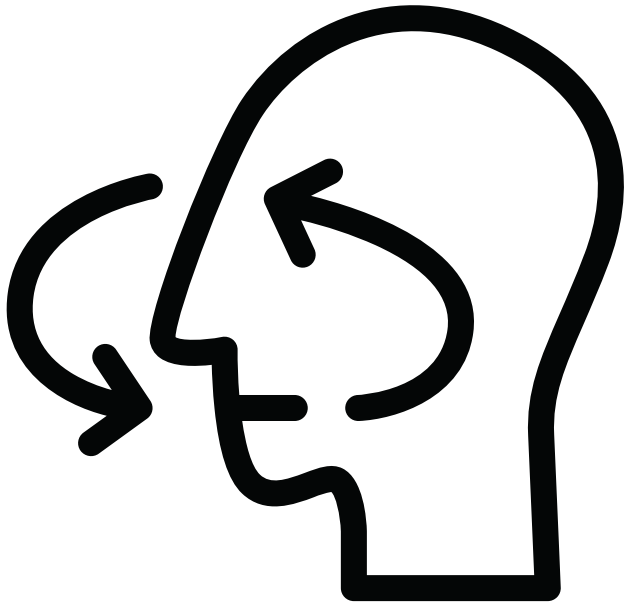
I disturbi del sonno nell'ADHD



- Sleep complaints in 50–70%
- Highest prevalence in the combined subtype - although sleepiness may be more frequent in the inattentive subtype

Sung V, et al.. Arch Pediatr Adolesc Med. 2008;162:336–342
Cortese S, et al. J Am Acad Child Adolesc Psychiatry. 2009;48:894–908
Mayes SD, et al. J Pediatr Psychol. 2009;34:328-337.
Corkum P, et al. Pediatr Clin North Am. 2011;58:667-683

La diagnosi dei disturbi del sonno nell'ADHD



Sleep disorders mimic and worsen ADHD symptoms

Accurate differential diagnosis is needed

Corkum P, et al. Pediatr Clin North Am. 2011;58:667-683

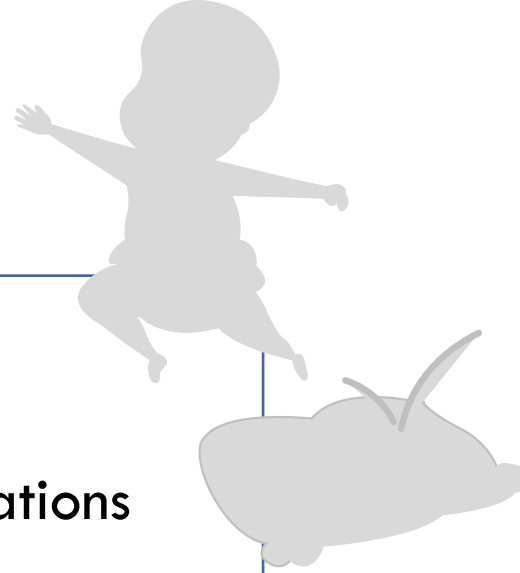
L'impatto dei disturbi del sonno nell'ADHD

- For children with ADHD, poor sleep (too little sleep or symptoms of sleep disorders) may profoundly impact ADHD symptoms.

- There is evidence suggesting that treating sleep problems may be enough to eliminate attention and hyperactivity issues for some children

Shur-Fen Gau, J Sleep Res 2006

Contributing factors



Associated medical conditions and their treatments (e.g., obesity)

Psychiatric comorbidities (e.g., mood/anxiety disorders)

Medications

Poor sleep practices (e.g., use of electronics before bedtime)

Sleep disorders in ADHD

ADHD per se

Effetti dei farmaci

Meta-analysis of 35 RCT

Significant impact of MPH on sleep-related AEs

Insomnia
(initial, middle, terminal, combined)

During therapy do not limit to non-specifically ask for “sleep problems”, clinicians should specifically explore initial, middle, terminal and combined insomnia, as well as sleep quality and the restorative value of sleep

Faraone et al, J Clin Psychiatry 2021

Depression

Anxiety

Scott AJ et al, 2021

Psychosis

PTSD

Eating disorders

Reeve S et al, 2015
Harvey AG et al, 2003
Lauer CJ and Krieg JC et al, 2004
Scott AJ et al, 2017

Altri disturbi neuropsichiatrici

Anxiety

Multiple pathogenetic mechanisms have been proposed (genetics, environmental, cognitive → pre-sleep arousal).
Sleep disturbances in youth may serve as a red flag for the development of later anxiety

Willis, et al. Sleep Medicine Clin. 2015

Tic and Tourette Syndrome

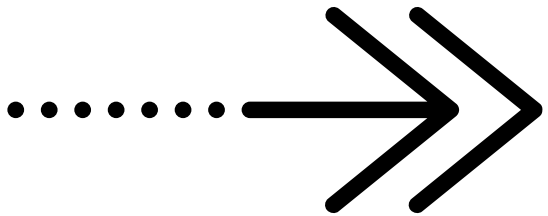
Sleep significantly more disturbed in patients with tic disorder.
High prevalence of difficulties in initiating sleep and increased motor activity during sleep.
Intrusive thoughts and other emotional disturbances might disrupt Sleep Onset.

Modafferi et al, EJPN 2016

Psychosis

SD are common in individuals at UHR of psychosis and have proven to play a causal role in the occurrence of psychotic symptoms in healthy individuals. UHR individuals with high CAARMS scores have a delayed sleep phase; they have difficulties waking up and feel exhausted at awakening.
Sleep disturbance predicts the development and persistence of PLEs.

Wang et al, Sleep Med 2023
Nordholm et al, J Psychiatr Res 2023



Eating disorders

The majority of individuals with eating disorders suffer from disturbed sleep.
It has also been proposed that subjective sleep disturbances may be used as a clinical marker for AN severity and for ANB/P subtype: compared to the AN restricitive subtype group, participants with AN and binge eating/purging showed significantly greater sleep disturbances and sleepiness, and also a higher preference for an eveningness chronotype

Cooper et al, Curr Opin Psychol 2020
Bat-Pitault et al, Eat Weight Disord 2021

STRUCTURE
REVOLUTIONS
PROGRAMME
SCIENTIFIC
ORIGINAL
TIME
HOWEVER
SEE
PARADIGM
PARADIGMS
SCIENCES
SOCIAL
SCIENCE
RESEARCH
KUHN
KUHN'S
INCOMMENSURABILITY
ANOMALIES
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STANDARD
DISCIPLINE
DEFINES
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LATTER
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TWO
LARRY
CHURCH
BELIEFS
CONCEPTUAL
SUBSEQUENT
PARADIGMATIC
OBSERVED
WORD
GOOD
ATOMIC
CITATION
TRADITIONS

Recent longitudinal studies suggest that early-life sleep problems may act as predictive risk factors for later psychopathology (e.g., depression, anxiety, ADHD, psychosis, conduct disorders).

Morales-Muñoz I & Gregory AM, Sleep Med Clin 18 (2023) 245-254

I disturbi del sonno come predittore clinico dei disturbi psichiatrici

Associations of evening-type and insomnia symptoms with depressive symptoms among youths

s Predict Increased Risk for the Later
f Suicidal Thoughts

DEPRESSION AND SLEEP ONSET DIFFICULTY IN ADOLESCI

Symptoms of Depression and Difficulty Initiati
to Early Adulthood: A Longitudinal Study

Review

Insomnia as a predictor of depression: A meta-analytic evaluation of longitudinal epidemiological studies

I disturbi del sonno come predittore clinico dei disturbi psichiatrici

Sleep and suicidality in school-aged adolescents: A prospective study with 2-year follow-up

LEEP DISTURBANCE AND
D FUNCTIONING IN COLLEGE

Longitudinal bidirectional effects between sleep quality and internalizing problems

Insomnia disorder in adolescenc
treatment

Insomnia symptoms and non-suicidal self-injury in adolescence: understanding temporal relations and mechanisms

I disturbi del sonno come predittore clinico dei disturbi psichiatrici: l'importanza del trattamento

- Sleep problems may be particularly important intervention target because they are easily assessed across healthcare settings and are amenable to treatment.

- Sleep problems may also be a potential prevention intervention target for youth at risk for depression.

- Behavioral interventions do effectively improve sleep in children and adolescents with depression, and indicate that sleep improvement is an important mediator of depression treatment outcome

Improving sleep quality leads to better mental health: A meta-analysis of randomised controlled trials

Alexander J. Scott,[a,*] Thomas L. Webb,[c] Marrissa Martyn-St James,[b] Georgina Rowse,[d] and Scott Weich[b]

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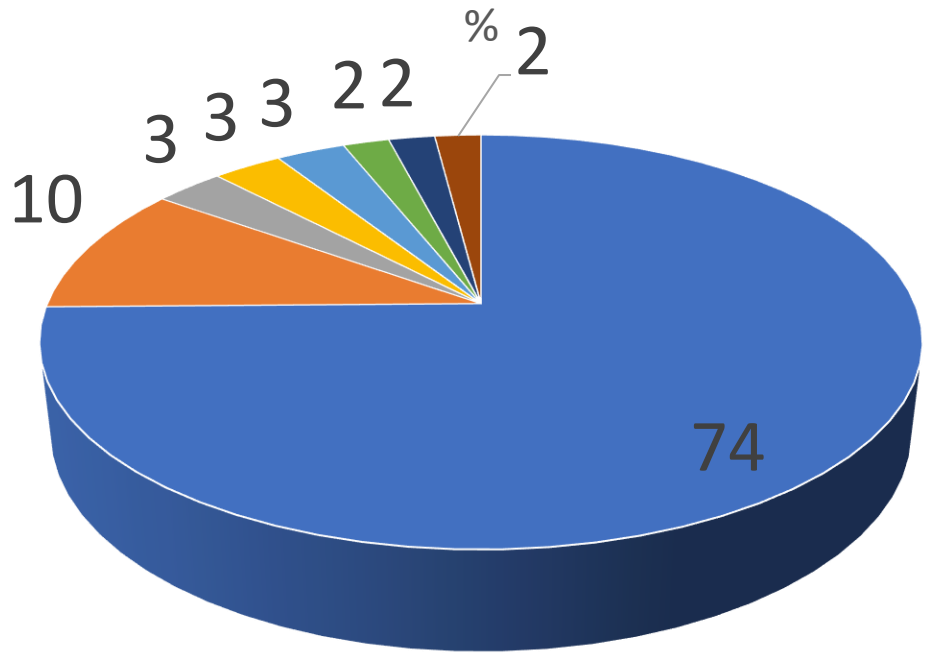
Sleep Medicine Reviews

ELSEVIER
FREE Full-Text Article

Meta-analysis from 65 RCTs
(N = 8608)

Improving sleep **reduced depression, anxiety, and stress**



Dose–response relationship: greater improvements in sleep led to greater improvements in mental health

Scott AJ et al, 2021

Igiene del sonno

La melatonina

INTEGRATORE

FARMACO

La melatonina

INTEGRATORE

FARMACO

Gli integratori non possono superare 1 mg di melatonina

La melatonina

Ha sicuramente un ruolo nel ridurre i tempi di addormentamento ma....

Un dosaggio sbagliato può essere del tutto inefficace o addirittura determinare un effetto paradosso (questo vale anche per dosaggi troppo alti)

Un orario errato di assunzione può peggiorare il quadro andando a determinare un disturbo del ritmo circadiano

Se assunta per i motivi errati (ad es. risvegli notturni) può condurre a una falsa “farmaco-resistenza” compromettendo anche la fiducia nei trattamenti

European expert guidance on management of sleep onset insomnia and melatonin use in typically developing children

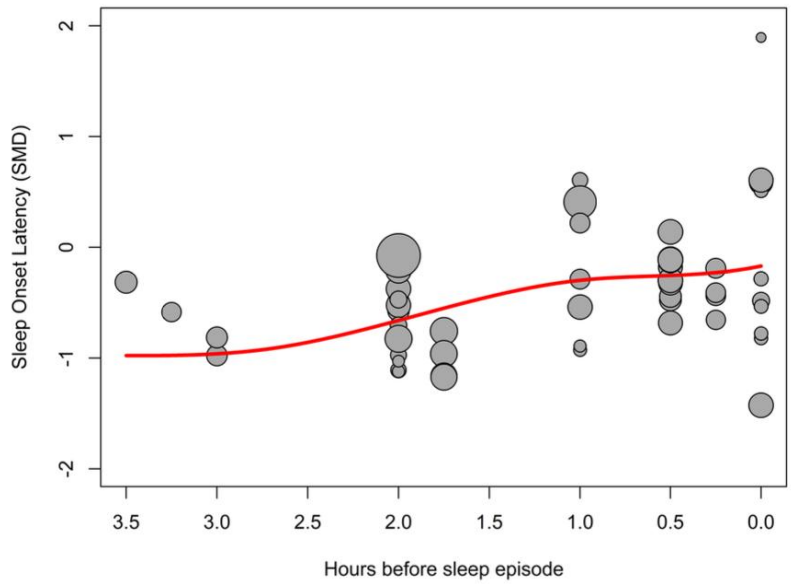
Oliviero Bruni[1] · Maria Breda[2] · Lino Nobili[3,4] · Ingo Fietze[5,6] · Oscar Ramon Sans Capdevila[7,8] · Claude Gronfier[9]

1. Advise parents or caregivers on sleep hygiene measures (including light hygiene, nutrition, and digital curfew measures) and behavioral strategies as a first line approach to improve sleep habits
2. If sleep hygiene and behavioral strategies are not effective, melatonin use is recommended in otherwise healthy children with sleep onset insomnia in association with behavioral strategies
3. Melatonin might be helpful for sleep onset insomnia at least in the short-term use
4. Melatonin for sleep induction should be administered 30–60 min before the desired bedtime
5. Start with a minimal dose of 0.5 mg; if no effect after 1 week and then increase the dose with possible titration to 1 mg or more if needed until a maximum of 5 mg depending on age. Consider a dosage of 0.5 to 1 mg in infants 1 to 3 years of age; 1–2 mg in preschoolers, up to 3 mg in school-age children, and up to 5 mg in adolescents
6. Parents should be informed regarding potential adverse events of melatonin use and lack of long-term safety data and advised to consult with healthcare professional before using melatonin in children and not use for longer than 14 days without doctor's recommendation
7. Melatonin use should be monitored by pediatricians to evaluate the presence of adverse effects
8. Theoretically, since there are no studies in infants and children, melatonin should be avoided in children below the age of 2 years
9. No relevant adverse effects have been reported in different studies for at least 2 years in children with NDDs and specifically no effect on growth or pubertal development; we could expect the same in neurotypical children

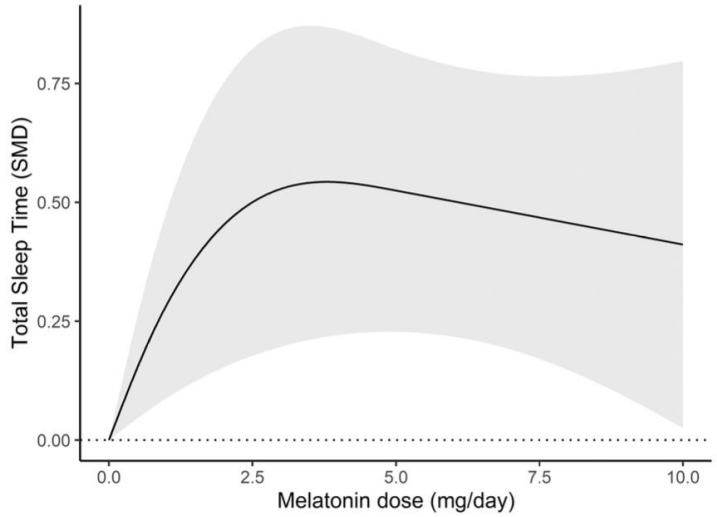
Bruni et al, Eur J of Pediatrics, 2024

La melatonina

Optimizing the Time and Dose of Melatonin as a Sleep-Promoting Drug: A Systematic Review of Randomized Controlled Trials and Dose–Response Meta-Analysis



26 studies included
1689 observations



It is very likely that **the time of administration,** and not only the dose, plays a crucial role in determining exo-MEL efficacy.

FIGURE 5 | Pooled time–response curve of sleep onset latency (standardized mean difference between melatonin and placebo groups, SMD) as a function of time of administration of melatonin with respect to the sleep episode. The sleep-promoting effect of advancing the time of melatonin administration is more apparent when exo-MEL is taken between 1 and 3 h before the sleep episode. Outside this time window, the relationship between timing and efficacy seems weaker.

Cruz-Sanabria et al, Journal of Pineal Research 2024

Other nutraceuticals and Over-the-Counter compounds

Tryptophan/5-Hydroxytryptophan

Carnosine

Iron

Vitamin D

Multivitamin and Mineral Supplements

Herbal Remedies

German chamomile (*Matricaria recutita*)

Valerian (*Valeriana* spp.)

Passiflora incarnata

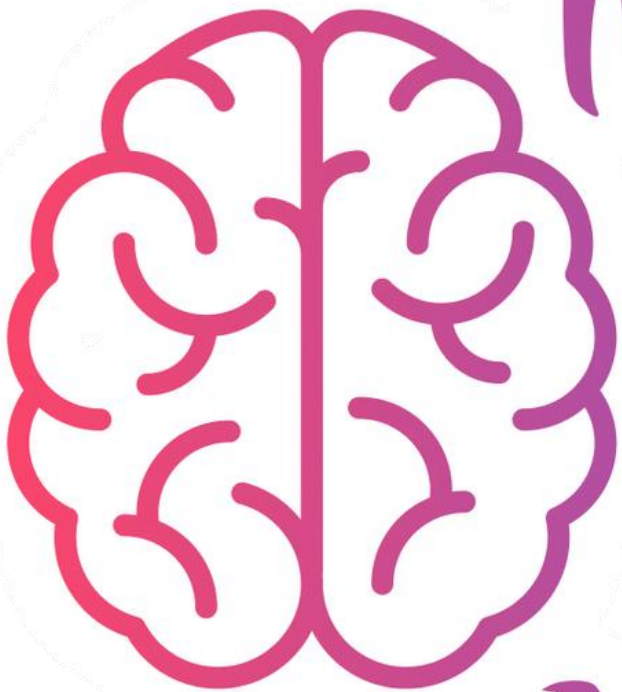
St. John's Wort (*Hypericum perforatum*)

Lemon balm (*Melissa officinalis*)

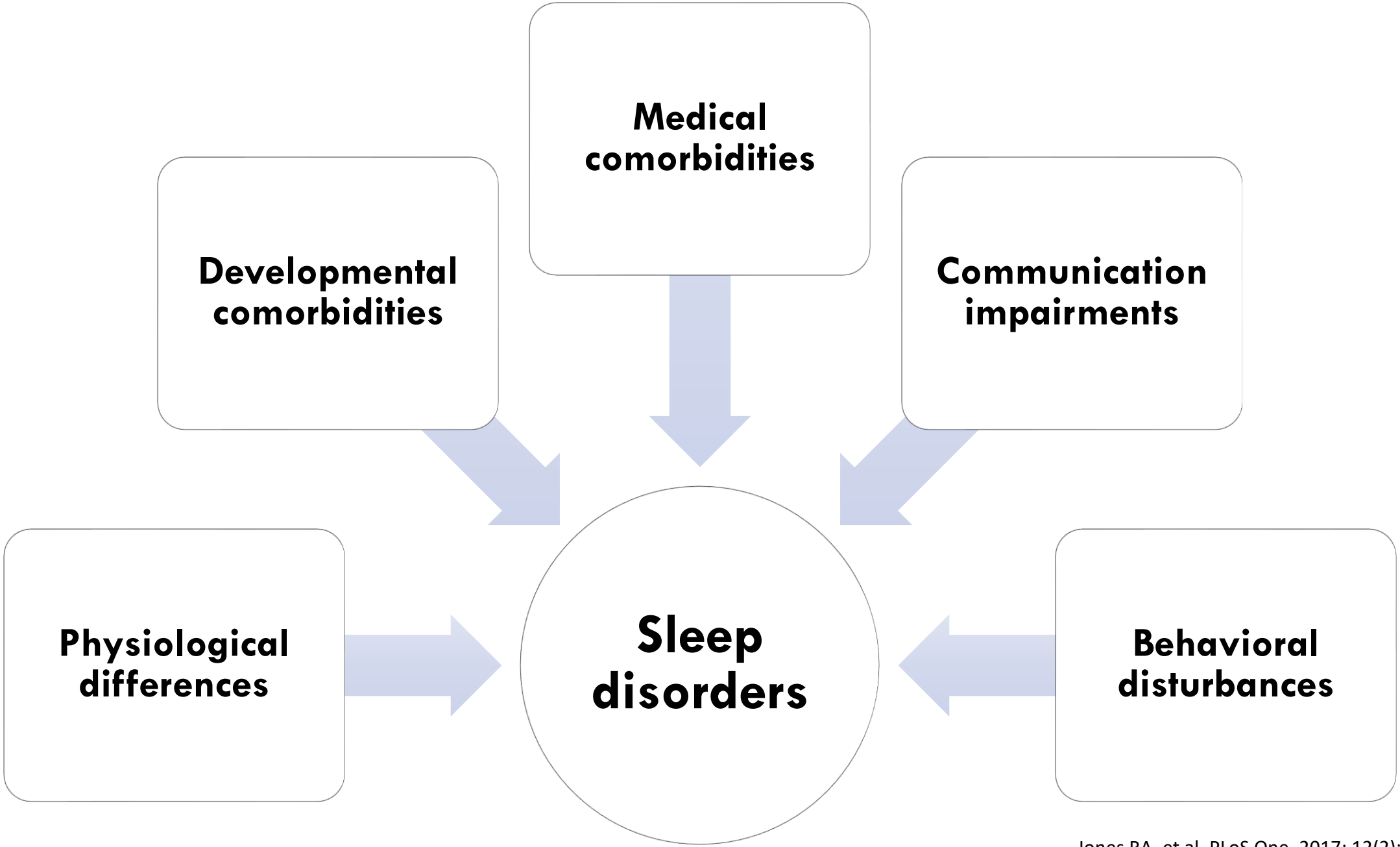
Lavender (*Lavandula*)

TAKE HOME MESSAGES

- Sonno chiaro precursore di psicopatologia, sin dalla prima infanzia
- Alterazioni durata del sonno e disturbi del sonno aumentano rischio psicopatologico
- Sonno come target terapeutico per migliorare outcome
- Igiene del sonno sin dall'infanzia come prevenzione



mental health matters



Jones RA, et al. PLoS One. 2017; 12(2):e0172482
Reynolds et al., Pediatrics 2019

In summary

- The links between sleep and mental health are shaped by **interacting biological, psychological, and social mechanisms**.
- These mechanisms operate in **sequential, parallel, or interactive ways**, encompassing:
  - **Environmental factors** (family stress, parenting practices)
  - **Genetic factors** (shared heritable risk)
  - **Neurobiological factors** (prefrontal cortex development and function)
- A deeper understanding of these mechanisms is crucial for developing **targeted, preventive, and therapeutic interver**