Comparing Infant and Toddler Sleep Patterns Prior to and During the First Wave of Home Confinement Due to COVID-19 in Spain

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Abstract

Introduction

Recent literature has shown that sleep patterns are shaped during the first years of life, playing a relevant role in children's functioning. We focused on comparing sleep patterns in infants and toddlers in Spain before and during COVID-19 home confinement to assess the immediate impact on sleep patterns.

Methods

e compared data from two cross-sectional surveys from parents of 1,658 children three to 36 months of age from Spain. One conducted before COVID-19 (2017-2018, n=1,380) and another during COVID-19 pandemic (March-May of 2020, n=254). We used an internet self-administrated questionnaire using the Brief Infant Sleep Questionnaire (BISQ) criteria in both surveys.

Results

During confinement infants and toddlers went to sleep later (median bedtime 21.5 before confinement vs. 21.6 during confinement p=0.004). We found a statistically significant increase in infants' and toddlers' sleep latency by >30 minutes during confinement (p<0.001). Based on the recommended BISQ criteria for classifying inadequate sleep patterns, we observed a statistically significant increase in poor sleepers meeting at least one criterion during confinement (p<0.001).

Conclusions

Parents during COVID-19 home confinement reported several factors affecting the quality of their children's sleep. Follow-up studies can help understand the potential long-term effects of the COVID-19 pandemic on sleep patterns.

What Is Known

- Adequate sleep patterns in infants and toddlers are relevant as they are linked to proper and long-term social-emotional development as well as adequate daytime functioning
- Regarding sleep patterns in pediatrics during the COVID pandemic, recent literature has described an increase in total daily sleep time as well as more exposure to screens in children and adolescents, providing evidence of immediate collateral consequences of the COVID-19 outbreak

What Is New

- Comparing sleep patterns in two samples of infants and toddlers in Spain before and during COVID-confinement, we found later bedtimes as well as a significant increase in infants' and toddlers' sleep latency by >30 minutes during confinement.

- Parental self-reported questionnaire during COVID-19 home confinement reported an overall worsening of their children's sleep based on the BISQ criteria

Introduction

Sleep patterns change rapidly across the earliest years of life and play an important role in children's daytime functioning. There is a growing interest in determining those factors influencing children's sleep development (both intrinsic (i.e., child characteristics) and extrinsic (i.e.environmental input)) (1, 2). Cultural norms determine the boundaries between "normal" and "problematic" sleep behavior typically based on the extent to which individuals conform to sleep-schedule and sleep-behavior expectations (3). However, cultural patterns might rapidly take a turn-over in light of external factors such the current public health pandemic due to COVID-19 outbreak.

On March 14th 2020, in response to the first wave outbreak, the Spanish Government imposed one of the most stringent lockdowns in Europe (BOE-A-2020-3692 https://www.boe.es/eli/es/rd/2020/03/14/463) especially for children, as an emergency measure to prevent further spreading of the infection. After six weeks of strict home confinement, Spanish minors were permitted to leave the house for one hour within allotted time slots and half-mile radius. This sudden unexpected circumstance meant having to adapt to a new reality for both adults and children.

Regarding the specific stressors affecting the population during the COVID-19 quarantine, a review of 24 studies highlighted as main stressors the duration of the quarantine, the fear of infection, frustration and boredom and not having adequate information or clear guidelines from public authorities (4).Previous international studies include 1,210 Chinese adults reporting that after two weeks of confinement, 53.8% showed a moderate or brief psychological impact, 16,5% moderate to severe depression, 28.8% anxiety and 8.1% stress (5). Another study on 1,047 adults from Asia (36%), Africa (40%), Europe (21%) and other (3%) reported that the COVID-19 home confinement had a negative effect on both mental-wellbeing and on mood and feelings (6).

Regarding children's health, previous literature has found that during non-school period, children tend to be physically less active, have longer screen time, irregular sleep patterns, and less adequate diets, resulting in weight gain and a loss of cardiorespiratory fitness (7, 8). Thus, there is a growing concern about the potential long-term effects of this pandemic on children's health and psychological development. A cross-sectional study carried out during the quarantine on 1,143 Spanish and Italian parents of children aged three to 18 years old found that 85.7% of the parents perceived changes in their children's emotional state and behaviors. The most frequent symptoms were difficulty concentrating (76.6%), boredom (52%), irritability (39%), restlessness (38.8%), nervousness (38%), feelings of loneliness (31.3%), uneasiness (30.4%), and worries (30.1%), and Spanish parents reported more symptoms than Italians ones (9).

The aim of this work is to compare two similar samples of infant and toddlers in Spain three to 36 months of age (before COVID-19 confinement and during COVID-19 confinement) in order to identify

possible sleep pattern changes related to the present confinement context. We hypothesize to find a negative impact on infants and toddlers sleep patterns during the COVID-19 confinement.

Methods

We analyzed a repeated cross-sectional survey of Spanish infants and toddlers between three and 36 months of age. One conducted before COVID-19 confinement (2017-2018), (10) and another conducted during the strict home confinement of the first wave of COVID-19 (March-May of 2020). We used an internet self-administrated questionnaire assessing sleep patterns using the Spanish validated Brief Infant Sleep Questionnaire (BISQ) criteria (11, 12) in both surveys. The sample recruitment, the inclusion and exclusion criteria as well as the variables measured and analyses mirrored our previous study in order to be able to perform adequate comparisons between both our samples (10).

Participants

We compared 1,634 infants and toddlers recruited in two different stages (1,380 before confinement and 254 during confinement). Both samples included healthy Spanish children between ages three to 36 months. Data were collected from a digital online questionnaire available within a free-access website. Parents participated either during their child's paediatric follow-up visit at Hospital Universitari General de Catalunya or through online free-access parental support groups.

Measures:

Parents completed a self-reported 47 item online questionnaire, which included the Spanish validated Brief Infant Sleep Questionnaire (BISQ-E) (12) (based on the BISQ (11).

In order to understand developmental patterns, children were grouped in five age ranges as initially done in the BISQ validation. Group one was ages three to six months; group two, ages seven to 12 months; group three, ages 13 to 18 months; group four, ages 19 to 24 months; group five, ages 25 to 36 months.

Based on the BISQ criteria established for clinically classifying poor sleepers (11), we defined problematic behaviour in our sample according to three criteria: more than three awakenings a night, nocturnal awakenings longer than one hour and, a total sleep time of less than nine hours. Parental perception of sleep quality was also included in the analysis as a variable present in the original BISQ.

Procedure

The Institutional Ethics Review Board at Hospital Universitari General de Catalunya and Universitat Internacional de Catalunya, Barcelona approved this study. All users provided consent to the inclusion of their data in the present research study and were able to decline participation at all times. The researchers provided users with contact information should they have any questions, concerns or desire to withdraw consent. Data form second cross-sectional sample were collected from April 2020 to June 2020.

For this study, a self-registered website domain was created called www.epison.es where the questionnaire was uploaded and encrypted. The completion of the questionnaire was voluntary and parents were not offered any compensation for their participation. Inclusion criteria were parents with infants and toddlers from three to 36 months of age residing in Spain. Exclusion criteria were limited to literacy in Spanish language.

Analyses

The variables were described with frequency and percentage for the qualitative variables, the median and standard deviation for the quantitative normal-distributed variables, and median and interquartile range for the quantitative not normally distributed variables.

To compare two groups (before and during confinement, for example) a prevalence ratio was calculated for qualitative variables, with their confidence interval and p-value; a Mann-Whitney test was performed for quantitative not normally distributed variables.

The confidence intervals were calculated with a level of confidence of 95%. The tests were considered significant when the p-value is under 0.05. The normality was tested with the Shapiro-Wilk test and the Kolmogorov-Smirnov test. All the analyses were performed with R Statistical Software versión 3.5.1 for MAC.

Results

Both samples of infants and toddlers were distributed regarding age in months as following: infants and toddlers age three-six months 13.8%, seven-12 months 20.5%, 13–18 months 17.3%, 19–24 months 14.6% and 25–36 months 33.9%. Further data on demographics are presented in Table 1.

Table 1
Demographics among both samples (before and during confinement sample)

	Before confinement		During confinement		comparison		
	n	%	n	%	PR*	95%CI PR	p-value
Child's sex							
Male	717	51.9	133	52.4	1.01	(0.83; 1.21)	0.934
Female	663	48.1	121	47.6	0.99	(0.81; 1.20)	0.932
Child's age months (mean)		19.2 (9.3)		18.8 (9.9)			
3–6	153	11.1	35	13.8	1.24	(0.85; 1.77)	0.246
7–12	239	17.3	52	20.5	1.18	(0.87; 1.58)	0.274
13–18	248	17.9	44	17.3	0.96	(0.69; 1.31)	0.822
19–24	296	21.4	37	14.6	0.70	(0.47; 0.94)	0.026
25–36	444	32.2	86	33.9	1.05	(0.83; 1.32)	0.665
Respondent's education:							
University degree	883	64.0	196	77.5	1.20	(1.03; 1.40)	0.018
High school degree	351	25.4	38	15.0	0.59	(0.41; 0.81)	0.002
Primary education	146	10.6	19	7.5	0.70	(0.42; 1.11)	0.155
Respondent's age months (mean)		34.6 (4.6)		35.4 (4.4)			
< 25	21	1.5	26	10.2	6.72	(3.79; 12.07)	< 0.001
25–35	787	57.0	113	44.5	0.78	(0.64; 0.94)	0.013
> 35	572	41.5	115	45.3	1.09	(0.89; 1.33)	0.388

PR*: Prevalence Ratio

Table 2 compares sleep patterns and ecology before and during confinement. We found that during confinement infants and toddlers went to sleep later than similar population under no confinement (median bedtime 21.5 (IQR 21–22) before confinement vs. 21.6 bedtime (IQR 21-22.5) during confinement p = 0.004. This finding were also significant when considering the youngest infant group (3–6 months of age) (median bedtime 21.4 (IQR 20.8–22.3) before confinement vs. median bedtime 22 (IQR 21.5–23) during confinement (p = 0.017)) and the oldest toddler group (25–36 months of age) (median bedtime 21.6 (IQR 21.3–22.1) before confinement vs. median bedtime 22.0 (IQR 21.5–22.6) during confinement < 0.001)). (see Supplementary tables: Table A. Bedtime). Regarding total sleep time, we found a tendency for less total sleep time during confinement (12.0 hours (IQR 11.0–13.0) before confinement vs. 12.0 hours (IQR 11.0-12.7) during confinement) however non statistically significant p = 0.078.

Table 2
Comparison on sleep patterns and ecology among both samples (before and during confinement).

	Before confinement (n = 1380)		**During confinement (n = 254)**		**comparison**		
	Median	IQR	Median	IQR			p-value**
Bedtime	21.5	(21.0; 22.0)	21.6	(21.0; 22.5)			0.004
	%	CI 95%	%	CI 95%	PR*	95%CI PR	p-value
Total sleep time < 9 h****	2.3	(1.59; 3.26)	2.8	(1.11; 5.59)	1.03	(0.39; 2.34)	0.950
> 3 night awakenings	15.7	(13.84; 17.75)	12.6	(8.78; 17.32)	0.77	(0.51; 1.09)	0.153
Duration of awakenings > 1 h	16.7	(14.80; 18.81)	9.8	(6.47; 14.18)	0.57	(0.36; 0.86)	0.011
sleep onset latency > 30 min	12.3	(10.63; 14.17)	33.9	(28.06; 40.04)	2.81	(2.13; 3.67)	< 0.001
“Inadequate” sleep patterns***:							
0 items	65.3	(62.71; 67.80)	52.4	(46.02; 58.64)	0.81	(0.67; 0.98)	0.029
1 items	25.0	(22.73; 27.37)	37.8	(31.81; 44.07)	1.49	(1.17; 1.88)	< 0.001
≥ 2 items	9.7	(8.20; 11.39)	9.8	(6.47; 14.18)	0.95	(0.59; 1.47)	0.844
Parental perception of a child’s sleep problem:							
A small problem	21.4	(19.24; 23.63)	24.0	(18.89; 29.75)	1.10	(0.82; 1.45)	0.525

*PR: Prevalence Ratio

** Mann-Whitney test

*** According to BISQ criteria

**** One missing data for total sleep time

Supplementary tables

Table A. Median bedtime in both samples (before COVID-19 confinement and during COVID-19 confinement) adjusted by child’s sex, age group, parental education and age as well as prception of a child’s sleep problem

	Before confinement (n = 1380)		During confinement (n = 254)		comparison		
A very serious problem	18.1	(16.12; 20.25)	20.0	(15.33; 25.54)	1.11	(0.81; 1.51)	0.502
A small + a very serious	39.4	(36.90; 42.13)	44.1	(37.89; 50.34)	1.10	(0.89; 1.35)	0.363
*PR: Prevalence Ratio							
** Mann-Whitney test							
*** According to BISQ criteria							
**** One missing data for total sleep time							
Supplementary tables							
Table A. Median bedtime in both samples (before COVID-19 confinement and during COVID-19 confinement) adjusted by child's sex, age group, parental education and age as well as prception of a child's sleep problem							

In Table 2, prevalence of infants and toddlers presenting with the criteria used in the original BISQ to define poor sleepers are presented (11) (total sleep time < 9 hours, > 3 nights awakenings, duration of awakenings > 1 hour) as well as sleep onset latency longer than 30 minutes both before and during COVID-19 confinement. Results were adjusted for age distribution of our sample, sex and parental level of education. We found a statistically significant increase of infants and toddlers with a sleep latency > 30 minutes during confinement ($p < 0.001$). However, we found a decrease in infants and toddlers presenting with longer than one hour nocturnal awakenings: 16.7% (IQR 14.8–18.8) before confinement vs. 9.8% (IQR 6.47–14.18) during confinement $p = 0.011$.

Based on the mentioned BISQ criteria for classifying inadequate sleep patterns, we categorised both samples of infants and toddlers in three groups (i) none, ii) one of the poor sleeper BISQ criteria and iii) two or more poor sleeper BISQ criteria. We observed a statistically significant increase in the group with one criteria for classifying poor sleepers during confinement ($p < 0.001$).

In Table 2 we also compare parental perception of the child's sleep problem in infants and toddlers before confinement and during confinement. A trend of increasing parental perception of a child's sleep as problematic was observed (39.4% of parents referring their child had a sleep problem before confinement vs. 44.1% of parents during confinement) however not statistically significant (adjusted $p = 0.363$).

In the supplementary tables, the main variables regarding sleep patterns (sleep time, bedtime, number and duration of nocturnal wakefulness, short sleep time, sleep latency and parental perception) were presented adjusted for sex and age of child, level of education, age of the respondent, as well as parental perception of sleep difficulty.

Regarding sleep onset latency > 30 minutes, we found statistically significant differences in both samples globally (12.3% of infants and toddlers presenting a sleep onset latency > 30 minutes before confinement vs. 33.8% during confinement ($p < 0.001$). This difference were also found when comparing both sexes, all age groups and among parents with a university degree (10.6% before confinement vs. 38.7% during confinement ($p < 0.001$). This difference was also found among parents among 25–35 years and > 35 years ($p < 0.001$). (See supplementary tables: Table E: Sleep onset latency > 30 minutes).

Discussion

To the best of our knowledge, this is the first age specific comparative study on infant and toddler sleep patterns before the COVID-19 pandemic and during confinement due to COVID-19 pandemic. We based our research on the Brief Infant Sleep Questionnaire (11) a validated age-specific instrument to study sleep patterns in infants and toddlers. Further, both our samples were recruited and methodologically analysed following the same criteria as to maintain adequacy for comparison.

Adequate sleep patterns in infants and toddlers are relevant as they are linked to proper and long-term social-emotional development. A previous study (13) examining cross-sectional and longitudinal relationship among variables related to sleep patterns as well as social-emotional problems and healthy social development in infants and toddlers found that later bedtimes and less total sleep across the 24-hr period predicted higher internalizing problem scores (including indices of depression/withdrawal, general anxiety, separation distress, and inhibition) (13). Children are vulnerable to environmental risks and both their physical and mental health as well as productivity in adult life is deeply rooted in early years (14). Therefore, close attention and great efforts are required to address these emergency issues effectively and avoid any long-term consequences in children.

Regarding sleep patterns in pediatrics during the COVID pandemic, recent literature has described an increase in total daily sleep time as well as more exposure to screens in children and adolescents, providing evidence of immediate collateral consequences of the COVID-19 outbreak (15, 16, 17). In our region, sleep patterns in infants and toddlers in Spain were described in a study of 280 children from 0–4 years of age with a mean sleep time in infants younger than one year of 11.69 hours (SD = 1.87) and among 1–2 years 11.35 hours (SD = 1.74) (18). In our study, regarding bedtime, our sample showed infants and toddlers during confinement going to bed later and this fact was especially substantial in both the youngest infants and the oldest toddlers. Screen time exposure might have had a negative impact, especially in toddlers as described in previous literature (16, 18).

Regarding total sleep time, we found a decreasing trend for all age groups during confinement however non-statistically significant ($p = 0.078$). Even so, we found a statistically significant differences in the youngest infant group (three-six months) and the oldest toddler group (25–36 months). Total sleep time is a relevant variable in describing children sleep patterns. Previous literature based on expert consensus have defined sleep time recommendations in children and adolescents such as the National Sleep Foundation or the World Health Organisation. For the present research we took the WHO guidelines for

children younger than five years as the reference (19). Regarding these guidelines, infants younger than one year of age should sleep a minimum of 12 hours of total sleep time and from 1 to 2 years of age a minimum of 11 hours. Infants and toddlers in our research showed than a quarter of them did not reach this total sleep time of 12 hours (IQR 11-12.7). These results were similar than the ones showed in other study during confinement in Spain in children of comparable age (mean 10.98 hours; SD = 1.8) (20).

Regarding sleep onset latencies (> 30 minutes) during COVID-19 confinement infants and toddlers showed more difficulty to fall asleep. Previous literature has already described similar findings regarding infants and toddlers with delayed bedtime being significantly associated with bedtime resistance even when adjusting for total sleep time (21).

The original BISQ Questionnaire (11) described very concrete sleep patterns that might indicate the need for a child to be further screened for sleep difficulties (total sleep time less than nine hours, more than three night awakenings and duration of awakenings longer than one hour). These criteria interestingly were defined as being relatively stable between 6 months to 36 months of age. When comparing infants and toddlers presenting with one or more of these criteria in both samples we found a statistically significantly increase of infants and toddlers presenting with one of this sleep criteria during COVID confinement (37% % of infants and toddlers vs. 25% before COVID-19 confinement) ($p < 0.001$).

Regarding parental perception of sleep difficulties, 44% of parents evaluated during COVID-19 confinement indicated their child had a sleep problem whereas 39% of parents stated sleep difficulties before COVID-19 confinement. This tendency, although not statistically significant, could perhaps point out the contextual difficulties linked to the exceptional situation of children and mostly entire families being locked down in apartments/homes for such a long period of time. Lockdown might affect sleep rhythm which is a multidimensional construct influenced by variables such as sleep light, activity level, social contact, psychological well-being (9, 16, 18),

There were some limitations to the present study. Both samples (before confinement and during confinement) showed slight differences in some characteristics such as a slightly uneven proportion of toddlers among 19–24 months of age in both samples (21% before confinement vs.14% during confinement ($p = 0.026$)), a higher proportion of parents with a university degree (64% before confinement vs. 77% during confinement ($p = 0.018$)) and a higher percentage of parents younger than 25 years of age (1.5% before confinement vs. 10% during confinement ($p < 0.001$)). This might be probably due to the relatively smaller sample recruited during confinement. However, methodologically in both groups we followed same procedural guidance.

Our sample may have a limited generalizability as participants were recruited by convenience sampling and were mostly living in the region of Catalonia in Spain. Regarding demographical characteristics, sample size limitations have to be noted. Despite this limitation, the results in this current research showed statistical significance. Our sample included an unbalanced proportion of families with higher education, as can be expected from a primarily internet-based study. Nevertheless, our findings were consistent with previous cross-cultural web-based studies (11, 22, 23), showing similar epidemiological

characteristics so we believe we have obtained similar segments of the population within our country for purposes of cross-cultural comparison (11, 23). For the present research we based the definition of sleep difficulties solely on the criteria presented in the BISQ (11) thus not taking into account other aspects of this complex construct. The reliance on parental reports in assessing infant sleep has inherent limitations; however previous research (24, 25) has shown a high correlation between parent-reported sleep duration and actigraphy-recorded sleep duration in young healthy children. Further, parents with concern about their child's sleep may have been more likely to participate, skewing this aspect of our results. Information bias may be an inherent limitation to web-based surveys. However, the fact that there was not an interviewer carrying out the questionnaire may have decreased an unacceptability bias (26).Another limitation of our study was the use of a limited number of sleep variables to define sleep ecology without taking into account further variables that have shown to have a predictor value for sleep quality such as the use of routines, as well as sociodemographic relevant data such as size of living unit, income, remote-working of one or both parents among others.

Conclusions

These results suggest that confinement due to COVID-19 pandemic had a significant impact on infants' and toddler's sleep during the initial wave in Spain. In light of these findings, sleep habits and thus sleep patterns can, under adequate contextual influences, be positively influenced thus improving children's potential development. Follow-up studies focusing on infant's and toddler's sleep patterns might help assess the potential long-term effects of the COVID-19 pandemic.

Abbreviations

BISQ (Brief Infanst Sleep Questionnaire), COVID-19 (Coronavirus-SARS 2019 pandemic), IQR (Interquartile range), WHO (World Health Organisation)

Declarations

- Funding: The present research received no funding.
- All authors state having no conflicts of interest / no competing interests to carry out the present research
- Availability of data and material: The databased created for the study is available upon request
- Code availability: N/A
- Authors' contributions: Cassanello Pia and Balaguer Albert had primary responsibility for protocol development, sample enrolltment, outcoment assessment, premilinary data analysis and writing the manuscript. Drs. Ruiz-Botia Irene and Sala-Castellvi Pere participated in the enrollment as well as analytical framework for the study and contributed to the writing of the manuscript.Martin Juan Carlos and Martínez-Sanchez Jose María supervised the design and execution of the study, performed the data analyses and contributed to the writing of the manuscript

- Ethics approval: The Institutional Ethics Review Board at Hospital Universitari General de Catalunya and Universitat Internacional de Catalunya, Barcelona approved this study.
- Consent to participate: All users provided consent to the inclusion of their data in the present research study and were able to decline participation at all times. The researchers provided users with contact information should they have any questions, concerns or desire to withdraw consent.
- Consent for publication; N/A

References

1.Camerota, Marie & Propper, Cathi & Teti, Douglas. Intrinsic and extrinsic factors predicting infant sleep: Moving beyond main effects. Developmental Review. 53. 2019; 10.1016

2.Sette S, Baumgartner E, Ferri R, Bruni O. Predictors of sleep disturbances in the first year of life: a longitudinal study. Sleep Med 2017; 36:78-85

3.Oskar J, O'Connor B. Children's sleep: an interplay between culture and biology. Pediatrics 2005; 115 (1 Suppl):204-16

4.Brooks SK, Webster RK, Smith LE et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. Lancet 2020; 395: 912–20

5.Wang C, Pan R., Wan X et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in china. Int J Environ Res Public Health 2020; 17 (5):1729

6.Ammar A, Mueller P, Trabelsi K, Chtourou H, Boukhris O, Masmoudi L et al. ECLB-COVID19 Consortium. Psychological consequences of COVID-19 home confinement: The ECLB-COVID19 multicenter study. PLoS One 2020; (11):15

7.Brazendale K, Beets MW, Weaver RG, et al.Understanding differences between summer vs. school obesogenic behaviors of children: the structured days hypothesis. Int J Behav Nutr Phys Act 2017; 14: 100

8.Cartanyà-Hueso À, Lidón-Moyano C, Cassanello P, Díez-Izquierdo A, Martín-Sánchez JC, Balaguer A, Martínez-Sánchez JM. Smartphone and Tablet Usage during COVID-19 Pandemic Confinement in Children under 48 Months in Barcelona (Spain). Healthcare (Basel). 2021;9(1):96

9.Orgilés M, Morales A, Delvecchio E, Mazzeschi C and Espada JP. Immediate Psychological Effects of the COVID-19 Quarantine in Youth From Italy and Spain. Front. Psycho 2020; 11:579038

10.Cassanello, P., Ruiz-Botia, I., Díez-Izquierdo, A. et al. How do infants and toddlers sleep in Spain? A cross-sectional study. Eur J Pediatr 2020; 180(3):775-782

11.Sadeh A. A brief screening questionnaire for infant sleep problems: validation and findings for an internet sample. Pediatrics 2004; 113(6)

12.Cassanello P, Díez-Izquierdo A, Gorina N, Matilla-Santander N, Martínez-Sanchez JM, Balaguer A. Adaptación y estudio de propiedades métricas de un cuestionario de valoración del sueño para lactantes y preescolares. An Pediatría. 2018;89(4): 230-237

13.Mindell JA, Leichman ES, DuMond C, Sadeh A. Sleep and Social-Emotional Development in Infants and Toddlers. J Clin Child Adolesc Psychol. 2017;46(2):236-246

14.Clark H, Coll-Seck AM, Banerjee A et al. A future for the world's children? A WHO–UNICEF–Lancet Commission. Lancet. 2020; 395: 605-658

15.Faulkner G, Rhodes RE, Brussoni M, Chulak-Bozzer T, Ferguson LJ, Mitra R, O'Reilly N, Spence JC, Vanderloo LM, Tremblay MS. Impact of the COVID-19 virus outbreak on movement and play behaviours of Canadian children and youth: a national survey. Int J Behav Nutr Phys Act. 2020;17(1):85

16.Moore SA, Faulkner G, Rhodes RE, Brussoni M, Chulak-Bozzer T, Ferguson LJ, Mitra R, O'Reilly N, Spence JC, Vanderloo LM, Tremblay MS. Impact of the COVID-19 virus outbreak on movement and play behaviours of Canadian children and youth: a national survey. Int J Behav Nutr Phys Act. 2020 Jul 6;17(1):85.

17.Pietrobelli A, Pecoraro L, Ferruzzi A, Heo M, Faith M, Zoller T, Antoniazzi F, Piacentini G, Fearnbach SN, Heymsfield SB. Effects of COVID-19 Lockdown on Lifestyle Behaviors in Children with Obesity Living in Verona, Italy: A Longitudinal Study. Obesity (Silver Spring). 2020;28(8):1382-1385

18.Arufe-Giráldez V., Sanmiguel-Rodríguez A., Zagalaz-Sánchez, M.L., Cachón-Zagalaz J. Gonzalez-Valero G. Sleep, physical activity and screens in 0-4 years Spanish children during the COVID-19 pandemic. Were the WHO recommendations met? Journal Human Sport and Exercise. 2020; 0 (0)

19.World Health Organization. (2019). Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age. World Health Organization. https://apps.who.int/iris/handle/10665/311664. Licencia: CC BY-NC-SA 3.0 IGO

20.Cachón-Zagalaz, J.; Zagalaz-Sánchez, M.ªL.; Arufe-Giráldez, V.; Sanmiguel-Rodríguez, A.; González-Valero, G. Physical Activity and Daily Routine among Children Aged 0–12 during the COVID-19 Pandemic in Spain. *Int. J. Environ. Res. Public Health* **2021**; *18*, 703

21.Kitamura, 2015) S, Enomoto M, Kamei Y, et al. Association between delayed bedtime and sleep-related problems among community-dwelling 2-year-old children in Japan. J Physiol Anthropol. 2015;34(1):12

22.Sadeh A, Mindell JA, Luedke K, Wiegand B. Sleep and sleep ecology in the first 3 years: a web-based study. J Sleep Res 2009; 18(1): 60-73

23.Mindell JA, Sadeh A, Wiegand B, How TH, Goh DYT. Cross-cultural differences in infant and toddler sleep. Sleep Med 2010; 11(3):274-280

24.Lomeli HA, Pérez-Olmos I, Talero-Gutiérrez C, Moreno CB,González-Reyes R, Palacios L, de la Peña F, Muñoz-Delgado J (2008) Sleep evaluation scales and questionaries: a review. Actas Esp Psiquiatr 36(1):50–59

25.Lewandowski AS, Toliver-Sokol M, Palermo TM (2011) Evidence-based review of subjective pediatric sleep measures. J Pediatr Psychol 36(7):780–793

26.Díaz de Rada V. Problemas de representatividad en las encuestas con muestreos probabilísticos. Pap Rev School 2018; 74:45