

The Importance of Reported Sleep Symptoms and Mental Health Problems in Pediatric Age: A Study in Primary Care

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Abstract

Background: The persistence of sleep problems has been documented in several studies and it has been found that early sleep problems may predict emotional and behavioral problems at later ages. Despite growing interest in the epidemiological study of mental health in the pediatric population, there are no studies in Latin America that have addressed the coexistence of sleep disturbances and psychopathological problems in children and adolescents seeking primary health care services.

Objective: Determine the frequency of reports of sleep disturbances, their diagnostic efficiency and association with other psychopathological symptoms and syndromes in a cohort of the clinical population of children and adolescents seeking treatment at a primary health care center in Mexico City.

Method: Information was obtained from 846 consecutive attendants aged 4 to 16 years. Subject to their informed consent, the children's parents answered the Brief Screening and Diagnostic Questionnaire as an initial evaluation of a follow-up study. The report of frequent sleep problems and frequent nightmares were asked in the questionnaire. Logistic regression analyses were used to study the strength of the association between the two symptoms of sleep problems and the rest of the symptoms investigated using the questionnaire as well as for the psychopathological syndromes obtained through the questionnaire.

Results: A robust association was found between sleep disturbances and caseness. Sleep disturbances were associated with other non-specific manifestations such as irritability and physical complaints without a medical diagnosis, and mainly with anxiety syndromes. Nightmares on pre-puberal age may be indicative of possible (severe) early onset affective disorders.

Conclusion: Sleep symptoms throughout the pediatric age should be subject to clinical monitoring since their presence is associated with potential neuro-developmental disorders and other central nervous system conditions.

Keywords: Sleep problems; Behavioral problems; Emotional problems; Primary-care; Anxiety; Affective disorders; ADHD; Irritability; Neuro-developmental disorders

Introduction

Sleep is an active physiological process involving the interaction of various components of the central nervous system (CNS) and other systems in the body, during which various functions are performed: metabolic, physiological and neuro-behavioral. Although the precise role of sleep is as yet uncertain, it is known to be a biological imperative necessary for life and the body's optimal functioning. It plays a central role in the restoration of the body, memory consolidation and affect regulation, and is an integral component in the growth and development of the CNS, constituting the brain's primary activity during early development [1,2].

Waking and sleeping states are regulated by two basic processes

The homeostatic process that regulates the duration and depth of sleep, and the endogenous circadian rhythm process, which influences the internal organization of sleep, and the time and duration of the daily waking and sleep cycles. Circadian rhythms are generated by gene expression and synchronize with other time signals such as food intake and alarm clocks. Circadian time develops rapidly within the first six months of life as a result of neuro-developmental maturation and socio-environmental patterns (light-darkness). Although a large part of chronobiology is unchangeable, brain plasticity means that various environmental influences and psychosocial factors affect sleeping, such as, for example, lead exposure; cultural variables such as bed sharing, and social patterns such as the starting time of the school or working

day. Thus, since much of sleep behavior is learned, the role of parents and caregivers in the establishment and modification of sleep patterns is of prime importance [2].

Most sleep problems in childhood and adolescence are transitory and self-limiting. However, the persistence of sleep problems has been documented in several studies [3,4], and it has been found that early sleep problems may predict emotional and behavioral problems at later ages [5,6].

Since the neurotransmitters responsible for controlling sleeping and waking cycle are also involved in the physiopathology of mental health problems, various psychopathological syndromes also entail sleeping problems. The disruption in normal sleep patterns and sleep problems have been identified in several psychiatric disorders in children and adolescents such as anxiety, depression, autism and attention deficit and hyperactivity disorder [7-14]. The link between changes in sleep

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and the presence of psychopathology are complex and probably bi-directional, since trouble sleeping or lack of sleep exacerbate emotional and behavioral difficulties; while mood disturbances, anxiety and stress compromise sleep patterns [14]. The association between sleeping problems and various psychopathological disorders has therefore been found in both longitudinal and cross-sectional studies and for example, more emotional or behavioral problems have been found in adolescence when there has been a history of sleep disturbances during early childhood [5,15].

Thus, it is plausible to consider that sleep disorders at an early age (given the central role sleep plays in development) may constitute an early indicator of vulnerability to psychopathology and should therefore be regularly monitored in general pediatric practice. However, despite growing interest in the epidemiological study of mental health in the pediatric population that represents a great proportion in Latin American countries, there are no studies that have addressed the coexistence of sleep problems and psychopathological disorders in children and adolescents seeking primary health care services, where an early detection and treatment of both kind of problems is crucial [16].

Objective

Determine the frequency of reports of sleep disturbances, their diagnostic efficiency and association with other psychopathological symptoms and syndromes at the initial evaluation of a cohort of the clinical population of children and adolescents seeking treatment at a primary health care center.

Material and Methods

Population and study design

The study used the database from the "Epidemiological Surveillance of Mental Health in Children and Adolescents: a pilot program" Project, in which information was obtained on a cohort of 846 children, of both sexes, aged between 4 and 16, who consecutively sought primary health care treatment at a health center. Subject to their informed consent, the children's parents answered an initial interview, in which, in addition to the socio-demographic information, a Brief Screening and Diagnostic Questionnaire was applied to identify potential mental health problems in their children. Interviews were carried out by nurses and psychologists trained in the use of the instrument. The recruitment period lasted eight months. This cohort was monitored over a two-year period; for this study, only data from the first evaluation were used, transversally. The research project was approved by the commission on ethics in research of the Dr. Ramón de la Fuente Muñiz National Institute of Psychiatry and informed consent was obtained from the adults responsible for the children. Patients who had already received care from the Health Center's Mental Health Service were excluded.

Instrument

Brief Screening and Diagnostic Questionnaire (CBTD for its initials in Spanish): This is a 27-item questionnaire designed to evaluate the presence of the most common psychopathological syndromes in childhood and adolescence [17]. The CBTD consists of 10 items from the Report Questionnaire for Children, RQC [18] as well as 17 other items selected from the Achenbach CBCL-P [19] to supplement the information to enable it to identify probable cases and types of psychopathology more accurately (see appendix). The instrument measures the presence and continuity of each symptom and behavior included in the questionnaire and highlights those that

have been frequent in the past year. The internal consistency of the questionnaire is 0.81, with a range of 0.75 and 0.85 for the different age groups [19,20]. The cut-off point for defining "case" was established using the upper confidence interval of the 90th percentile, in other words, five symptoms. The following efficiency indices were obtained using a cut-off point of 4/5 symptoms: Sensitivity = 68.2%, Specificity = 82%, Positive predictive value = 88% and Negative predictive value = 57.1%, as well as acceptable concurrent validity with respect to the psychiatric [21,22] diagnosis. Two questions in the CBTD inquire about sleeping problems: Q7 Does your child often have trouble sleeping? and Q22 Does your child often have nightmares?

Statistical analysis

First, the frequency of the symptoms of interest, trouble sleeping and frequent nightmares, was determined by sex and age groups. Then, the efficiency ratios were obtained: sensitivity, specificity, positive and negative prediction values of each symptom and of the joint report on both, using the 4/5 cut-off point to define case [20] and the strength of association between sleeping symptoms and the existence of probable cases was determined by the odds ratio. Next, a logistic regression analysis was undertaken, the dependent variables being the two symptoms of sleep disorders and the independent variables being the rest of the different symptoms investigated using the questionnaire both for the total population and by the age of the children grouped into the following ranges: 4 to 5; 6 to 8; 9 to 12 and 13 to 16 as independent variables. The same procedure was subsequently performed although this time, the independent variables were the various psychopathological syndromes obtained through the CBTD [17] each coded as present or absent. This analysis was initially conducted by controlling for the total syndromes and then controlling for the groups of syndromes: 1) Combined attention deficit disorder, inattentive, slightly inattentive, and impulsive hyperactive; oppositional defiant disorder, and moderate and severe behavior disorder, respectively. 2) Generalized anxiety, anxiety with inhibition, severe and moderate depression with two cardinal symptoms-irritability and sadness-and severe and mild depression with one cardinal symptom. 3) Serious and moderate language disorder, probable epilepsy, explosive behavior with probable brain damage, explosive behavior as a probable personality trait. 4) Alteration of eating behaviors with serious and moderate overweight and low weight, respectively [17].

The classic logistic regression model is suitable for estimating the association between a dichotomous variable and one or more variables related to the characteristics of the subjects or their exposure. When the dependent variable is dichotomous, the analysis yields results in terms of the odds ratio (OR), which may be interpreted transversally (between subjects) or longitudinally (within the same subject over time). In this case, the analysis was transversal, between subjects. The significance level was set at $p < 0.05$, with a confidence interval of 95%. All the analyses were performed using the Stata 12 program.

Results

The cohort consisted of 55% of girls and teenagers and 45% of males, with an average age of 9 (s. d 3.5); 20.7% were preschoolers ages 4 to 5, 24.9% were schoolchildren ages 6 to 8, 33.7% were schoolchildren ages 9 to 12 years and 20.7% were teenagers ages 13 to 16. In 88% of the population studied, the informant was the child's mother.

A total of 15.8% of the cohort reported frequent sleeping problems, with 13% reporting frequent nightmares; both symptoms occurred in 5.9% of the children studied. Sensitivity was low: 25%, 26% and 10%

respectively, but specificity, 97%, 96% and 99% and positive predictive value, 91%, 90% and 98%, were extremely high. Strength of association in terms of the odds ratio between the frequent sleeping problems symptom, and the cut-off point in the CBTD to identify probable cases, five symptoms or more, was 10 times more likely whereas in the reports of frequent nightmares, it was 6 times higher. When both sleep symptoms were present, the strength of association was considerably higher, OR=26.9 (CI 95%: 3.7, 195.7).

In the total cohort, no statistically significant differences were found in the frequency of sleeping symptoms by sex (Table 1). However, by age group, both the trouble sleeping symptom and the frequent nightmares symptoms were far more commonly reported among teenage girls than boys ($\chi^2=5.4058$, $p=0.02$; $\chi^2=7.3833$, $p=0.007$), as was the combined presence of the two symptoms ($\chi^2=7.1073$, $p=0.008$).

The results of the association between sleeping symptoms and the rest of the CBTD symptoms are shown in Table 2. In the total cohort, the strongest strength of association was found between the joint expressions of sleep disturbances. The only other symptom with which both sleeping problems were associated was with the report that the children were nervous and fearful. Independently, the trouble sleeping symptom is associated with irritability and physical pain or discomfort without having a medical problem, whereas nightmares are associated with reports of frequent headaches. The combined report of both sleeping problems was associated with the nervous, fearful symptom (OR= 4.4, 95% CI: 1.6, 11.9) and the symptom of staring into space or daydreaming (OR= 2.3, 95% CI: 1.1, 4.7).

The results of the association, by age group, showed that there were variations according to age, yet whereas sleeping problems were

	4-5 years		6-8 years		9-12 years		13-16 years		TOTAL		
	M	F	M	F	M	F	M	F	M	F	
Q7 Trouble sleeping	11	10	13	17	27	25	6	25	57	77	134
	12.50%	11.49%	13.13%	15.18%	21.09%	15.92%	9.09%	22.94%	14.96%	16.56%	15.84%
Q22 Frequent nightmares	8	9	20	16	18	19	2	18	48	62	110
	9.09%	10.34%	20.20%	14.29%	14.06%	12.10%	3.03%	16.51%	12.60%	13.33%	13%
Both symptoms	2	4	8	5	11	9	0	11	21	29	50
	2.3%	4.6%	8.1	4.5	8.6	5.7%	--	10.1%	5.5%	6.2%	5.9%

Table 1: Frequency of sleeping symptoms by sex and age groups.

Symptoms	4-5 years		6-8 years		9-12 years		13-16 years		Total	
	Q 7 OR 95% CI	Q 22 OR 95% CI	Q 7 OR 95% CI	Q 22 OR 95% CI	Q 7 OR 95% CI	Q 22 OR 95% CI	Q 7 OR 95% CI	Q 22 OR 95% CI	Q 7 OR 95% CI	Q 22 OR 95% CI
Q6 Abnormal Language								17.6 (1.04-298.1)		
Q7 Trouble Sleeping		17.5 (2.2-139.8)		8.6 (2.6-28.1)		6.5 (2.4-17.3)		40.4 (2.9-560.2)		5.0 (3.0-8.3)
Q8 Frequent Headaches								51.4 (5.0-531)		1.8 (1.02-3.0)
Q9 Runs Away From Home	113.1 (2.1-590.)		60.8 (2.3-1602.)							
Q 11 Nervous	11.4 (1.4-90.4)	6.2 (1.0-40)							1.9 (1.2-3.2)	2.0 (1.2-3.4)
Q14 Enuresis			6.8 (1.8-25.7)							
Q15 Dependent		6.2 (1.2-31.5)								
Q16 Afraid of School	75.6 (5.5-1034.)									
Q19 Irritable									2.2 (1.2-3.7)	
Q21 Physical Pain							5.4 (1.5-19.2)		1.6 (1.0-2.7)	
Q22 Frequent Nightmares	9.5 (1.2-6.8)		8.8 (2.6-29.7)		6.6 (2.5-16.9)		8.5 (1.6-46.3)		5.0 (3.0-8.3)	
Q25 Disobedient, Quarrelsome				4.0 (1.4-11.5)						
Q26 Frequent Lies		9.2 (1.2-69.7)					4.2 (1.3-12.9)			
Q28 ExplosivE		13.4 (1.7-106.2)								
Q30 Stares Into Space							2.9 (1.0-8.8)			
Q31 Keeps Bad Company							4.1 (1.2-13.4)			

Table 2: Association between sleeping symptoms and the rest of CBTD symptoms.

associated from an early age with symptoms suggestive of anxiety problems, nightmares were mainly associated with externalized symptoms throughout the various age groups. The combined report of both sleeping problems was only found to be significantly associated with other manifestations in schoolchildren ages 9 to 12: with the symptom of staring into space or daydreaming (OR= 2.3, CI 95%: 1.3, 15.6) and with the report of frequent lying (OR= 3.8, 95% CI: 1.01, 14.4).

The association between sleeping symptoms and total CBTD syndromes by age group -Table 3- was shown early and predominantly with anxiety syndromes, although towards adolescence, they were reported less frequently. Among schoolchildren ages 6 to 8, there was an association between frequent nightmares and attention deficit disorder, predominantly in its inattentive and hyperactive-impulsive forms, whereas in both this age group and adolescents, sleeping problems were associated with oppositional defiant behavior. Depressive syndromes were only associated with reports of frequent nightmares in schoolchildren ages 9 to 12, which was also associated with epilepsy.

The results of the logistic regression analyses by groups of syndromes and across age groups are shown in Table 4. The association between sleep symptoms and externalizing syndromes was evident as of school age, where they were clearly associated with attention deficit disorder and hyperactivity in its various forms, as well as oppositional behavior in schoolchildren ages 6 to 8. For the total population studied, nightmares showed a greater strength of association than sleep problems. The combined report of both sleep disturbance was associated with mixed ADHD syndrome (OR=5.6 CI95%: 2.2, 14.0) and inattentiveness (OR= 4.4 CI95%: 1.6, 12.0). By age group, the reporting of both manifestations was associated with mixed type ADHD at school age, from 6 to 12 and with inattentive ADHD in adolescents.

Regarding the group of internalizing syndromes, anxiety disorders proved to be the only ones associated with the whole cohort and by age group except for schoolchildren ages 9 to 12, where, in addition to generalized anxiety, the two severe depressive syndromes and the mild depressive symptoms were significantly associated.

The association between sleep symptoms and the other group of syndromes identified by the CBTD showed that from an early age, sleep problems accompanied explosive behavior and early epilepsy, whereas nightmares were experienced at school age and language disorders were mainly reported during adolescence. Lastly, the associations with syndromes concerning eating and weight, showed that sleep problems tended to be reported in severely underweight preschoolers, whereas in adolescents, it was associated with a moderate weight gain. The combined report of both sleep symptoms was only associated with a moderate weight increase for the total population studied (OR= 3.0 IC95% 1.2, 7.6).

Discussion

To our knowledge, this is the first paper in Mexico and possibly Latin America to study parent's reports on sleeping symptoms in children and adolescents seeking consultation at a primary care center, and their association with probable psychopathology, all through a simple screening tool with acceptable validity regarding psychiatric diagnosis [22].

The prevalence of sleep disturbances reported in the child and adolescent population in a primary care unit, 15.8% and 13%, was within the expected range for sleep problems, 10% to 30%, associated with circumstantial requirements in childhood, and over twice the expected rate for frequent nightmares, 1% to 5% [23]. By age group,

Syndromes	4-5 years		6-8 years		9-12 years		13-16 years		Total	
	Q 7 OR 95% CI	Q 22 OR 95% CI	Q-7 OR 95% CI	Q-22 OR 95% CI						
Combined ADHD										
Inattentive ADHD				17.5 (2.6-119.6)						
Hyperactive-impulsive ADHD				7.7 (1.8-32.7)						
Oppositional Defiant			7.1 (1.5-34.0)				16.1 (1.4-192)			
Severe depression with 2 cardinal symptoms						5.7 (1.0-33.2)				
Severe depression with 1 cardinal symptom						9.4 (1.8-48.2)				
Mild depressive symptoms						17.9 (2.6-126)				
Anxiety with inhibition	13.9 (2.2-88.6)		4.3 (1.2-15.0)		3.8 (1.4-10.3)		39.0 (1.8-836)		3.6 (2.1-6.2)	1.8 (1.1-3.2)
Generalized Anxiety		9.3 (1.4-63.6)	10.0 (2.5-40.2)	55.6 (10.9-284)	18.1 (5.2-62.6)	6.8 (1.7-26.1)	989 (34.9-28016)	7.3 (1.1-48.5)	11.1 (5.9-21.1)	8.8 (4.4-17.3)
Language difficulties										
Probable Epilepsy										
Epilepsy severe						5.5 (1.4-21.4)				
Explosive behavior with probable brain damage										
Explosive behavior as probable personality trait										
Moderately overweight							561 (15.3-20577)			

Table 3: Association between sleeping symptoms and total CBTD syndromes.

Syndromes		4-5 years		6-8 years		9-12 years		13-16 years		Total	
		Q 7 OR 95% CI	Q 22 OR 95% CI								
Exteriorized	Combined ADHD				4.3 (1.3-14.6)	4.0 (1.4-11.6)	4.3 (1.3-14.0)	4.0 (1.1-13.8)		2.5 (1.3-4.5)	3.1 (1.6-6.0)
	Inattentive ADHD				5.3 (1.5-18.7)			4.2 (1.1-15.7)	5.0 (1.2-20.6)		3.2 (1.6-6.6)
	Hyperactive-impulsive ADHD				4.5 (1.5-13.4)	3.2 (1.2-8.6)					
	Oppositional Defiant			4.3 (1.4-13.7)						1.8 (1.04-3.0)	
Interiorized	Severe depression with 2 cardinal symptoms						4.9 (1.05-22.7)				
	Severe depression with 1 cardinal symptom						5.5 (1.3-23.3)	-			
	Mild depressive symptoms						9.3 (1.5-56.9)				
	Anxiety with inhibition	4.0 (1.2-13.1)	4.8 (1.3-18.3)	3.3 (1.3-8.3)		2.6 (1.1-5.8)		4.0 (1.3-12.5)		2.8 (1.8-4.5)	1.6 (1.01-2.7)
	Generalized Anxiety			4.5 (1.5-13.5)	19.2 (5.4-68.6)	8.0 (3.0-21.2)	3.8 (1.5-10.2)	13.0 (2.9-57.5)	5.2 (1.1-24.6)	6.1 (3.5-10.9)	7.4 (3.9-14.0)
Other	Language difficulties		3.5 (1.0-12.6)					5.4 (1.1-26.3)			
	Probable Epilepsy							8.4 (1.3-52.7)			
	Severe epilepsy			3.9 (1.0-14.3)		2.6 (1.0-6.6)	4.1 (1.5-11.1)			2.06 (1.1-3.7)	2.1 (1.1-3.9)
	Explosive behavior with probable brain damage	9.8 (1.2-80.1)		8.0 (1.5-43.0)	11.4 (2.1-60.4)	3.7 (1.3-10.0)	4.4 (1.5-13.1)	3.2 (1.0-9.7)		4.5 (2.4-8.3)	4.1 (2.2-7.9)
	Explosive behavior as probable personality trait	6.5 (2.2-19.5)		2.9 (1.1-7.4)	2.6 (1.1-6.4)	2.2 (1.0-4.7)				2.9 (1.8-4.6)	2.1 (1.2-3.5)
Weight	Severely underweight	3.2 (1.01- 10.3)								2.4 (1.3-4.5)	
	Moderately overweight							4.8 (1.2-19.6)			

Table 4: Association between sleeping symptoms and group of CBTD syndromes.

sleep symptoms were more prevalent in adolescent girls, a finding consistent with other studies [24], which has been explained as more of a biological effect. Thus, Calhoun et al. [25] find a higher prevalence of sleep problems in girls ages 11 to 12 compared with boys of the same age, controlling for several variables including anxiety and depression, and using objective measurements. The results therefore suggest that these symptoms may be more a reflection of the biological changes around menarche than the psychosocial changes associated with this stage of development.

The diagnostic efficiency of the reports on both types of sleep disturbance regarding the cutoff point for the definition of a probable psychiatric case showed both high specificity and high positive predictive value and therefore a strong association with the presence of probable psychopathology, consistent with that reported in the

literature [14,26].

From the symptomatic perspective of the total population studied, the symptom most clearly associated with the report of frequent sleep problems was irritability, although it did not appear to be significantly associated in the analysis by age group. This suggests that irritability, which in itself is a nonspecific symptom, corresponded to a variable underlying more specific or conspicuous manifestations. Likewise, the marginal association between sleep problems and physical discomfort without a medical problem in the total cohort, and the association between frequent nightmares and headaches, consistent with the results of an epidemiological study on the school population exploring the relationship between headaches and sleep disorders [27], reinforced the previous impression, that is, the existence of non-specific symptoms associated with sleep symptoms, which is why they may go unnoticed

or not be paid sufficient attention [28]. In any case, these results suggest a general neurobiological basis with nonspecific manifestations.

The logistic analysis controlling for all CBTD syndromes (Table 3) showed that sleep symptoms were predominantly reported as being clearly associated with anxiety symptoms throughout the pediatric age, and that associations with other syndromes, such as those related to attention deficit and hyperactivity disorder, and depressive syndromes only appeared conspicuously at a certain age.

However, when the logistic analysis only controlled for groups of syndromes (Table 4), in other words, partially overlooking the total number of possible psychopathological comorbidities, one can see that from as early as kindergarten, the expressions of both anxiety and explosive behavior should be considered. Moreover, this analysis showed that explosive behavior was robustly associated with sleep disturbances until early adolescence, as was the epilepsy syndrome. Moreover, the associations between sleep disorders and attention deficit hyperactivity disorder were solid and relatively constant until adolescence although they apparently reflected the possible existence of comorbidity, as reported in other studies [9,10,29,30].

A clinical aspect to be highlighted was the association between nightmares and severe depressive syndromes among schoolchildren ages 9 to 12. Frequent nightmares have been associated with post-traumatic stress disorder [30] but not with depression. Anxiety and depression have been reported to overlap in the transition from childhood to adolescence in follow-up studies, and several epidemiological studies, including a report on the general population of Mexico City showing an increase in anxiety symptoms for this age group [31-36].

The analyses of this study showed that when the total syndromes were controlled for (Table 3), the magnitude of the association between nightmares and generalized anxiety were greater than that obtained when only the groups of syndromes were controlled for (Table 4), where it was halved. Conversely, although the strength of the association between nightmares and depressive syndromes declined, it was higher than that found with anxiety, suggesting that the reports of frequent nightmares in this age group may have been more specific to a possible depressive disorder although the confidence intervals indicated an overlap. Clinical relevance pointed to the identification of children with possible (severe) early onset affective disorders, since pre-puberty age has been cited as a critical time for the start of this type of pathology, and which have a more complicated prognosis in the long term [14,37].

In conclusion, the results of this study suggest that in fact, sleep symptoms throughout the pediatric age should be subject to clinical monitoring since their presence is associated with potential neuro-developmental disorders and other central nervous system conditions. It should be noted that anxiety, autism and attention deficit and hyperactivity disorder correspond to very early onset pathologies and that they share symptoms. Moreover, given the presence of anxiety syndromes, the most frequent findings reported in the literature [30], as corroborated in this study, it is essential to rule out the possibility that these manifestations reflect or are part of other neuro-psychiatric disorders. It should be recalled that anxiety is characterized by a state of hypervigilance or hyperalertness that is therefore more closely linked to sleep regulation.

It is important to point out several limitations of this study: 1) The questionnaire only explored two sleep symptoms, meaning that it is impossible to talk about specific sleep disorders. Moreover, the report on symptoms provided by the children's parents may have been biased by the informant, particularly as regards the reporting of nightmares

and symptoms experienced by teenagers, which are not communicated to adults; 2) The children's medical diagnoses were not obtained even though the adults responsible were asked about the reason for the consultation and whether the children were in treatment for a particular disease. The analysis of this information yielded no significant trends or patterns associated with the reports of the children's sleep symptoms; 3) The results corresponded to the population treated in a primary health care unit, meaning that their extrapolation to other similar services should be done with caution; 4) As noted, this report only worked with the initial information on the cohort, as a result of which the overview reflects a transversal vision, which is no less important in light of the clinical findings presented.

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References

1. Montes-Rodríguez CJ, Rueda-Orozco PE, Urteaga-Urías E, Aguilar-Roblero R, Prospero-García O (2006) [From neuronal recovery to the reorganisation of neuronal circuits: a review of the functions of sleep]. *Rev Neurol* 43: 409-415.
2. Mindell J, Owens J (2003) A clinical guide to pediatric sleep: Diagnosis and management of sleep problems. (2nd Ed) Wolters Kluwer /Lippincot Williams and Wilkins, Philadelphia.
3. Paavonen EJ, Solantaus T, Almqvist F, Aronen ET (2003) Four-year follow-up study of sleep and psychiatric symptoms in preadolescents: relationship of persistent and temporary sleep problems to psychiatric symptoms. *J Dev Behav Pediatr* 24: 307-314.
4. Laberge L, Tremblay RE, Vitaro F, Montplaisir J (2000) Development of parasomnias from childhood to early adolescence. *Pediatrics* 106: 67-74.
5. Gregory AM, O'Connor TG (2002) Sleep problems in childhood: a longitudinal study of developmental change and association with behavioral problems. *J Am Acad Child Adolesc Psychiatry* 41: 964-971.
6. Shang CY, Gau SS, Soong WT (2006) Association between childhood sleep problems and perinatal factors, parental mental distress and behavioral problems. *J Sleep Res* 15: 63-73.
7. Ivanenko A, Crabtree VM, Gozal D (2004) Sleep in children with psychiatric disorders. *Pediatr Clin North Am* 51: 51-68.
8. Chorney DB, Detweiler MF, Morris TL, Kuhn BR (2008) The interplay of sleep disturbance, anxiety, and depression in children. *J Pediatr Psychol* 33: 339-348.
9. Tsai MH, Huang YS (2010) Attention-deficit/hyperactivity disorder and sleep disorders in children. *Med Clin North Am* 94: 615-632.
10. Gruber R (2009) Sleep characteristics of children and adolescents with attention deficit-hyperactivity disorder. *Child Adolesc Psychiatr Clin N Am* 18: 863-876.
11. Willoughby MT, Angold A, Egger HL (2008) Parent-Reported Attention-Deficit Hyperactivity Disorder Symptomatology and Sleep Problems in a Preschool-Aged Pediatric Clinic Sample. *J Am Acad Child Adolesc Psychiatry* 47: 1086-1094.
12. Gruber R, Xi T, Frenette S, Robert M, Vannasinh P, et al. (2009) Sleep disturbances in prepubertal children with attention deficit hyperactivity disorder: a home polysomnography study. *Sleep* 32: 343-350.
13. Golan N, Shahar E, Ravid S, Pillar G (2004) Sleep disorders and daytime sleepiness in children with attention-deficit/hyperactive disorder. *Sleep* 27: 261-266.
14. Gregory AM, Sadeh A (2012) Sleep, emotional and behavioral difficulties in children and adolescents. *Sleep Med Rev* 16: 129-136.
15. Quach J, Hiscock H, Canterford I, Wake M (2009) Outcomes of child sleep problems over the school-transition period: Australian population longitudinal

- study. *Pediatrics* 123: 1287-1292.
16. Pagel JF, Pandi-Perumal SR (2007) *Primary care sleep medicine*. Humana Press, Totowa New Jersey.
 17. Caraveo-Anduaga JJ, Caraveo-Anduaga JJ (2007) Brief screening and diagnostic questionnaire: syndromes' algorithms and their prevalence in México City. *Salud Mental* 30: 48-55.
 18. Giel R, de Arango MV, Climent CE, Harding TW, Ibrahim HH, et al. (1981) Childhood mental disorders in primary health care: results of observations in four developing countries. A report from the WHO collaborative Study on Strategies for Extending Mental Health Care. *Pediatrics* 68: 677-683.
 19. Achenbach TM, Edelbrock C (1983) *Manual for the Child Behavior Checklist and Revises Child Behavior Profile*, University of Vermont, Burlington.
 20. Caraveo-Anduaga JJ (2006) Brief screening and diagnostic questionnaire for mental health problems in children and adolescents: reliability, standardization, and construct validity. Part one. *Salud Mental* 29: 65-72.
 21. Caraveo-Anduaga JJ (2007) Validity of the Brief screening and diagnostic questionnaire (CBTD) for children and adolescents in clinical settings. *Salud Mental* 30: 42-49.
 22. Caraveo-Anduaga JJ, López-Jiménez JL, Soriano-Rodríguez A, López-Hernández JC, Contreras-Garza A, et al. (2011) [Concurrent validity and efficiency of the CBTD for the surveillance of mental health on children and adolescents at a primary health care center in Mexico]. *Rev Invest Clin* 63: 590-600.
 23. American Academy of Sleep Medicine (2014) *International Classification of Sleep Disorders*. AASM, Darien, IL, U.S.A.
 24. Johnson EO, Roth T, Schultz L, Breslau N (2006) Epidemiology of DSM-IV insomnia in adolescence: lifetime prevalence, chronicity, and an emergent gender difference. *Pediatrics* 117: e247-e256.
 25. Calhoun SL, Fernandez-Mendoza J, Vgontzas AN, Liao D, Bixler EO (2014) Prevalence of insomnia symptoms in a general population sample of young children and preadolescents: gender effects. *Sleep Med* 15: 91-95.
 26. Kyung Lee E, Douglass AB (2010) Sleep in psychiatric disorders: where are we now? *Can J Psychiatry* 55: 403-412.
 27. Tomás-Vila M, Miralles-Torres A, Beseler-Soto B, Revert-Gomar M, Salalanga MJ, et al. (2009) [The relationship between headache and sleep disorders: findings from an epidemiological study in a population of Spanish school-age children]. *Rev Neurol* 48: 412-417.
 28. Owens JA (2001) The practice of pediatric sleep medicine: results of a community survey. *Pediatrics* 108: E51.
 29. Corkum P, Moldofsky H, Hogg-Johnson S, Humphries T, Tannock R (1999) Sleep problems in children with attention-deficit/hyperactivity disorder: impact of subtype, comorbidity, and stimulant medication. *J Am Acad Child Adolesc Psychiatry* 38: 1285-1293.
 30. Ivanenko A, Johnson K (2008) Sleep disturbances in children with psychiatric disorders. *Semin Pediatr Neurol* 15: 70-78.
 31. Kim-Cohen J, Caspi A, Moffitt TE, Harrington H, Milne BJ, et al. (2003) Prior juvenile diagnoses in adults with mental disorder: developmental follow-back of a prospective-longitudinal cohort. *Arch Gen Psychiatry* 60: 709-717.
 32. Burke JD, Loeber R, Lahey BB, Rathouz PJ (2005) Developmental transitions among affective and behavioral disorders in adolescent boys. *J Child Psychol Psychiatry* 46: 1200-1210.
 33. Moffitt TE, Harrington H, Caspi A, Kim-Cohen J, Goldberg D, et al. (2007) Depression and generalized anxiety disorder: Cumulative and sequential comorbidity in a birth cohort followed prospectively to age 32 years. *Arch Gen Psychiatry* 64: 651-660.
 34. Costello EJ, Copeland W, Angold A (2011) Trends in psychopathology across the adolescent years: what changes when children become adolescents, and when adolescents become adults? *J Child Psychol Psychiatry* 52: 1015-1025.
 35. Copeland WE, Adair CE, Smetanin P, Stiff D, Briante C, et al. (2013) Diagnostic transitions from childhood to adolescence to early adulthood. *J Child Psychol Psychiatry* 54: 791-799.
 36. Caraveo-Anduaga JJ (2011) Intergeneration familial risk and psychosocial correlates for anxiety syndromes in children and adolescents in a developing country. *INTECH* 49-68.
 37. Wenar C, Kerig P (2006) *Developmental psychopathology: From the infancy through adolescence*. (5a Ed), McGraw-Hill, New York.