



SLEEP HABITS IN STUDENT'S PERFORMANCE (SHASTU) FINAL REPORT

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... WITHOUT THEM THE SHASTU PROJECT WOULD HAVE NOT BEEN POSSIBLE

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I. INTRODUCTION AND JUSTIFICATION

A successful school performance is not determined solely by the academic ability of a child, but also by five core attributes collectively referred as **school readiness**: physical health and well-being of the child, his/her social competence, emotional maturity, language and cognitive skills and his/her approach to learning. The fact of taking those factors into account during the school years can help to improve their performance and behaviour at school.

Although sleep plays a vital role in healthy development through childhood and adolescence, it is an often neglected topic in health education. Sleep supports physical and neurobiological development and it also facilitates academic learning ⁽¹⁾. Sleep is essential for memory consolidation processes, learning capacity and academic performance. Sleep deprivation leads to a decrease in teacher reported attention and academic achievement ⁽²⁾. Children enrolled in remedial school programs report significantly more sleep problems ⁽³⁾.

The modern world is highly associated with attractive social and media distractions which are accessible 24/7. In our society, sleep time is often considered as optional and sometimes an awkward time which interrupts people's busy lives, also including the lives of children and adolescents. Therefore, the duration of sleep in children and adolescents has been decreasing in recent decades. The increasing loss of sleep is one of the greatest contributors to sleep disorders in the 21st century. In 2014, the American Academy of Paediatrics found out and acknowledged sleep deprivation in adolescence as an important public health issue that significantly affects the health and safety of teenagers. Sleep seems to be as important to health and well-being as food ^(4,5). In Spain, between 91.2% and 76.1% of students believe that they suffer from sleep disturbances, which are directly related to their age and the lack of a regular sleep schedule during school days in 15% of the cases ⁽⁶⁾.

A growing body of work documents shows the link between disordered sleep and school performance. Students with inadequate sleep or irregular sleep patterns do not perform as well in school as others, sleep debt with more than 2 h of weekend bedtime delay are related to poor academic performance ⁽⁷⁾ and consequently causing lack of attention, poor memory, behavioural problems and poor academic performance ⁽⁸⁾.

A large study in the Spanish secondary school system ($N = 1155$, mean age 14) found a significant correlation between class failure and sleep complaints, and morning sleepiness ⁽⁹⁾.

The association between sleep complaints and poor school performance is supported by in-lab experimental studies that prove negative effects of sleep deprivation, sleep restriction, and sleepiness, on laboratory testing of motor skills, memory, attention and problem solving in children and adolescents. Experimental restriction of sleep in students (ages 6–12) has led to academic difficulty in the classroom as well as increased severity of school related attention

problems⁽¹⁰⁾ Pagel et al found that daytime sleepiness was the sleep variable that most likely affected negatively high school students⁽¹¹⁾.

There is a direct link between how a family behaves or their parenting characteristics, and the duration and quality of their children's sleep (6-17 years of age). When parents enforce limits on child's caffeine intake, they are protecting the child's sleep duration. When parents enforce a specific time for bed and bedtime routines, they are protecting the child's sleep quality. In contrast, the fact of children having ≥ 1 technology devices left in their bedroom overnight is significantly associated with reduced sleep duration and poor sleep quality⁽¹²⁾.

In contrast, the objective deterioration of cognitive functions caused by sleep debt is not partnered with a subjective awareness of the decline; therefore, children, parents and teachers may not be aware of the negative impact of sleep loss and as such, they will get little motivation to alter bad habits. The information as related to sleep knowledge and healthy sleep practise, is not widely and readily availed in schools (in sharp contrast with the knowledge related to the importance of a healthy diet and regular exercise). The paradox is thus: although the advances in sleep science are encouraging, awareness and appreciation of the importance of sleep among the general public and among health care, professionals are still extremely limited. Therefore it is necessary to equip school people (students, teachers and parents) with adequate sleep knowledge in order to tackle the current situation, in this sense, researchers in other fields (e.g., drug prevention) have noted that acquisition of knowledge is rarely enough in itself if the aim is to change behaviour. Consequently, sleep education should be an important consideration for school-aged children, not only as an intention to treat basic disorders but also as a preventive capacity⁽¹³⁾.

There a very few (nearly 13-14) worldwide published studies about sleep education programs which are not described in detail for scrutiny. There is such wide range of factors which may contribute to a successful sleep education program that, information and knowledge are not enough. Making knowledge cause a lasting behaviour change is much more complex than simply disseminating knowledge. Increasing people's knowledge does not necessarily change their behaviour. The motivation to change has often been related to the degree of dysfunctional patterns at baseline, which would suggest that the salience of sleep education depends on the perceived importance of sleep health which, in itself, is the aim of sleep education.

The sleep pattern of children is influenced by interactive factors as school start time, parental sleep-wake patterns, socio-demographics, daytime activities such as electronic media use, school work and extracurricular activities. Therefore, not only students must be enrolled in a program to improve their sleep habits, but also the involvement of families is fundamental for good results⁽¹⁴⁾.

Sleep education would need knowledge in development and delivery:

- a) Method of delivery: mass circulation of documentation, traditional classroom sessions...
- b) Style of delivery: didactic teaching methods or more interactive learning.

c) Status of the educator: sleep expert versus teacher or school staff member.



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I.1 State of the art in sleep education program:

Vollmer et al showed that the interventions increased pupil's theoretical sleep knowledge and knowledge about good sleep practices; however their sleep practices did only improve in a short-term period but then became worse. They suggest that interventions might be longer and should last over the whole school year⁽¹⁵⁾.

Li et al showed that insufficient sleep and daytime sleepiness commonly existed and was positively associated with the impairment of school performance, especially academic achievement, among Chinese school-aged children. The effectiveness of delaying school starting time emphasized the benefits of optimal school schedule regulation to children's sleep health⁽¹⁶⁾.

Moseley and Gradisar in a randomized, controlled trial using 2 groups (program class, classes-as-usual: [CAU]) assessed over 3 time points (pre-program, post-program, 6-week follow-up) during four 50-minute lessons across a 4-week period. Lessons consisted of educating adolescents on promoting and maintaining a healthy lifestyle based on a cognitive-behaviour. Therapy framework showed that there was a significant interaction for reducing the discrepancy between school and weekend out of bed times ($P = 0.002$). There was no impact on other sleep parameters or depressed mood⁽¹⁷⁾.

Tsai and Li in 2004 showed that a short sleep course had a limited effect on sleep patterns and recommended measures to be applied during the entire school year⁽¹⁸⁾.

II. OBJECTIVES

The ultimate goal of the project is summarized in the quotation of Professor Sheldon: ‘Our intention is to be an awakening for the sleep medicine community to take action not only by providing educational programs to patients, public, legislators and educators; but also a challenge for the community to begin fundamental educational research in methods that can result in long-lasting change in sleep knowledge and ultimately changes in behaviour during childhood and adolescence’⁽¹⁹⁾

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In that sense, the aim of this study is to help us answer the following four questions:

1. If students sleep better and for a more optimal and longer time, can they improve their academic performance and behaviour?
2. What can be done in schools and in the education systems in order to improve the sleep habits of students within a society of twenty-four hours of non-stop activity?
3. Which is the best time of the day to study a complex matter or to sit an exam about it?
4. If we find out about those moments and try to select the optimal schedules for the activities, does it facilitate and optimize student’s performance?

If the answer is cost-effective, schools should bring in knowledge and programs based on sleep habits, a forgotten area within traditional healthy habits but essential at the same time.

III. MATERIAL AND METHODS.

Referring to the method used to improve knowledge about the sleep of students and their families as well as to promote changes in their attitudes towards sleep, it has been suggested by literature that traditional pen and paper delivery methods may no longer be enough for young people who spend significant amounts of time online. Given the absence of online sleep education plans we raised a mixed project: online- interactive and personal. Moreover, we must always take into account the abilities and qualities of those people people/teachers/doctors involved in the program: their skills and their teaching and communication abilities can be influential.

For this project and as suggested by some authors^(17,20), it was decided the integration of teaching staff especially trained in sleep, so that they could teach students some important points for the program about sleep during their everyday lessons. In this way the role of trained teachers is vital for the project. For instance, teachers can talk about sleep in a chemistry class by adding an extra lesson about it, or, another example can be studying the circadian rhythms of plants⁽²¹⁾ in a science lesson.

The project/study is seen as a multi-site trial which may improve its own power to detect changes needed in schools or at home and it may well be an additional method of achieving better conditions in classrooms including brighter lights, bigger or open windows, the need for nap rooms, scheduling difficult subjects such as Maths, taking into account the circadian timing of the day... All of these actions are supposed to improve the students and families’ knowledge about sleep. Such change in their sleeping habits will lead to a more successful performance in

school and better behaviour of students in schools and at home, which will mean less school failure a better adult society in the long run.

Teachers from schools, secondary schools, parents' associations, psychologists and doctors got involved in the project with the strong belief it will benefit our society and our citizens.

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The Paediatric Sleep Unit in Hospital Quirónsalud Valencia, directed and supervised the project. The coordinator of de Sleep Unit is Dr. Gonzalo Pin Arboledas, specialized in treating sleep disturbances in children. His broad experience as a doctor, researcher and trainer, make him essential for the project.



III.1. Organizations participating in the Project:



a) Spain:

SILLA COUNCIL (coordinator),

Hospital Quirónsalud Valencia,

Pre-School, Primary, Secondary Schools: IES Enric Valor, IES Manuel Sanchis Guarner, CEIP El Patí, CEIP Reis Catòlics, CEIP San Roque, CEIP Verge dels Desemparats.

Parents and Students associations: AMPA IES Enric Valor, AMPA IES Manuel Sanchis Guarner, AMPA CEIP El Patí, AMPA CEIP Reyes Católicos, AMPA CEIP San Roque, AMPA CEIP Verge dels Desemparats, AMPA CC Sagrada Família, ASOCIACIÓN ALUMNOS IES ENRIC VALOR.



b) Turkey:

Ünye: is a city and a district within Ordu province, in the Black Sea Region .

ÜNYE MEB (Local Authority - Partner 1)

School: Puset Polvan Ortaokulu

Associations: Ipekyolu Mahallesi Muhtarligi



c) Italy:

Remedello: is a town (Lombardy) with 2.996 inhabitants.

REMEDELLO (Local Authority - Partner 2)

Institute: Istituto Istruzione Superiore G. Bonsignori

Associations: Tempo Libero Società Cooperativa Sociales ONLUS

III.2 Method.

It is a descriptive population study by conducting transversal probability samples questionnaires. The actions of SHASTU project have been performed by the three states involved in the educational process, teachers, families and students with the following aims:

I. To provide teachers with the necessary knowledge so that they are well able to introduce information and programs of healthy sleep habits in class, within their daily work and lessons.

II. To communicate and inform the families about the importance of sleep topic and its advantages so that they can perform successfully at school and achieve a good quality of life. At the same time it is important to provide them with some clear and easy to follow guidelines in order to improve the whole family rest at home.

III. To provide students with the main concepts within their daily school curriculum. The actions and guidelines of the Project must not be considered as external and isolated actions just at a certain time of the school year. It is not an external campaign about sleep. The Project must be considered as part of their daily work and must be involved in their daily learning procedure. In this way, the students in each class must be aware of their own role in the Project. They are part of it and they must empower their own responsibilities as main actors of a healthy life habit related with good rest and sleep.

That triple action has been carried out in two clearly different stages

III.2.1 PREVIOUS STAGE: PREPARATION AND TRAINING

a) Before starting the field work with students and families, the training of teachers took place as follows:

1. Two theoretical sessions with a duration of 4 hours each, in which teachers were trained by the scientific head of the project about:

- Physiology of sleep.

- Consequences of lack of sleep and other problems related to sleep in students.

- Measures about sleep hygiene supported by the American Academy of Sleep Medicine, the European Sleep Association and the Practical Guide for Prevention and Treatment of Sleep Disorders in Children and Teenagers, published by the Spanish National Health Department.

The theoretical sessions were broadcasted and uploaded online for the Turkish and Italian partners of the project.

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2. Two practical sessions with a duration of 4 hours each, in which teachers from Silla (Spain), worked in groups and discussed, proposed and shared the most suitable measures and actions to be told and taught to families, students and parents. Those actions are the ones teachers also included in their lessons and classrooms on a daily basis to help their students improve their sleep habits.

The actions were shared online with the European partners.

The specific measures to be applied in each classroom depending on the age group or special needs of each class and at home by families are the following:

2.1 General rules for all age groups:

- A) Have a healthy breakfast with your family.
- B) Technological devices restricted at night.
- C) Reach an agreement at home about timetables.
- D) Avoid sedentary lifestyle.
- E) Older students act as “trainers or sleep coaches for younger students within the same school.

2.2 General rules to be taught at pre-school education:

- A) Parents / tutors must set family timetables.
- B) Recommended pre-sleep habits:
 - Shower
 - Family dinner without TV or technology.
 - Oral Hygiene – physiological needs before sleep..
 - Reading: low intensity light, preferably with yellow-orange light.
 - No TV or other technologies after shower.
 - Recommend parents not to give children stimulants (fizzy sweet drinks, chocolate...)
 - Recommend sleep between 10 and 12 hours.

2.3 General rules to be taught to families of secondary and bachelor students:

- Family dinner without TV or technology.
- Get their schoolbag ready for the following day.
- Relaxing activity (reading – music - hugs)
- Set a time for bed by negotiating with the teenager.
- Lower intensity of lights at home in the evening in order to avoid exposure to bright light before night time.
- Turn bedrooms into technology free areas (no telephone, no mobile phone, no PC, no tablet...)

Both, tutorial meetings with parents or legal tutors and meetings with students have been really important. In fact, meetings have been the cornerstone of the SHASTU Project, and really useful to set up rules, check and verify the evolution of the aforementioned rules and guidelines. On the other hand, the concepts to be taught within each school subject have been supported by theoretical understanding.

The methodology used with pre-school students, aged 3 to 5 years old, was learning by playing. Teachers and pedagogues designed and proposed games for students. In order to help them to design the games and make children understand the main concepts in a very easy way, the main characters of the SHASTU project were created: CIRCADIAN, DARKNESSLIGHT, SEROTONIN, MELATONIN and SUPERSLEEP.



All of the other students: primary and secondary were also encouraged to prepare theatre plays and took drama lessons related to healthy sleep habits and the Project. Some of them also used the Sleep Characters to perform their plays.

The sleep time and the wake-up time set on the main guidelines were different for every country, depending on their cultural context.

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2.4 Measures to be applied within schools, created and implemented by teachers:

-Students from all ages must design and create educative banners with drawings, pictures, words and sentences related to sleep and rest. They must pin them up on their walls inside the classrooms and along the corridors at school. In this way, they are creating a proper atmosphere to learn about healthy sleep habits and the banners will help them to be aware of the subject every day

- To boost discussions and debates in class about sleep and good rest.

- To make use of activation measures:

a) To the extent possible, teachers must design school timetables and subject placement by taking into account the chronobiology of attention efficiency. According to experts, the highest attention efficiency time is set between 11.00h and 13.00h. By knowing this fact, teachers should set subjects that involve physical activity early in the morning and subjects that might need concentration, attention and intellectual efficiency after 10.00h, especially at about 12.00h.

b) Set guidelines for stimulation and physical activation before the first lesson in the morning: dancing or jogging for example, depending on the possibilities of each school.

c) Stimulation with light: especially for those students who feel much more sleepy in the morning. Classrooms should be as lit and bright as possible. Therefore the bright light, (natural, artificial or a combination of both) will stimulate their ability to concentrate and it will also help them to bring their circadian rhythm forward. In this way, students will fall asleep a bit early at night.

d) Avoid exams and tests in the following situations: at first time in the morning, on Mondays or the first day of class after a holiday.

e) Introducing subjects and debates related to sleep and rest. Teach students about a moderate and sensitive use of new technologies and their negative impact on students' sleep timetable.

f) Promote extra physical activity outside school at sensible times, to make it compatible with a good rest and healthy sleep habits, taking into account the timetables of sport centres and those agreed within their families.

III.2.1. IMPLEMENTATION

1 Implementing designed strategies.

2. **One to one meetings and class meetings**, specifically held to talk and follow up SHASTU healthy sleep habits.

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3. **Assessing the sleeping habits of students** by using subjective measures: three different questionnaires. The questionnaires valued the quality and quantity of sleep by similar questions, but at the same time different, in order to obtain much more accurate and reliable results. Even though two of the three surveys (BEARS AND SDSC) are not validated in Spanish language, they were chosen for the Project because they are recommended by the Practical Guide for Prevention and Treatment of Sleep Disorders in Children and Teenagers, published by the Spanish National Health Department. The survey called “Self Sleep Report” has been validated in Spanish language from its original format in English. The survey called SDSC was written originally in Italian and its translation into English was also properly validated.

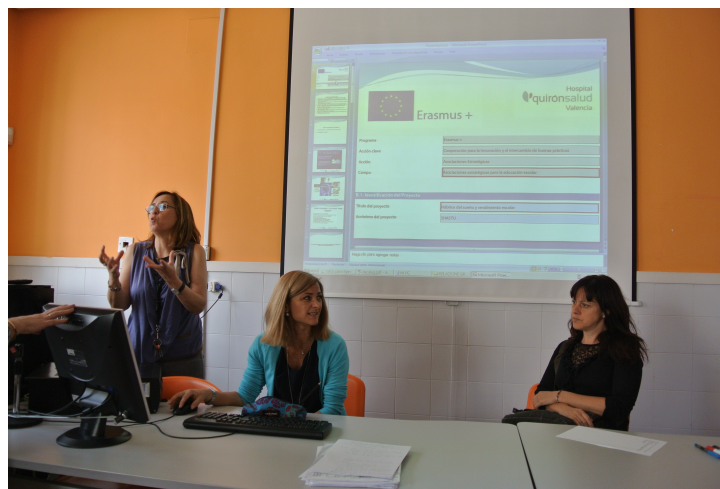
3.1. Appendix 1: find attached the English version of the surveys. Some of the main features of the surveys and questionnaires are the following:

a) BEARS questionnaire.

It is a quick 5 –item screening tool to be used with children in a primary care setting. Each letter of the acronym BEARS represents one of the five items for query: Bedtime issues, Excessive daytime sleepiness, night awakenings, regularity and duration of sleep and snoring.

The survey is designed for use with children between the ages of 2 and 12.

Though it has not yet been evaluated for its psychometric properties, the instrument has been shown to increase the amount of sleep information. This questionnaire is recommended by the Clinical Practice Guideline on Sleep Disorders in Childhood and Adolescence in Primary Care (Spain) as screening questionnaire.



b) SLEEP DISTURBANCE SCALE FOR CHILDREN (SDSC)

Consisting of 26 Likert-Type items, the SDSC was designed both to evaluate specific sleep disorders and to provide an overall measure of sleep disturbance. Using factor analysis divided items into six categories representing some of the most common sleeping difficulties: initiating and maintaining sleep, sleep breathing disorders, disorders of arousal/nightmares, sleep-wake disorders of excessive somnolence and sleep hyperhidrosis. Internal consistency ranges from .71 to .79, a test-retest reliability of .71, a diagnostic accuracy of .91.

This questionnaire is recommended by the Clinical Practice Guideline on Sleep Disorders in Childhood and Adolescence in Primary Care (Spain) as diagnostic questionnaire.

c) SLEEP SELF-REPORT.

The Sleep Self-Report (SSR) is a questionnaire initially created in the USA to be used with one sample only, to assess sleep patterns and problems in school-aged children. Internal consistency was good ($\alpha=0.85$). Convergent validity with anxiety ($r=0.54$) and perceived welfare ($r=-0.53$) measures, and divergent validity with a measure of academic performance and positive influence of peers ($r=-0.22$) were acceptable. Exploratory analysis suggested a factorial structure composed by four subscales: sleep quality, sleep anxiety, bedtime refusal and sleep routines. Confirmatory analysis indicated a good fit for the model (RMSEA = 0.04; GFI = 0.95; AGFI = 0.93; $\chi^2/df = 2.48$)⁽²¹⁾.

3.2. EVALUATION OF RESULTS: The chronology has changed depending on the different possibilities of work in each country.

-In Spain, surveys have been filled in by families and students three times: the first surveys or Basal surveys, before starting any action, a second time, at the end of the first year of actions and a third round of surveys at the end of the second year of actions

- In Italy and Turkey, the basal survey and the final survey have been filled in.

Basal Survey-Questionnaires: March 2015

Intermediate Survey-Questionnaires: November 2015

Final Survey-Questionnaires: June 2016

3.3. Follow up: During the development of the program, three follow up meetings have taken place with the teachers from Silla (Valencia) and two online meetings with the European partners. Therefore, there have also been two re-evaluation face-to-face meetings in the three towns: Silla, Ünye and Remedello.

3.4. The results shown by the initial survey and the follow up surveys have a direct relationship with the students' performance shown on their personal marks and school year results.



MAYO 28, 2016 - NO COMMENTS - SHASTU - SHASTU
Shastu a Telehorta
 Telehorta també ha participat en la difusió del programa europeu sobre els hàbits de la son i el rendiment escolar Shastu, amb la gravació d'una xerrada dirigida per Jesús Miquel. En el programa es va parlar dels nivells, desenvolupament i estat actual de la implementació dels hàbits saludables de la

mayo 25, 2016
 Activitats al voltant del projecte Shastu

mayo 25, 2016
 Última fase del projecte Shastu

mayo 10, 2016
 Personatges Shastu

mayo 10, 2016
 Trobadra transnacional del Projecte Shastu a Sardenya

4. The Project Website: SHASTU.eu

The creation of the Project website called SHASTU.EU allowed the follow up of the project to all the partners and organizations involved in it. News about activities and meetings were uploaded as well as a complete photo gallery of events.

5. CEFIRE

The important role of the Continuous Training Centre for Teachers and Educators: CEFIRE. CEFIRE Torrent organised and managed the specific formation on SHASTU, for Primary and Secondary teachers in Silla, for both public and private schools and high schools. During the first year eighty teachers were trained and around eighty more were trained during the second years of the project.

The teachers training for the first year consisted of four in-person lessons. During the first two hours teachers were face-to-face taught about theoretical sleep concepts, sleep habits in schoolchildren and the consequences of inappropriate sleep hygiene. During the two following hours teachers were working on possible methodologies, activities and workshops for the different school stages and ages, so that they could introduce the SHASTU guidelines of healthy sleeping habits in their classrooms. They also discussed how to provide parents with the SHASTU guidelines to be followed at home and the tools to follow up the progress within the families. Moreover, an on-line platform was designed and set up where the theoretical sessions, scientific essays and press articles related to sleep in scholars were uploaded so that the professionals involved in the project could have online access and get as much information as they needed. They could also have access to a wide range of documents written and discussed by teachers containing their own proposals and conclusions on the subject.

After the first year of formation, the technical and medical team of the Project realised that, although many of the measures proposed had been carried out properly, there were other measures that had not been applied properly. Aware of the situation, Dr. Gonzalo Pin, teachers and parents proposed a closer and nearer follow up of the actions. In order to do so, during the following year there were three in-person lectures and one online training session. Firstly and following the methodology during the first year, teachers were also face-to-face taught about theoretical sleep concepts, sleep habits in schoolchildren and the consequences of inappropriate sleep hygiene. Next, on a second in-person lecture, participants (teachers) started working on the first year teachers' proposals and how to make a good use of them in class and at home. Continuing with the in-person lectures, there were online sessions by means of an online platform; the online work was coordinated and directed by two teachers who were specifically trained for it for a year. Finally, a last in-person lecture / session was held in order to share proposals and activities designed by the different teams of teachers being trained during this second half of the Project.

The excellent guided work by the two tutors and the sharing of new strategies soon started to give great and optimal results. Teachers were fully involved and the SHASTU guidelines and messages soon had reached classrooms, families and students. The spirit of the project was on every wall in schools in Silla, Remedello and Ünye and some families were changing their habits at home: the seeds of the SHASTU project were starting to be properly planted. Thanks to their belief in the project and their personal and professional involvement, teachers carried out their tasks properly and their activities were uploaded onto the online platform. On the platform they could share notes, share their own work and also theoretical essays and interesting articles.

The conclusions and activities were uploaded to the SHASTU website so that the European partners could look up for any information they might have needed.



6. Broadcasting and dissemination.

The media were interested in SHASTU from the very start of the project. Motivated by the impact of healthy sleeping habits on children and teenagers and their direct relationship with school performance and healthy life, the media decided to follow and broadcast all about this unique project in Europe during the two years of the project. They covered the news in all

formats possible: news, reports and interviews on newspapers, magazines, radios and television programs, along the different stages of the project.

Media from every country involved in SHASTU Project, Spain, Turkey and Italy published and broadcasted information always depending on the different stages of the Project taking place at that moment in their country. It should be pointed out the outstanding role of digital media, which potentially broadened the influence of the Project and incremented the informative synergy in each region.

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The advertising campaign, in the strictly advertising sense, advertisements, add breaks in media and marketing messages, has taken place at the end of the project. The media and marketing department decided to do it at the end of the project with the aim of disseminating the complete SHASTU project and conclusions, so that they could give the whole information to the public and the media. The logos of all the entities taking part in the project have been present in every TV program, radio broadcasting, written press and digital media, and the partners clearly mentioned in the case of the radio.

It must be pointed out the media coverage nationwide of TVE Televisión Española – National Spanish Television and interviews about the Project on national radios as Cadena Ser - Valencia, Levante TV, reports on Levante-EMV newspaper or the special talk showdebate on Telehorta. These are only a few of the many media that covered the SHASTU news all along the stages of the project.

Online links:

<http://www.hortanoticias.com/un-proyecto-nacido-en-silla-sobre-habitos-del-sueno-podria-extenderse-a-toda-europa/>

http://www.elperiodic.com/silla/noticias/441080_silla-converteix-referent-europeu-dh%C3%A0bits-saludable-descans.html

<http://www.nouhorta.eu/index.php/horta-sud/silla/item/11216-programa-erasmus-shastu-en-silla>

<http://www.elperiodicodeaqui.com/noticias/Sillideraestudio-sobreinflenciasueno-enaprendizaje/109689>

<http://www.levante-emv.com/horta/2016/05/23/silla-lidera-programa-europeo-shastu/1421808.html>

https://www.youtube.com/watch?v=p_q_SJOJvKc

<https://www.youtube.com/watch?v=CBU9S5P8bpk>

<https://www.youtube.com/watch?v=kunux3sZ91k>

<https://www.youtube.com/watch?v=bk6U1xoJvU>

<https://www.youtube.com/watch?v=uRw5BRzmZEg>



IV. RESULTS

1. Statistical assumptions

2. Statistical results

2.1. General and descriptive data

2.2. Results for Spain's subjects

2.2.1. Wake up time, sleep hours and breakfast

2.2.2. SDSC - Sleep Disturbance Scale for Children

2.2.3. BEARS – (Bedtime Issues, Excessive daytime sleepiness, night Awakenings, Regularity and duration of sleep, Snoring)

2.2.4. SSR – (Sleep Self Report)

2.2.5. Academic performance

2.3. Results for Italy's subjects

2.3.1. Wake up time, sleep hours and breakfast

2.3.2. SDSC - Sleep Disturbance Scale for Children

2.3.3. BEARS – (Bedtime Issues, Excessive daytime sleepiness, night Awakenings, Regularity and duration of sleep, Snoring)

2.3.4. SSR – (Sleep Self Report)

2.3.5. Academic performance

2.4. Results for Turkey's subjects

2.4.1. Wake up time, sleep hours and breakfast

2.4.2. SDSC - Sleep Disturbance Scale for Children

2.4.3. BEARS – (Bedtime Issues, Excessive daytime sleepiness, night Awakenings, Regularity and duration of sleep, Snoring)

2.4.4. SSR – (Sleep Self Report)

2.4.5. Academic performance



1. Statistical assumptions

- ANOVA tests were used to evaluate the relationship between continuous dependent variables (scores, hours and time variables, academic marks...) and factors (survey number, age range, country, ...).
- When applying ANOVA tests, the statistical assumptions of normality and homoscedasticity were evaluated using the Kolmogorov-Smirnov and Levene's tests respectively.
- Welch tests were used if the assumption of equality of variances is violated in ANOVA tests.
-
- Post Hoc Tukey HSD tests (or Tamhane's T2 when considering unequal variances) were carried out after obtaining statistically significant effects in ANOVAs models with factors with two or more levels.
- Contingency tables with Chi-square tests were used for categorical variables. In each comparison, the Chi-Square assumption of cell frequencies was checked.
- Significance criteria were established at $p < 0.05$.
- All test were computed using SPSS (IBM, USA) version 19.

2. Statistical results

2.1. General and descriptive data

- Total number of samples analyzed: 4419
- Subjects by country:

	N	%
Spain	3869	87,6
Italy	341	7,7
Turkey	209	4,7
Total	4419	100,0

TABLE 1

- Subjects by gender:

	N	%
Male	2009	45,5
Female	2053	46,5
Undetermined	357	8,1
Total	4419	100,0

TABLE 2

- Subjects by range of age:

	N	%
2-5 years	800	18,1
6-12 years	2337	52,9
13-18 years	1282	29,0
Total	4419	100,0

TABLE 3



- Subjects by moment of filling the survey:

	N	Percent
Basal Survey (S1)	1964	44,4
1st Follow-Up Survey (S2)	1390	31,5
2nd Follow-Up Survey (S3)	1065	24,1
Total	4419	100,0

TABLE 4

2.2. Results for Spain's subjects

2.2.1. Wake up time, sleep hours and breakfast

Descriptive table.

		Average wake up time	Average breakfast time	Average breakfast duration (in minutes)	Elapsed time (in hours) between wake up and leaving home time	Average total sleep hours in school days	Average time (in minutes) between wake up time and breakfast	
Basal Survey	2-5 years	Count	318	318	318	318	318	
		Mean	7:55	8:12	12	0,84	10,4	17
		SD	0:17	0:17	7	0,29	0,6	12
	6-12 years	Count	946	946	946	946	946	946
		Mean	7:53	8:10	11	0,84	9,9	18
		SD	0:22	0:20	7	0,32	0,7	14
	13-18 years	Count	367	367	367	367	-	367
		Mean	7:21	7:41	7	0,71	-	20
		SD	0:25	0:30	5	0,32	-	15
1st Follow-Up Survey	2-5 years	Count	270	270	270	270	270	270
		Mean	7:56	8:11	12	0,86	10,4	16
		SD	0:16	0:15	7	0,27	0,6	9
	6-12 years	Count	596	596	596	596	596	596
		Mean	7:55	8:13	11	0,93	9,8	18
		SD	0:19	0:17	6	0,79	0,6	14
	13-18 years	Count	435	435	435	435	-	435
		Mean	7:09	7:27	7	0,70	-	19
		SD	0:23	0:23	6	0,68	-	21
2nd Follow-Up Survey	2-5 years	Count	197	197	197	197	197	197
		Mean	7:54	8:11	12	0,94	10,3	17
		SD	0:18	0:15	7	0,92	0,6	10
	6-12 years	Count	550	550	550	550	550	550
		Mean	7:56	8:14	10	0,96	9,8	19
		SD	0:22	0:18	6	0,92	0,7	17
	13-18 years	Count	190	190	190	190	-	190
		Mean	7:08	7:24	6	0,67	-	17
		SD	0:18	0:17	4	0,59	-	13

TABLE 5

Breakfast type.

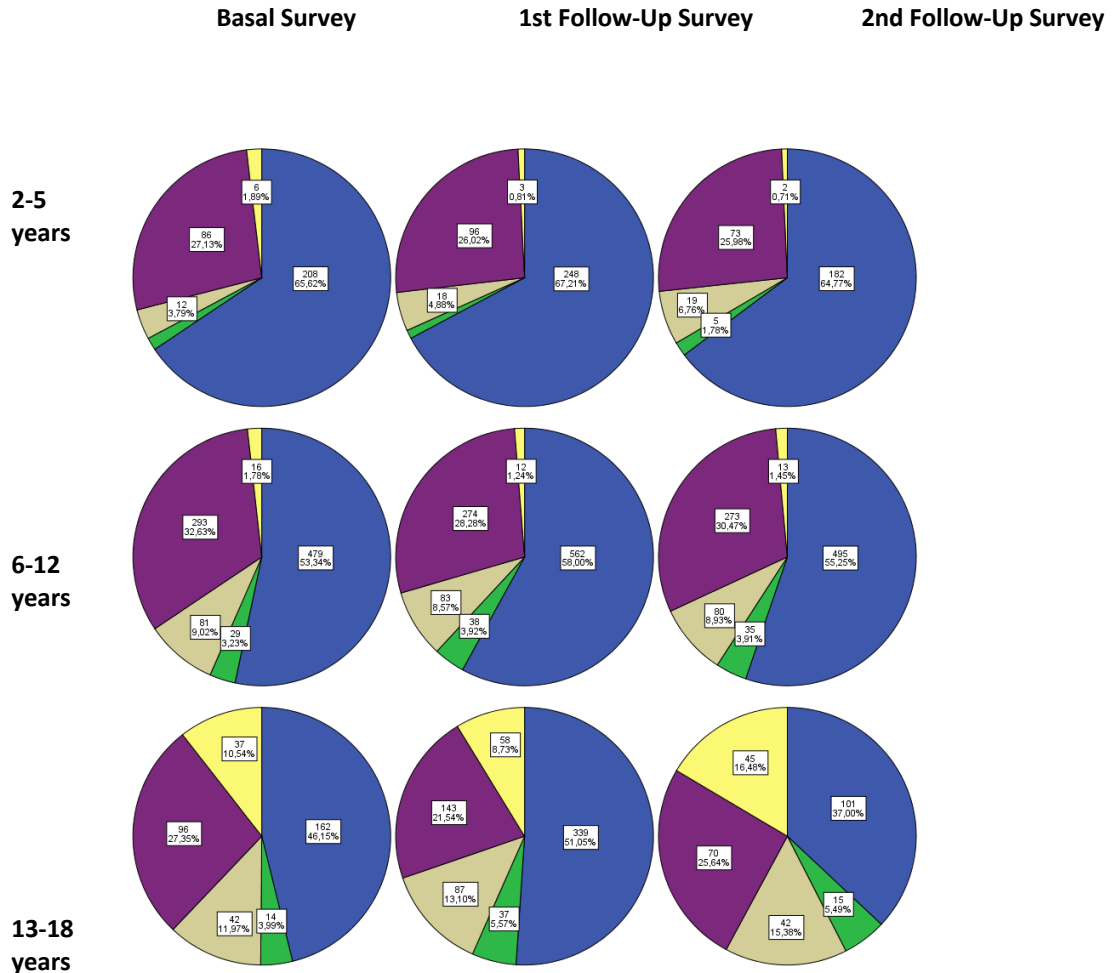
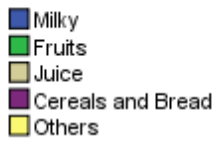


FIGURE 1

2.2.2. SDSC - Sleep Disturbance Scale for Children

The following cut-off values have been considered:

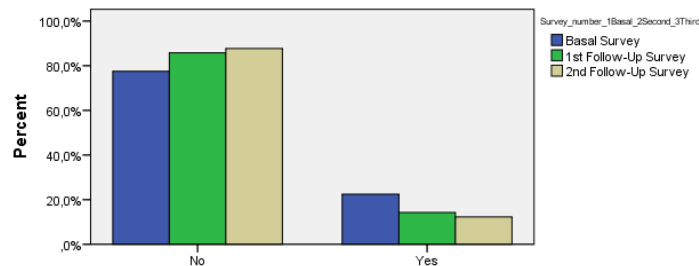
- Initiating and maintaining sleep problems: $9,9 \pm 3,11$
- Sleep breathing problems: $3,77 \pm 1,45$
- Arousal problems: $3,29 \pm 0,84$
- Sleep wake transition problems: $8,11 \pm 2,41$
- Excessive daytime sleepiness problems : $7,11 \pm 2,57$
- Sleep hyperhidrosis: $2,87 \pm 1,69$
- Global cut-off value for SDSC: 39

Initiating and maintaining sleep problems

			Basal Survey (S1)	1st Follow-Up Survey (S2)	2nd Follow-Up Survey (S3)	Total	Global Chi-Square / p-value	S1 vs S2 Chi-Square / p-value	S1 vs S3 Chi-Square / p-value	S2 vs S3 Chi-Square / p-value
2-5 years	No	Count %	261 92,6%	239 92,3%	176 93,1%	676 92,6%	0,115 / 0,944	0,015 / 0,904	0,055 / 0,815	0,114 / 0,736
	Yes	Count %	21 7,4%	20 7,7%	13 6,9%	54 7,4%				
	Total	Count %	282 100,0%	259 100,0%	189 100,0%	730 100,0%				
6-12 years	No	Count %	568 92,5%	533 93,5%	444 93,7%	1545 93,2%	0,713 / 0,700	0,454 / 0,500	0,557 / 0,456	0,011 / 0,915
	Yes	Count %	46 7,5%	37 6,5%	30 6,3%	113 6,8%				
	Total	Count %	614 100,0%	570 100,0%	474 100,0%	1658 100,0%				
13-18 years	No	Count %	155 77,5%	289 85,8%	150 87,7%	594 83,9%	8,773 / 0,012*	5,976 / 0,015*	6,583 / 0,010	0,372 / 0,542
	Yes	Count %	45 22,5%	48 14,2%	21 12,3%	114 16,1%				
	Total	Count %	200 100,0%	337 100,0%	171 100,0%	708 100,0%				

*p<0.05, **p<0.005, ***p<0.0005

TABLE 6



Bar chart showing significant differences in the “Initiating and maintaining sleep problems” variable in subjects between 13-18 years when compared within the different surveys.

FIGURE 2

Sleep breathing problems

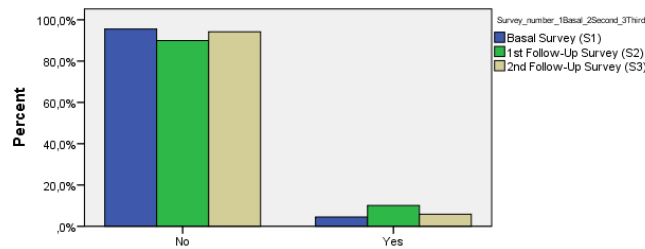
			Basal Survey (S1)	1st Follow-Up Survey (S2)	2nd Follow-Up Survey (S3)	Total	Global Chi-Square / p-value	S1 vs S2 Chi-Square / p-value	S1 vs S3 Chi-Square / p-value	S2 vs S3 Chi-Square / p-value
2-5 years	No	Count %	259 91,8%	235 90,7%	175 92,6%	669 91,6%	0,517 / 0,772	0,210 / 0,647	0,088 / 0,767	0,486 / 0,486
	Yes	Count %	23 8,2%	24 9,3%	14 7,4%	61 8,4%				
	Total	Count %	282 100,0%	259 100,0%	189 100,0%	730 100,0%				
6-12	No	Count	573	542	454	1569	3,537 /	1,678 /	3,054 /	0,283 /



years	%		93,3%	95,1%	95,8%	94,6%	0,171	0,195	0,081	0,595
	Yes	Count	41	28	20	89				
		%	6,7%	4,9%	4,2%	5,4%				
	Total	Count	614	570	474	1658				
		%	100,0%	100,0%	100,0%	100,0%				
13-18 years	No	Count	191	303	161	655	6,535 / 0,038*	5,322 / 0,021*	0,345 / 0,557	2,579 / 0,108
		%	95,5%	89,9%	94,2%	92,5%				
	Yes	Count	9	34	10	53				
		%	4,5%	10,1%	5,8%	7,5%				
	Total	Count	200	337	171	708				
		%	100,0%	100,0%	100,0%	100,0%				

*p<0.05, **p<0.005, ***p<0.0005

TABLE 7



Bar chart showing significant differences in the “Sleep breathing problems” variable in subjects between 13-18 years when compared within the different surveys.

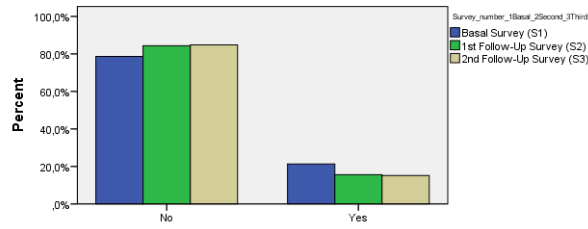
FIGURE 4

Arousal problems

			Basal Survey (S1)	1st Follow-Up Survey (S2)	2nd Follow-Up Survey (S3)	Total	Global Chi-Square / p-value	S1 vs S2 Chi-Square / p-value	S1 vs S3 Chi-Square / p-value	S2 vs S3 Chi-Square / p-value
2-5 years	No	Count	203	202	140	545	2,620 / 0,270	2,588 / 0,108	0,249 / 0,618	0,929 / 0,335
		%	72,0%	78,0%	74,1%	74,7%				
	Yes	Count	79	57	49	185				
		%	28,0%	22,0%	25,9%	25,3%				
	Total	Count	282	259	189	730				
		%	100,0%	100,0%	100,0%	100,0%				
6-12 years	No	Count	483	481	402	1366	9,352 / 0,009*	6,396 / 0,011*	6,657 / 0,010*	0,036 / 0,850
		%	78,7%	84,4%	84,8%	82,4%				
	Yes	Count	131	89	72	292				
		%	21,3%	15,6%	15,2%	17,6%				
	Total	Count	614	570	474	1658				
		%	100,0%	100,0%	100,0%	100,0%				
13-18 years	No	Count	127	248	129	504	8,218 / 0,016*	6,066 / 0,014*	6,143 / 0,013*	0,202 / 0,653
		%	63,5%	73,6%	75,4%	71,2%				
	Yes	Count	73	89	42	204				
		%	36,5%	26,4%	24,6%	28,8%				
	Total	Count	200	337	171	708				
		%	100,0%	100,0%	100,0%	100,0%				

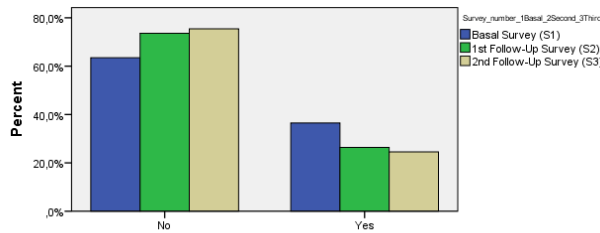
*p<0.05, **p<0.005, ***p<0.0005

TABLE 9



Bar chart showing significant differences in the “Arousal problems” variable in subjects between 6-12 years when compared within the different surveys.

FIGURE 4



Bar chart showing significant differences in the “Arousal problems” variable in subjects between 13-18 years when compared within the different surveys.

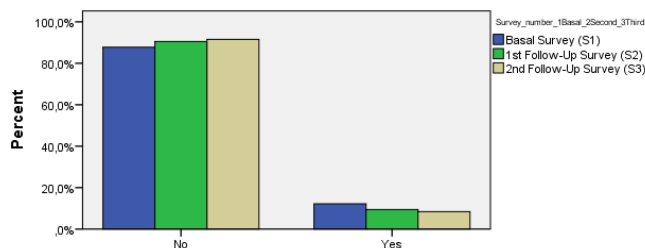
FIGURE 5

Sleep wake transition problems

			Basal Survey (S1)	1st Follow-Up Survey (S2)	2nd Follow-Up Survey (S3)	Total	Global Chi-Square / p-value	S1 vs S2 Chi-Square / p-value	S1 vs S3 Chi-Square / p-value	S2 vs S3 Chi-Square / p-value
2-5 years	No	Count %	238 84,4%	224 86,5%	164 86,8%	626 85,8%	0,699 / 0,705	0,473 / 0,492	0,511 / 0,475	0,008 / 0,939
	Yes	Count %	44 15,6%	35 13,5%	25 13,2%	104 14,2%				
	Total	Count %	282 100,0%	259 100,0%	189 100,0%	730 100,0%				
6-12 years	No	Count %	539 87,8%	516 90,5%	434 91,6%	1489 89,8%	4,658 / 0,097	2,288 / 0,130	4,035 / 0,045*	0,338 / 0,561
	Yes	Count %	75 12,2%	54 9,5%	40 8,4%	169 10,2%				
	Total	Count %	614 100,0%	570 100,0%	474 100,0%	1658 100,0%				
13-18 years	No	Count %	167 83,5%	303 89,9%	151 88,3%	621 87,7%	4,860 / 0,088	4,724 / 0,030*	1,737 / 0,187	0,308 / 0,579
	Yes	Count %	33 16,5%	34 10,1%	20 11,7%	87 12,3%				
	Total	Count %	200 100,0%	337 100,0%	171 100,0%	708 100,0%				

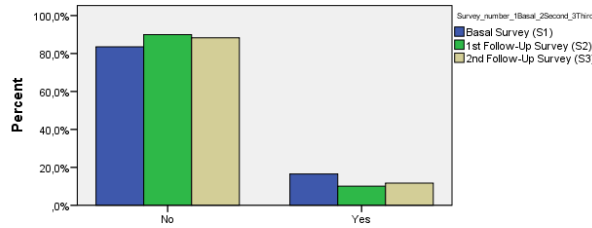
*p<0.05, **p<0.005, ***p<0.0005

TABLE 9



Bar chart showing significant differences in the “Sleep wake transition problems” variable in subjects between 6-12 years when compared within the different surveys.

FIGURE 6



Bar chart showing significant differences in the “Sleep wake transition problems” variable in subjects between 13-18 years when compared within the different surveys.

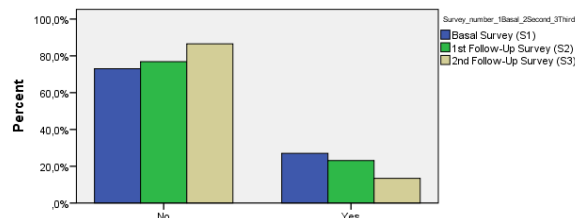
FIGURE 7

Excessive daytime sleepiness problems

			Basal Survey (S1)	1st Follow-Up Survey (S2)	2nd Follow-Up Survey (S3)	Total	Global Chi-Square / p-value	S1 vs S2 Chi-Square / p-value	S1 vs S3 Chi-Square / p-value	S2 vs S3 Chi-Square / p-value
2-5 years	No	Count %	270 95,7%	251 96,9%	185 97,9%	706 96,7%	1,678 / 0,432	0,516 / 0,473	1,578 / 0,209	0,396 / 0,768
	Yes	Count %	12 4,3%	8 3,1%	4 2,1%	24 3,3%				
	Total	Count %	282 100,0%	259 100,0%	189 100,0%	730 100,0%				
6-12 years	No	Count %	593 96,6%	553 97,0%	454 95,8%	1600 96,5%	1,191 / 0,551	0,182 / 0,669	0,471 / 0,492	1,158 / 0,282
	Yes	Count %	21 3,4%	17 3,0%	20 4,2%	58 3,5%				
	Total	Count %	614 100,0%	570 100,0%	474 100,0%	1658 100,0%				
13-18 years	No	Count %	146 73,0%	259 76,9%	148 86,5%	553 78,1%	10,488 / 0,005*	1,006 / 0,316	10,290 / 0,001**	6,694 / 0,010*
	Yes	Count %	54 27,0%	78 23,1%	23 13,5%	155 21,9%				
	Total	Count %	200 100,0%	337 100,0%	171 100,0%	708 100,0%				

*p<0.05, **p<0.005, ***p<0.0005

TABLE 10



Bar chart showing significant differences in the “Excessive daytime sleepiness problems” variable in subjects between 13-18 years when compared within the different surveys.

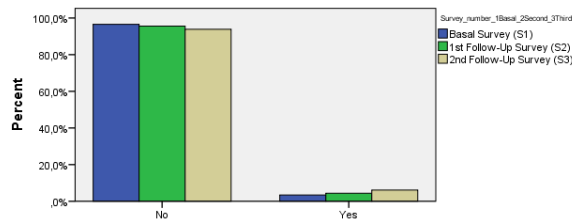
FIGURE 8

Sleep hyperhidrosis

			Basal Survey (S1)	1st Follow-Up Survey (S2)	2nd Follow-Up Survey (S3)	Total	Global Chi-Square / p-value	S1 vs S2 Chi-Square / p-value	S1 vs S3 Chi-Square / p-value	S2 vs S3 Chi-Square / p-value
2-5 years	No	Count %	252 89,4%	233 90,0%	163 86,2%	648 88,8%	1,678 / 0,432	0,052 / 0,819	1,050 / 0,305	1,472 / 0,225
	Yes	Count %	30 10,6%	26 10,0%	26 13,8%	82 11,2%				
	Total	Count %	282 100,0%	259 100,0%	189 100,0%	730 100,0%				
6-12 years	No	Count %	593 96,6%	545 95,6%	445 93,9%	1583 95,5%	4,546 / 0,103	0,738 / 0,390	4,441 / 0,035*	1,583 / 0,208
	Yes	Count %	21 3,4%	25 4,4%	29 6,1%	75 4,5%				
	Total	Count %	614 100,0%	570 100,0%	474 100,0%	1658 100,0%				
13-18 years	No	Count %	197 98,5%	329 97,6%	165 96,5%	691 97,6%	1,589 / 0,452	0,478 / 0,489	1,571 / 0,210	0,545 / 0,460
	Yes	Count %	3 1,5%	8 2,4%	6 3,5%	17 2,4%				
	Total	Count %	200 100,0%	337 100,0%	171 100,0%	708 100,0%				

*p<0.05, **p<0.005, ***p<0.0005

TABLE 11



Bar chart showing significant differences in the “Sleep hyperhidrosis” variable in subjects between 6-12 years when compared within the different surveys.

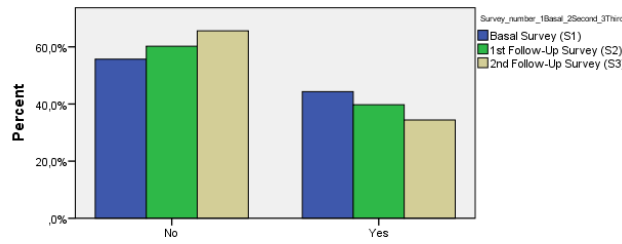
FIGURE 9

SDSC TOTAL

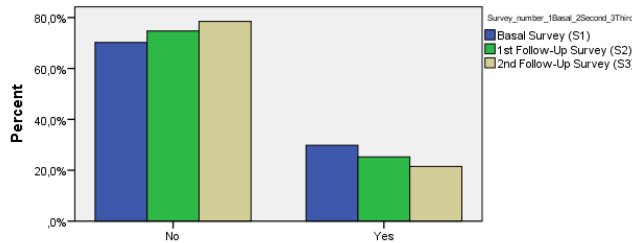
			Basal Survey (S1)	1st Follow-Up Survey (S2)	2nd Follow-Up Survey (S3)	Total	Global Chi-Square / p-value	S1 vs S2 Chi-Square / p-value	S1 vs S3 Chi-Square / p-value	S2 vs S3 Chi-Square / p-value
2-5 years	No	Count %	157 55,7%	156 60,2%	124 65,6%	437 59,9%	4,671 / 0,097	1,150 / 0,283	4,641 / 0,031*	1,348 / 0,246
	Yes	Count %	125 44,3%	103 39,8%	65 34,4%	293 40,1%				
	Total	Count %	282 100,0%	259 100,0%	189 100,0%	730 100,0%				
6-12 years	No	Count %	431 70,2%	426 74,7%	372 78,5%	1229 74,1%	9,744 / 0,008*	3,050 / 0,081	9,499 / 0,002**	2,014 / 0,156
	Yes	Count %	183 29,8%	144 25,3%	102 21,5%	429 25,9%				
	Total	Count %	614 100,0%	570 100,0%	474 100,0%	1658 100,0%				
13-18 years	No	Count %	74 37,0%	179 53,1%	101 59,1%	354 50,0%	20,448 / <0,000**	13,083 / <0,000**	18,009 / <0,000**	1,623 / 0,203
	Yes	Count %	126 63,0%	158 46,9%	70 40,9%	354 50,0%				
	Total	Count %	200 100,0%	337 100,0%	171 100,0%	708 100,0%				

*p<0.05, **p<0.005, ***p<0.0005
TABLE 12

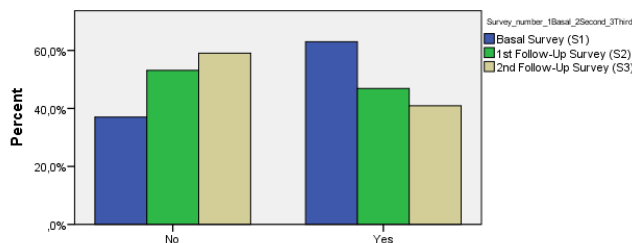
27



Bar chart showing significant differences in the “SDSC TOTAL” variable in subjects between 2-5 years when compared within the different surveys.
FIGURE 10



Bar chart showing significant differences in the “SDSC TOTAL” variable in subjects between 6-12 years when compared within the different surveys.
FIGURE 11



Bar chart showing significant differences in the “SDSC TOTAL” variable in subjects between 13-18 years when compared within the different surveys.
FIGURE 12

2.2.3. BEARS – (Bedtime Issues, Excessive daytime sleepiness, night Awakenings, Regularity and duration of sleep, Snoring)

According to the survey templates used for filling in the data in this scale, only ‘Yes – No - DK/NC’ options were accepted. In the filled surveys from Spain, there were a 3,8% of answers different to these (e.g. ‘Sometimes’) which were discarded.

Legend:

- PAOQ: Parents-oriented questions
- STOQ: Students-oriented questions

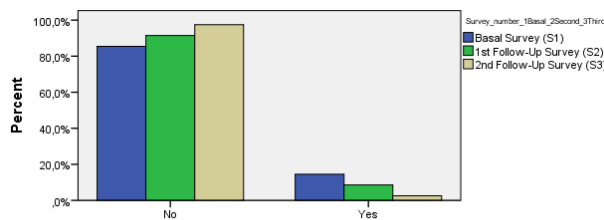
2-5 years. Yes/No questions.

			Basal Survey (S1)	1st Follow-Up Survey (S2)	2nd Follow-Up Survey (S3)	Total	Global Chi-Square / p-value	S1 vs S2 Chi-Square / p-value	S1 vs S3 Chi-Square / p-value	S2 vs S3 Chi-Square / p-value
BEARS2-5_PAOQ_1. Does your child have any problems going to bed?	No	Count %	194 85,5%	182 91,5%	152 97,4%	528 90,7%	15,942 / <0,000 ***	3,678 / 0,055	15,188 / <0,000 ***	5,616 / 0,018*
	Yes	Count %	33 14,5%	17 8,5%	4 2,6%	54 9,3%				
	Total	Count %	227 100,0%	199 100,0%	156 100,0%	582 100,0%				
BEARS2-5_PAOQ_2a. Does your child seem overtired or sleepy a lot during the day?	No	Count %	211 95,5%	202 100,0%	167 97,7%	580 97,6%	9,390 / 0,009*	9,362 / 0,002**	1,377 / 0,248	4,776* / 0,029*
	Yes	Count %	10 4,5%	0 0,0%	4 2,3%	14 2,4%				
	Total	Count %	221 100,0%	202 100,0%	171 100,0%	594 100,0%				
BEARS2-5_PAOQ_2b. Does he still take naps?	No	Count %	128 69,9%	128 81,0%	81 75,7%	337 75,2%	5,590 / 0,061	5,550 / 0,018*	1,111 / 0,292	1,080 / 0,299
	Yes	Count %	55 30,1%	30 19,0%	26 24,3%	111 24,8%				
	Total	Count %	183 100,0%	158 100,0%	107 100,0%	448 100,0%				
BEARS2-5_PAOQ_3. Does your child wake up a lot at night?	No	Count %	177 85,1%	155 92,8%	129 97,0%	461 90,7%	14,940 / 0,001**	5,435 / 0,020*	12,465 / <0,000 ***	2,560 / 0,110
	Yes	Count %	31 14,9%	12 7,2%	4 3,0%	47 9,3%				
	Total	Count %	208 100,0%	167 100,0%	133 100,0%	508 100,0%				
BEARS2-5_PAOQ_4a. Does your child have a regular bedtime and wake time?	No	Count %	26 11,2%	24 10,8%	12 6,7%	62 9,8%	2,699 / 0,256	0,023 / 0,880	2,442 / 0,118	2,006 / 0,157
	Yes	Count %	206 88,8%	199 89,2%	167 93,3%	572 90,2%				
	Total	Count %	232 100,0%	223 100,0%	179 100,0%	634 100,0%				
BEARS2-5_PAOQ_5. Does your child snore a lot or have difficulty breathing at night?	No	Count %	202 90,2%	194 93,3%	155 95,7%	551 92,8%	4,359 / 0,113	1,349 / 0,246	4,093 / 0,043*	0,988 / 0,320
	Yes	Count %	22 9,8%	14 6,7%	7 4,3%	43 7,2%				
	Total	Count %	224 100,0%	208 100,0%	162 100,0%	594 100,0%				

*p<0.05, **p<0.005, ***p<0.0005.

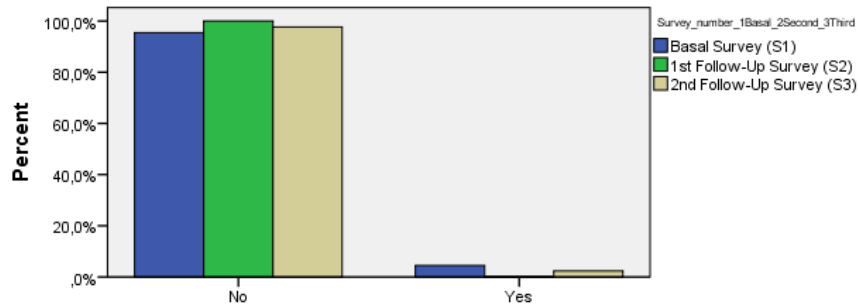
+ Does not accomplish the Chi-Square assumption of cell frequencies.

TABLE 13



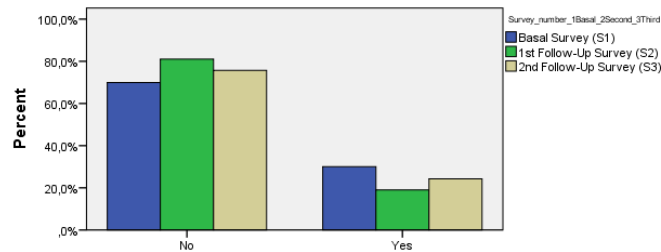
Bar chart showing significant differences in the “BEARS2-5_PAOQ_1. Does your child have any problems going to bed?” variable in subjects between 2-5 years when compared within the different surveys.

FIGURE 13



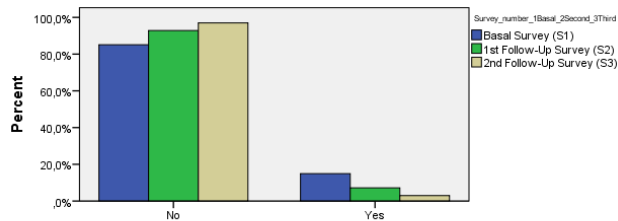
Bar chart showing significant differences in the “BEARS2-5_PAOQ_2a. Does your child seem overtired or very sleepy during the day?” variable in subjects between 2-5 years when compared with the different surveys.

FIGURE 14



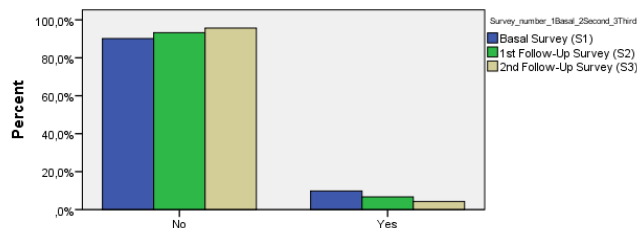
Bar chart showing significant differences in the “BEARS2-5_PAOQ_5. Does your child snore a lot or have difficulty breathing at night?” variable in subjects between 2-5 years when compared within the different surveys.

FIGURE 15



Bar chart showing significant differences in the “BEARS2-5_PAOQ_3. Does your child wake up a lot at night?” variable in subjects between 2-5 years when compared within the different surveys.

FIGURE 16



Bar chart showing significant differences in the “BEARS2-5_PAOQ_3. Does your child wake up a lot at night?” variable in subjects between 2-5 years when compared within the different surveys.

FIGURE 17



2-5 years. Time questions.

		N	Mean	SD	ANOVA F	p-value
BEARS2-5_PAOQ_4b. Bed time	Basal Survey (S1)	131	21:35	0:34	0,589	0,555
	1st Follow-Up Survey (S2)	257	21:34	0:36		
	2nd Follow-Up Survey (S3)	187	21:37	0:29		
	Total	575	21:35	0:34		
BEARS2-5_PAOQ_4c. Wake-up time	Basal Survey (S1)	173	7:56	0:23	0,565	0,569
	1st Follow-Up Survey (S2)	256	7:56	0:18		
	2nd Follow-Up Survey (S3)	189	7:54	0:19		
	Total	618	7:56	0:20		

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 14

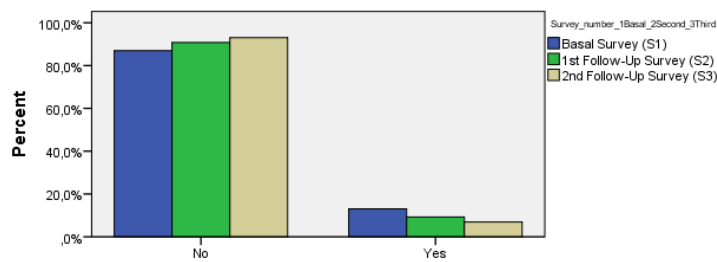
6-12 years. Yes/No questions.

			Basal Survey (S1)	1st Follow-Up Survey (S2)	2nd Follow-Up Survey (S3)	Total	Global Chi-Square / p-value	S1 vs S2 Chi-Square / p-value	S1 vs S3 Chi-Square / p-value	S2 vs S3 Chi-Square / p-value
BEARS6-12_PAOQ_1. Does your child have any problem at bedtime?	No	Count %	453 86,9%	413 90,8%	363 93,1%	1229 90,0%	9,767 / 0,008*	3,546 / 0,060	8,969 / 0,003**	1,491 / 0,222
	Yes	Count %	68 13,1%	42 9,2%	27 6,9%	137 10,0%				
	Total	Count %	521 100,0%	455 100,0%	390 100,0%	1366 100,0%				
BEARS6-12_PAOQ_2. Does your child have difficulty waking in the morning, seem sleepy during the day or take naps?	No	Count %	473 91,0%	477 96,0%	410 97,2%	1360 94,5%	20,374 / <0,000 ***	10,383 / 0,001**	15,227 / <0,000 ***	0,946 / 0,331
	Yes	Count %	47 9,0%	20 4,0%	12 2,8%	79 5,5%				
	Total	Count %	520 100,0%	497 100,0%	422 100,0%	1439 100,0%				
BEARS6-12_PAOQ_3a. Does your child seem to wake up a lot at night?	No	Count %	475 92,6%	476 97,7%	400 98,5%	1351 96,1%	26,616 / <0,000 ***	14,212 / <0,000 ***	17,480 / <0,000 ***	0,723 / 0,395
	Yes	Count %	38 7,4%	11 2,3%	6 1,5%	55 3,9%				
	Total	Count %	513 100,0%	487 100,0%	406 100,0%	1406 100,0%				
BEARS6-12_PAOQ_3b. Have they sleepwalked or had nightmares	No	Count %	443 90,2%	451 97,8%	397 98,3%	1291 95,2%	41,959 / <0,000 ***	24,047 / <0,000 ***	24,861 / <0,000 ***	0,213 / 0,644
	Yes	Count %	48 9,8%	10 2,2%	7 1,7%	65 4,8%				
	Total	Count %	491 100,0%	461 100,0%	404 100,0%	1356 100,0%				
BEARS6-12_PAOQ_5. Does your child have loud or nightly snoring or any breathing difficulties at night?	No	Count %	480 92,3%	472 96,3%	368 97,1%	1320 95,0%	13,340 / 0,001**	7,528 / 0,006*	9,399 / 0,002**	0,394 / 0,530
	Yes	Count %	40 7,7%	18 3,7%	11 2,9%	69 5,0%				
	Total	Count %	520 100,0%	490 100,0%	379 100,0%	1389 100,0%				
BEARS6-12_STOQ_1. Do you have any problems going to bed?	No	Count %	470 92,2%	425 91,2%	382 94,6%	1277 92,5%	3,690 / 0,158	0,292 / 0,588	2,049 / 0,152	3,621 / 0,057
	Yes	Count %	40 7,8%	41 8,8%	22 5,4%	103 7,5%				
	Total	Count %	510 100,0%	466 100,0%	404 100,0%	1380 100,0%				
BEARS6-12_STOQ_2. Do you feel tired a lot?	No	Count %	436 89,7%	411 93,2%	354 95,4%	1201 92,5%	10,340 / 0,006*	3,562 / 0,059	9,505 / 0,002**	1,822 / 0,177
	Yes	Count %	50 10,3%	30 6,8%	17 4,6%	97 7,5%				

	Total	Count	486	441	371	1298				
		%	100,0%	100,0%	100,0%	100,0%				
BEARS6-12_STOQ_3a. Do you wake up a lot at night?	No	Count	460	444	380	1284	16,720 / <0,000 ***	9,296 / 0,002**	11,592 / 0,001**	0,366 / 0,545
		%	92,2%	96,7%	97,4%	95,3%				
	Yes	Count	39	15	10	64				
	%		7,8%	3,3%	2,6%	4,7%				
	Total	Count	499	459	390	1348				
	%		100,0%	100,0%	100,0%	100,0%				
BEARS6-12_STOQ_3b. Do you have trouble getting back to sleep?	No	Count	450	440	378	1268	5,716 / 0,057	3,167 / 0,075	4,586 / 0,032*	0,210 / 0,646
		%	89,8%	93,0%	93,8%	92,1%				
	Yes	Count	51	33	25	109				
	%		10,2%	7,0%	6,2%	7,9%				
	Total	Count	501	473	403	1377				
	%		100,0%	100,0%	100,0%	100,0%				

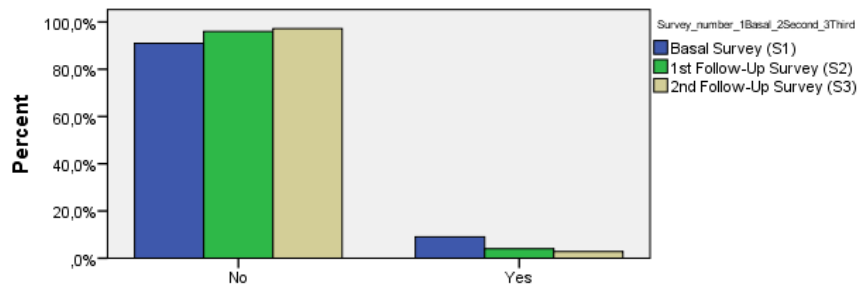
*p<0.05, **p<0.005, ***p<0.0005.

TABLE 15



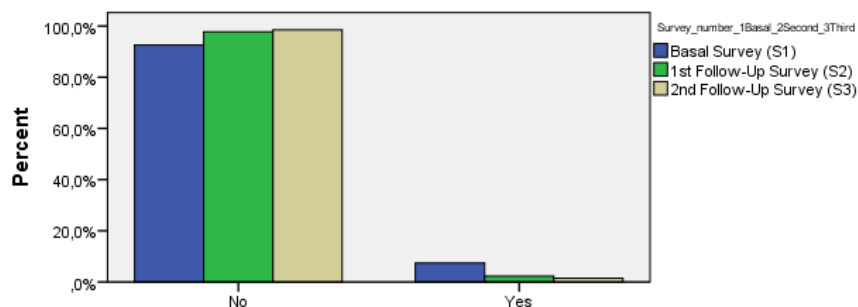
Bar chart showing significant differences in the “BEARS6-12_PAOQ_1. Does your child have any problem at bedtime?” variable in subjects between 6-12 years when compared within the different surveys.

FIGURE 18



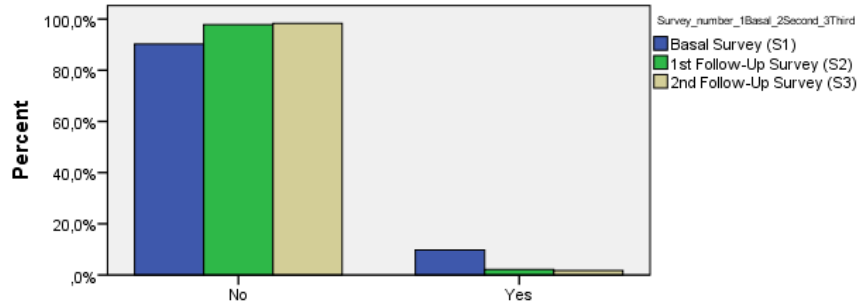
Bar chart showing significant differences in the “BEARS6-12_PAOQ_2. Does your child have difficulty waking in the morning, seem sleepy during the day or take snaps?” variable in subjects between 6-12 years when compared within the different surveys.

FIGURE 19



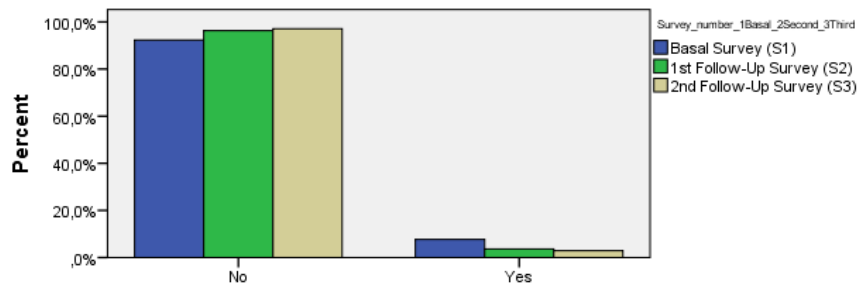
Bar chart showing significant differences in the “BEARS6-12_PAQQ_3a. Does your child seem to wake up a lot at night?” variable in subjects between 6-12 years when compared within the different surveys.

FIGURE 20



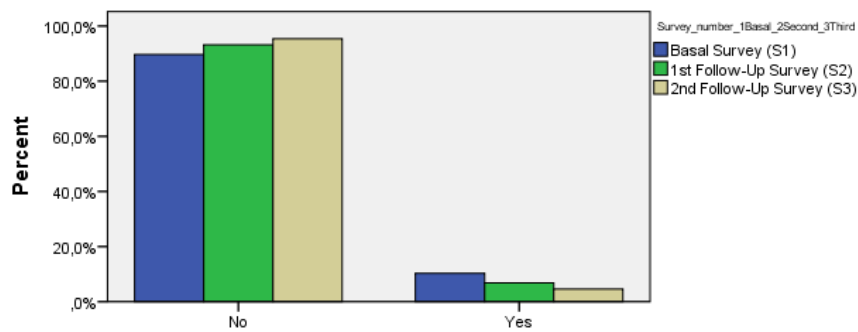
Bar chart showing significant differences in the “BEARS6-12_PAQQ_3b. Have they sleepwalked or had nightmares” variable in subjects between 6-12 years when compared within the different surveys.

FIGURE 21



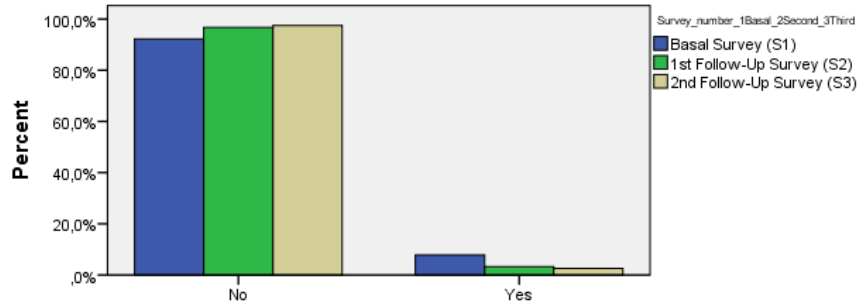
Bar chart showing significant differences in the “BEARS6-12_PAQQ_5. Does your child have loud or nightly snoring or any breathing difficulties at night?” variable in subjects between 6-12 years when compared within the different surveys.

FIGURE 22



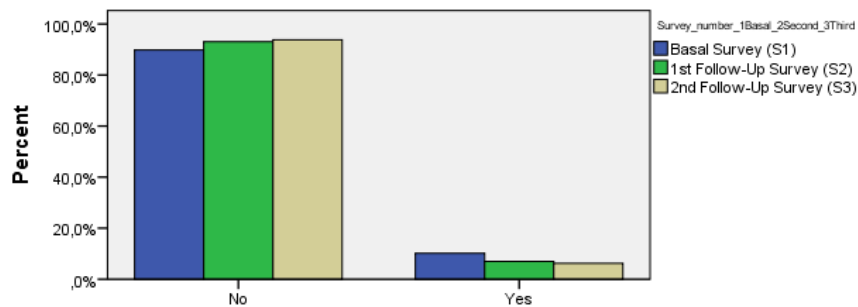
Bar chart showing significant differences in the “BEARS6-12_STOQ_2. Do you feel tired a lot?” variable in subjects between 6-12 years when compared within the different surveys.

FIGURE 23



Bar chart showing significant differences in the “BEARS6-12_STOQ_3a. Do you wake up a lot at night?” variable in subjects between 6-12 years when compared within the different surveys.

FIGURE 24



Bar chart showing significant differences in the “BEARS6-12_STOQ_3b. Do you have trouble getting back to sleep?” variable in subjects between 6-12 years when compared within the different surveys.

FIGURE 25

6-12 years. Time questions.

		N	Mean	SD	ANOVA F	p-value
BEARS6-12_PAOQ_4a. What time does your child go to bed on school days?	Basal Survey (S1)	487	22:03	0:33	0,824	0,439
	1st Follow-Up Survey (S2)	572	22:05	0:34		
	2nd Follow-Up Survey (S3)	487	22:06	0:34		
	Total	1546	22:05	0:34		
BEARS6-12_PAOQ_4b. What time does your child wake up on school days?	Basal Survey (S1)	450	7:55	0:26	0,290	0,748
	1st Follow-Up Survey (S2)	572	7:55	0:19		
	2nd Follow-Up Survey (S3)	487	7:56	0:26		
	Total	1509	7:55	0:23		
BEARS6-12_PAOQ_4c. What time does your child go to bed on weekend?	Basal Survey (S1)	404	22:58	0:45	11,952	<0,000***
	1st Follow-Up Survey (S2)	562	23:09	0:44		
	2nd Follow-Up Survey (S3)	457	23:12	0:42		
	Total	1423	23:06	0:44		
BEARS6-12_PAOQ_4d. What time does your child wake up on weekend?	Basal Survey (S1)	362	9:15	0:56	7,424	0,001**
	1st Follow-Up Survey (S2)	562	9:27	1:00		
	2nd Follow-Up Survey (S3)	282	9:32	0:56		
	Total	1206	9:24	0:58		

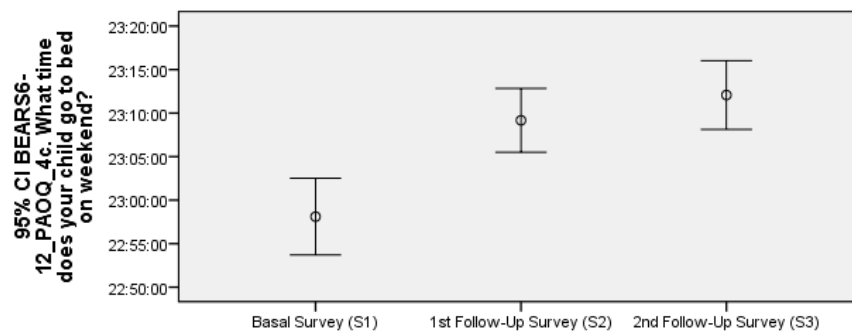
*p<0.05, **p<0.005, ***p<0.0005.

TABLE 16

Post Hoc Tukey HSD tests for the statistically significant variables

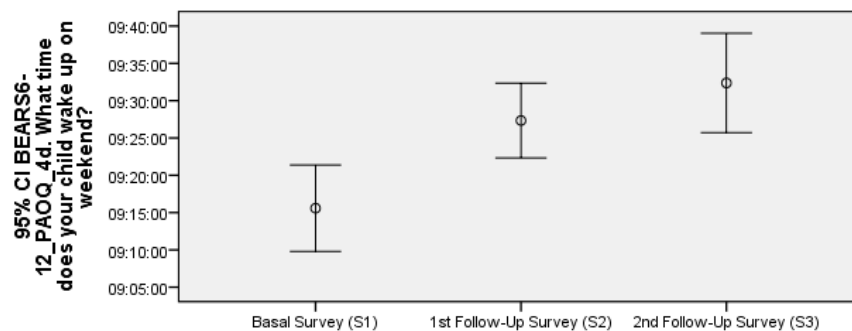
			p-value
BEARS6-12_PAOQ_4c. What time does your child go to bed on weekend?	Basal Survey (S1)	1st Follow-Up Survey (S2)	<0,000***
		2nd Follow-Up Survey (S3)	<0,000***
	1st Follow-Up Survey (S2)	Basal Survey (S1)	<0,000***
		2nd Follow-Up Survey (S3)	0,548
	2nd Follow-Up Survey (S3)	Basal Survey (S1)	<0,000***
		1st Follow-Up Survey (S2)	0,548
BEARS6-12_PAOQ_4d. What time does your child wake up on weekend?	Basal Survey (S1)	1st Follow-Up Survey (S2)	0,008*
		2nd Follow-Up Survey (S3)	0,001**
	1st Follow-Up Survey (S2)	Basal Survey (S1)	0,008*
		2nd Follow-Up Survey (S3)	0,463
	2nd Follow-Up Survey (S3)	Basal Survey (S1)	0,001***
		1st Follow-Up Survey (S2)	0,463

TABLE 17



Error bar chart (95% CI) showing significant differences in the “BEARS6-12_PAOQ_4c. What time does your child go to bed on weekend?” variable in subjects between 6-12 years when compared within the different surveys.

FIGURE 26



Error bar chart (95% CI) showing significant differences in the “BEARS6-12_PAOQ_4d. What time does your child wake up on weekend?” variable in subjects between 6-12 years when compared within the different surveys.

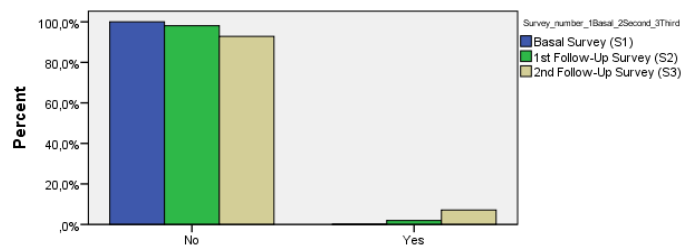
FIGURE 27

13-18 years. Yes/No questions.

			Basal Survey (S1)	1st Follow-Up Survey (S2)	2nd Follow-Up Survey (S3)	Total	Global Chi-Square / p-value	S1 vs S2 Chi-Square / p-value	S1 vs S3 Chi-Square / p-value	S2 vs S3 Chi-Square / p-value
BEARS13-18_PAOQ_5. Does your teenager snore loudly or nightly?	No	Count %	84 100,0%	308 98,1%	117 92,9%	509 97,1%	11,800 / 0,003*	1,630 / 0,202	6,269 / 0,012*	7,475 / 0,006*
	Yes	Count %	0 0,0%	6 1,9%	9 7,1%	15 2,9%				
	Total	Count %	84 100,0%	314 100,0%	126 100,0%	524 100,0%				
BEARS13-18_STOQ_1. Do you have any problems falling asleep at bedtime?	No	Count %	91 82,0%	263 90,4%	131 96,3%	485 90,1%	14,192 / 0,001*	5,387 / 0,020*	13,818 / <0,000***	4,594 / 0,032*
	Yes	Count %	20 18,0%	28 9,6%	5 3,7%	53 9,9%				
	Total	Count %	111 100,0%	291 100,0%	136 100,0%	538 100,0%				
BEARS13-18_STOQ_2. Do you feel sleepy a lot during the day, in school, while driving?	No	Count %	78 70,9%	161 74,5%	102 84,3%	341 76,3%	6,416 / 0,040*	0,490 / 0,484	6,004 / 0,014*	4,311 / 0,038*
	Yes	Count %	32 29,1%	55 25,5%	19 15,7%	106 23,7%				
	Total	Count %	110 100,0%	216 100,0%	121 100,0%	447 100,0%				
BEARS13-18_STOQ_3a. Do you wake up a lot at night?	No	Count %	100 90,9%	253 91,0%	57 98,3%	410 91,9%	3,621 / 0,164	0,001 / 0,976	3,368 / 0,066	3,551 / 0,059
	Yes	Count %	10 9,1%	25 9,0%	1 1,7%	36 8,1%				
	Total	Count %	110 100,0%	278 100,0%	58 100,0%	446 100,0%				
BEARS13-18_STOQ_3b. Do you have trouble getting back to sleep?	No	Count %	90 81,8%	271 89,7%	54 87,1%	415 87,6%	4,651 / 0,098	4,659 / 0,031*	0,811 / 0,368	0,374 / 0,541
	Yes	Count %	20 18,2%	31 10,3%	8 12,9%	59 12,4%				
	Total	Count %	110 100,0%	302 100,0%	62 100,0%	474 100,0%				

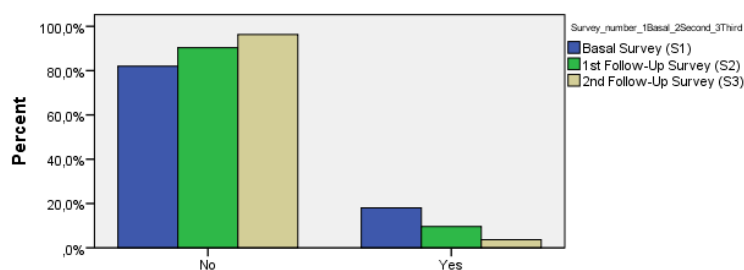
*p<0.05, **p<0.005, ***p<0.0005.

TABLE 18



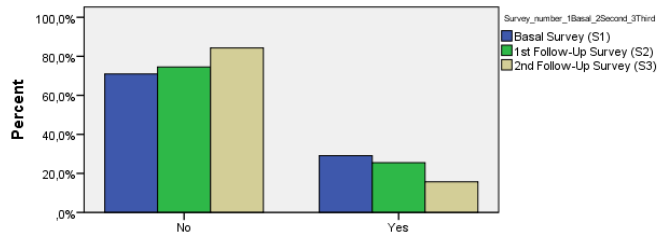
Bar chart showing significant differences in the “BEARS13-18_PAOQ_5. Does your teenager snore loudly or nightly?” variable in subjects between 13-18 years when compared within the different surveys.

FIGURE 28



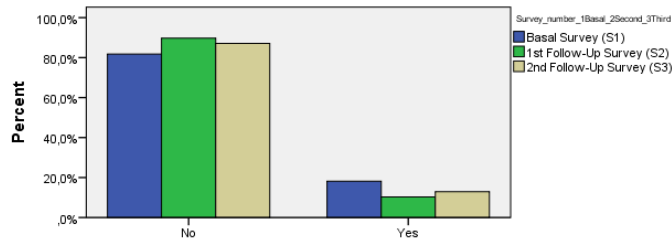
Bar chart showing significant differences in the “BEARS13-18_STOQ_1. Do you have any problems falling asleep at bedtime?” variable in subjects between 13-18 years when compared within the different surveys.

FIGURE 29



Bar chart showing significant differences in the “BEARS13-18_STOQ_2. Do you feel sleepy a lot during the day, in school, while driving?” variable in subjects between 13-18 years when compared within the different surveys.

FIGURE 30



Bar chart showing significant differences in the “BEARS13-18_STOQ_3b. Do you have trouble getting back to sleep?” variable in subjects between 13-18 years when compared within the different surveys.

FIGURE 31

13-18 years. Time questions.

		N	Mean	SD	ANOVA F	p-value
BEARS13-18_STOQ_4a. What time do you usually go to bed on school nights?	Basal Survey (S1)	109	23:07	0:55	1,553 ^{**}	0,177 ^{***}
	1st Follow-Up Survey (S2)	389	23:11	0:57		
	2nd Follow-Up Survey (S3)	188	23:02	0:47		
	Total	686	23:08	0:54		
BEARS13-18_STOQ_4b. What time do you go to bed on weekends?	Basal Survey (S1)	104	00:12	1:31	1,182	0,307
	1st Follow-Up Survey (S2)	378	00:15	1:39		
	2nd Follow-Up Survey (S3)	185	00:02	1:29		
	Total	667	00:11	1:35		

*p<0.05, **p<0.005, ***p<0.0005.

** Does not accomplish the assumption of equal variances (Levene’s test).

*** Welch’s p-value is given.

TABLE 19

2.2.4. SSR – (Sleep Self Report)



Who says bedtime?

		Basal Survey (S1)	1st Follow-Up Survey (S2)	2nd Follow-Up Survey (S3)	Total	Global Chi-Square / p-value	S1 vs S2 Chi-Square / p-value	S1 vs S3 Chi-Square / p-value	S2 vs S3 Chi-Square / p-value	
2-5 years	Mom or dad (only)	Count %	- 93,4%	185 93,0%	173 93,2%	1,405* / 0,704	-	-	1,405* / 0,704	
	Mom or dad and myself	Count %	- 3,0%	6 3,0%	8 4,3%					
	Myself only	Count %	- 3,0%	6 3,0%	5 2,7%					11 2,9%
	Others	Count %	- 0,5%	1 0,5%	0 0,0%					1 0,3%
	Total	Count %	- 100,0%	198 100,0%	186 100,0%					384 100,0%
6-12 years	Mom or dad (only)	Count %	216 83,7%	455 83,8%	412 83,1%	4,347* / 0,630	1,866* / 0,601	4,023* / 0,259	1,017 / 0,797	
	Mom or dad and myself	Count %	16 6,2%	24 4,4%	18 3,6%					58 4,5%
	Myself only	Count %	24 9,3%	61 11,2%	62 12,5%					147 11,3%
	Others	Count %	2 0,8%	3 0,6%	4 0,8%					9 0,7%
	Total	Count %	258 100,0%	543 100,0%	496 100,0%					1297 100,0%
13-18 years	Mom or dad (only)	Count %	- 29,3%	114 29,3%	44 25,6%	2,600 / 0,458	-	-	2,600 / 0,458	
	Mom or dad and myself	Count %	- 4,4%	17 4,4%	4 2,3%					21 3,7%
	Myself only	Count %	- 65,0%	253 65,0%	121 70,3%					374 66,7%
	Others	Count %	- 1,3%	5 1,3%	3 1,7%					8 1,4%
	Total	Count %	- 100,0%	389 100,0%	172 100,0%					561 100,0%

*p<0.05, **p<0.005, ***p<0.0005.

+ Does not accomplish the Chi-Square assumption of cell frequencies.

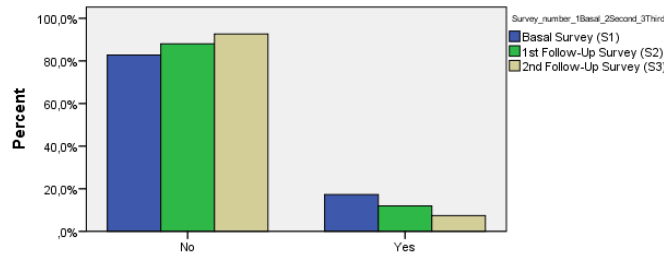
TABLE 20

Do you think you have sleeping problems?

		Basal Survey (S1)	1st Follow-Up Survey (S2)	2nd Follow-Up Survey (S3)	Total	Global Chi-Square / p-value	S1 vs S2 Chi-Square / p-value	S1 vs S3 Chi-Square / p-value	S2 vs S3 Chi-Square / p-value	
2-5 years	Yes	Count %	- 93,9%	170 97,0%	164 95,4%	1,949 / 0,163	-	-	1,949 / 0,163	
	No	Count %	- 6,1%	11 6,1%	5 3,0%					16 4,6%
	Total	Count %	- 100,0%	181 100,0%	169 100,0%					350 100,0%
6-12 years	Yes	Count %	211 82,7%	449 88,0%	427 92,6%	16,279 / <0,000* **	4,024 / 0,045*	16,509 / <0,000* **	5,768 / 0,016*	
	No	Count %	44 17,3%	61 12,0%	34 7,4%					139 11,3%
	Total	Count %	255 100,0%	510 100,0%	461 100,0%					1226 100,0%
13-18 years	Yes	Count %	- 87,4%	318 87,4%	145 90,1%	0,781 / 0,377	-	-	0,781 / 0,377	
	No	Count %	- 12,6%	46 12,6%	16 9,9%					62 11,8%
	Total	Count %	- 100,0%	364 100,0%	161 100,0%					525 100,0%

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 21



Bar chart showing significant differences in the “Do you think you have sleeping problems?” variable in subjects between 6-12 years when compared within the different surveys.

FIGURE 32

Do you like getting to sleep?

		Basal Survey (S1)	1st Follow-Up Survey (S2)	2nd Follow-Up Survey (S3)	Total	Global Chi-Square / p-value	S1 vs S2 Chi-Square / p-value	S1 vs S3 Chi-Square / p-value	S2 vs S3 Chi-Square / p-value
2-5 years	Yes	Count %	52 29,4%	43 26,7%	95 28,1%	0,298 / 0,585	-	-	0,298 / 0,585
	No	Count %	125 70,6%	118 73,3%	243 71,9%				
	Total	Count %	177 100,0%	161 100,0%	338 100,0%				
6-12 years	Yes	Count %	75 32,2%	155 30,7%	151 31,8%	0,556 / 0,757	0,166 / 0,683	0,035 / 0,851	0,539 / 0,463
	No	Count %	158 67,8%	350 69,3%	308 68,2%				
	Total	Count %	233 100,0%	505 100,0%	459 100,0%				
13-18 years	Yes	Count %	40 11,1%	17 10,6%	57 11,0%	0,027 / 0,870	-	-	0,027 / 0,870
	No	Count %	320 88,9%	143 89,4%	463 89,0%				
	Total	Count %	360 100,0%	160 100,0%	520 100,0%				

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 22

SSR Subscales for subjects between 2-5 years

		N	Mean	SD	ANOVA F	p-value
Subscale Routines to go to bed	1st Follow-Up Survey (S2)	203	3,93	0,957	0,820	0,366
	2nd Follow-Up Survey (S3)	190	4,02	0,894		
	Total	393	3,97	0,927		
Subscale Anxiety related to sleep	1st Follow-Up Survey (S2)	203	3,55	2,139	2,786	0,096
	2nd Follow-Up Survey (S3)	190	3,17	2,292		
	Total	393	3,37	2,220		
Subscale Quality of Sleep	1st Follow-Up Survey (S2)	203	1,02	1,227	0,083	0,773
	2nd Follow-Up Survey (S3)	190	0,98	1,560		
	Total	393	1,00	1,396		
Subscale Reject to Sleep	1st Follow-Up Survey (S2)	203	1,29	1,286	2,468	0,117
	2nd Follow-Up Survey (S3)	190	1,08	1,319		
	Total	393	1,19	1,304		

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 23

SSR Subscales for subjects between 6-12 years

		N	Mean	SD	ANOVA F	p-value
Subscale Routines to go to bed	Basal Survey (S1)	261	1,06	1,387	2,623**	0,109***
	1st Follow-Up Survey (S2)	556	0,88	1,227		
	2nd Follow-Up Survey (S3)	529	0,85	1,159		
	Total	1346	0,90	1,235		
Subscale Anxiety related to sleep	Basal Survey (S1)	261	2,47	2,063	1,303	0,272
	1st Follow-Up Survey (S2)	556	2,68	2,133		
	2nd Follow-Up Survey (S3)	529	2,50	2,098		
	Total	1346	2,57	2,106		
Subscale Quality of Sleep	Basal Survey (S1)	261	2,42	2,369	10,959**	<0,000*****
	1st Follow-Up Survey (S2)	556	2,17	2,084		
	2nd Follow-Up Survey (S3)	529	1,75	1,842		
	Total	1346	2,05	2,069		
Subscale Reject to Sleep	Basal Survey (S1)	261	1,30	1,455	0,714	0,490
	1st Follow-Up Survey (S2)	556	1,33	1,407		
	2nd Follow-Up Survey (S3)	529	1,23	1,369		
	Total	1346	1,28	1,401		

*p<0.05, **p<0.005, ***p<0.0005.

** Does not accomplish the assumption of equal variances (Levene’s test).

*** Welch’s p-value is given.

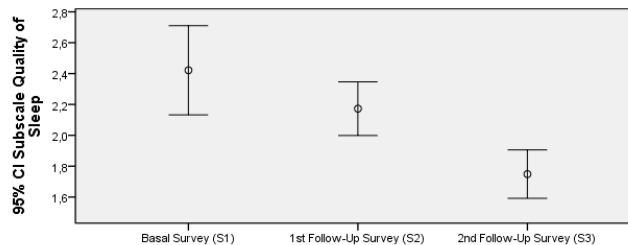
TABLE 24

Post Hoc Tamhane’s T2 tests for the statistically significant variables

			p-value
Subscale Quality of Sleep	Basal Survey (S1)	1st Follow-Up Survey (S2)	0,379
		2nd Follow-Up Survey (S3)	<0,000***
	1st Follow-Up Survey (S2)	Basal Survey (S1)	0,379
		2nd Follow-Up Survey (S3)	0,001**
2nd Follow-Up Survey (S3)	Basal Survey (S1)	<0,000***	
	1st Follow-Up Survey (S2)	0,001**	

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 25



Error bar chart (95% CI) showing significant differences in the “Subscale Quality of Sleep” variable in subjects between 6-12 years when compared within the different surveys.

FIGURE 33

SSR Subscales for subjects between 13-18 years

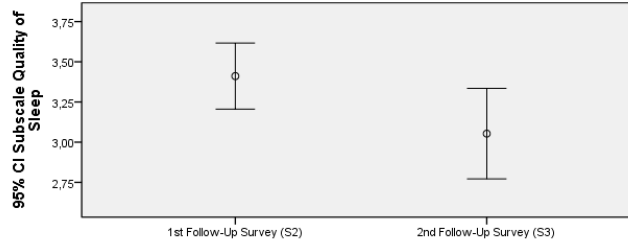
		N	Mean	SD	ANOVA F	p-value
Subscale Routines to go to bed	1st Follow-Up Survey (S2)	399	0,33	0,815	0,210	0,647
	2nd Follow-Up Survey (S3)	189	0,37	0,910		
	Total	588	0,34	0,846		
Subscale Anxiety related to sleep	1st Follow-Up Survey (S2)	399	1,29	1,452	0,227**	0,647***
	2nd Follow-Up Survey (S3)	189	1,35	1,623		
	Total	588	1,31	1,508		
Subscale Quality of Sleep	1st Follow-Up Survey (S2)	399	3,41	2,089	3,918	0,048*
	2nd Follow-Up Survey (S3)	189	3,05	1,962		
	Total	588	3,30	2,054		
Subscale Reject to Sleep	1st Follow-Up Survey (S2)	399	0,92	1,196	0,123	0,726
	2nd Follow-Up Survey (S3)	189	0,88	1,114		
	Total	588	0,91	1,170		

*p<0.05, **p<0.005, ***p<0.0005.

** Does not accomplish the assumption of equal variances (Levene’s test).

*** Welch’s p-value is given.

TABLE 26



Error bar chart (95% CI) showing significant differences in the “Subscale Quality of Sleep” variable in subjects between 13-18 years when compared within the different surveys.

FIGURE 34

2.2.5. Academic performance

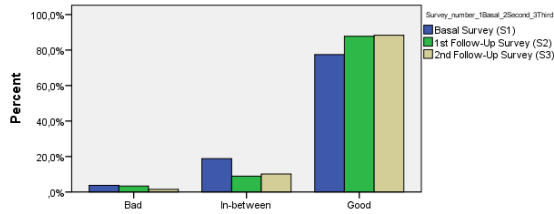
Behavior at school

			Basal Survey (S1)	1st Follow-Up Survey (S2)	2nd Follow-Up Survey (S3)	Total	Global Chi-Square / p-value	S1 vs S2 Chi-Square / p-value	S1 vs S3 Chi-Square / p-value	S2 vs S3 Chi-Square / p-value
2-5 years	Bad	Count	5	9	3	17	11,200 / 0,024*	8,281 / 0,016*	7,109 / 0,029*	1,654 / 0,437
		%	3,8%	3,3%	1,5%	2,8%				
	In-between	Count	25	24	20	69				
		%	18,8%	8,9%	10,2%	11,5%				
	Good	Count	103	236	174	513				
		%	77,4%	87,7%	88,3%	85,6%				
	Total	Count	133	269	197	599				
		%	100,0%	100,0%	100,0%	100,0%				
6-12 years	Bad	Count	12	5	10	27	11,065 / 0,026*	9,646 / 0,008*	2,657 / 0,265	5,644 / 0,059
		%	3,6%	0,8%	2,6%	2,1%				
	In-between	Count	32	68	51	151				
		%	9,7%	11,4%	13,2%	11,5%				
	Good	Count	286	522	325	1133				
		%	86,7%	87,7%	84,2%	86,4%				
	Total	Count	330	595	386	1311				
		%	100,0%	100,0%	100,0%	100,0%				
13-18 years	Bad	Count		4	0	4	3,829 / 0,147	-	-	3,829* / 0,147
		%		1,9%	0,0%	1,8%				
	In-between	Count		51	1	52				
		%		24,3%	5,6%	22,8%				
	Good	Count		155	17	172				
		%		73,8%	94,4%	75,4%				
	Total	Count		210	18	228				
		%		100,0%	100,0%	100,0%				

*p<0.05, **p<0.005, ***p<0.0005.

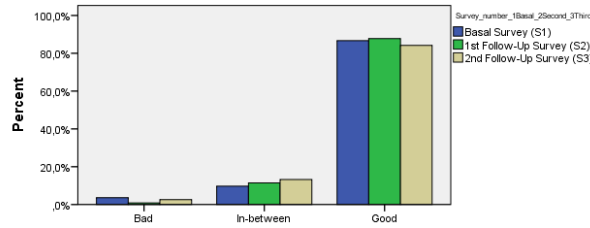
* Does not accomplish the Chi-Square assumption of cell frequencies.

TABLE 27



Bar chart showing significant differences in the “Behavior at school” variable in subjects between 2-5 years when compared within the different surveys.

FIGURE 35



Bar chart showing significant differences in the “Behavior at school” variable in subjects between 6-12 years when compared within the different surveys.

FIGURE 36

Averaged mark for subjects between 6-12 years

		N	Mean	SD	ANOVA F	p-value
Averaged mark	Basal Survey (S1)	350	7,162	1,559	5,901**	0,004***
	1st Follow-Up Survey (S2)	594	7,460	1,486		
	2nd Follow-Up Survey (S3)	545	7,484	1,420		
	Total	1489	7,399	1,485		

*p<0.05, **p<0.005, ***p<0.0005.

** Does not accomplish the assumption of equal variances (Levene’s test).

*** Welch’s p-value is given.

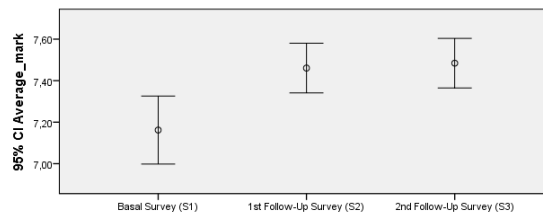
TABLE 28

Post Hoc Tamhane's T2 tests for the statistically significant variables

			p-value
Averaged mark	Basal Survey (S1)	1st Follow-Up Survey (S2)	0,012*
		2nd Follow-Up Survey (S3)	0,006*
	1st Follow-Up Survey (S2)	Basal Survey (S1)	0,012*
		2nd Follow-Up Survey (S3)	0,990
	2nd Follow-Up Survey (S3)	Basal Survey (S1)	0,006*
		1st Follow-Up Survey (S2)	0,990

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 29



Error bar chart (95% CI) showing significant differences in the “Averaged mark” variable in subjects between 6-12 years when compared within the different surveys.

FIGURE 37

Averaged mark for subjects between 13-18 years

		N	Mean	SD	ANOVA F	p-value
Averaged mark	1st Follow-Up Survey (S2)	408	6,198	1,725	0,264	0,608
	2nd Follow-Up Survey (S3)	186	6,277	1,759		
	Total	594	6,223	1,734		

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 30

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2.3. Results for Italy's subjects

2.3.1. Wake up time, sleep hours and breakfast

Descriptive table.

		Average wake up time	Average breakfast time	Average breakfast duration (in minutes)	Elapsed time (in hours) between wake up and leaving home time	Average total sleep hours in school days	Average time (in minutes) between wake up time and breakfast	
Basal Survey (S1)	2-5 years	Count	15	15	15	15	15	
		Mean	7:35	8:09	14	1,21	10,3	28
		SD	0:30	0:36	5	0,38	0,9	20
	6-12 years	Count	49	49	49	49	49	49
		Mean	7:23	7:43	8	0,83	10,5	21
		SD	0:19	0:17	5	0,33	1,2	16
	13-18 years	Count	149	149	149	149	149	149
		Mean	6:35	6:58	7	0,66	8,8	24
		SD	0:27	0:40	4	0,30	0,9	30
2nd Follow-Up Survey (S3)	2-5 years	Count	-	-	-	-	-	-
		Mean	-	-	-	-	-	-
		SD	-	-	-	-	-	-
	6-12 years	Count	18	18	18	18	18	18
		Mean	7:17	7:33	7	0,89	8,4	30
		SD	0:18	0:12	3	0,33	1,0	11
	13-18 years	Count	110	110	110	110	110	110
		Mean	6:37	6:58	8	0,71	8,3	23
		SD	0:29	0:36	4	0,35	0,9	27

TABLE 31

Breakfast type.

- Milky
- Fruits
- Juice
- Cereals and Bread
- Others

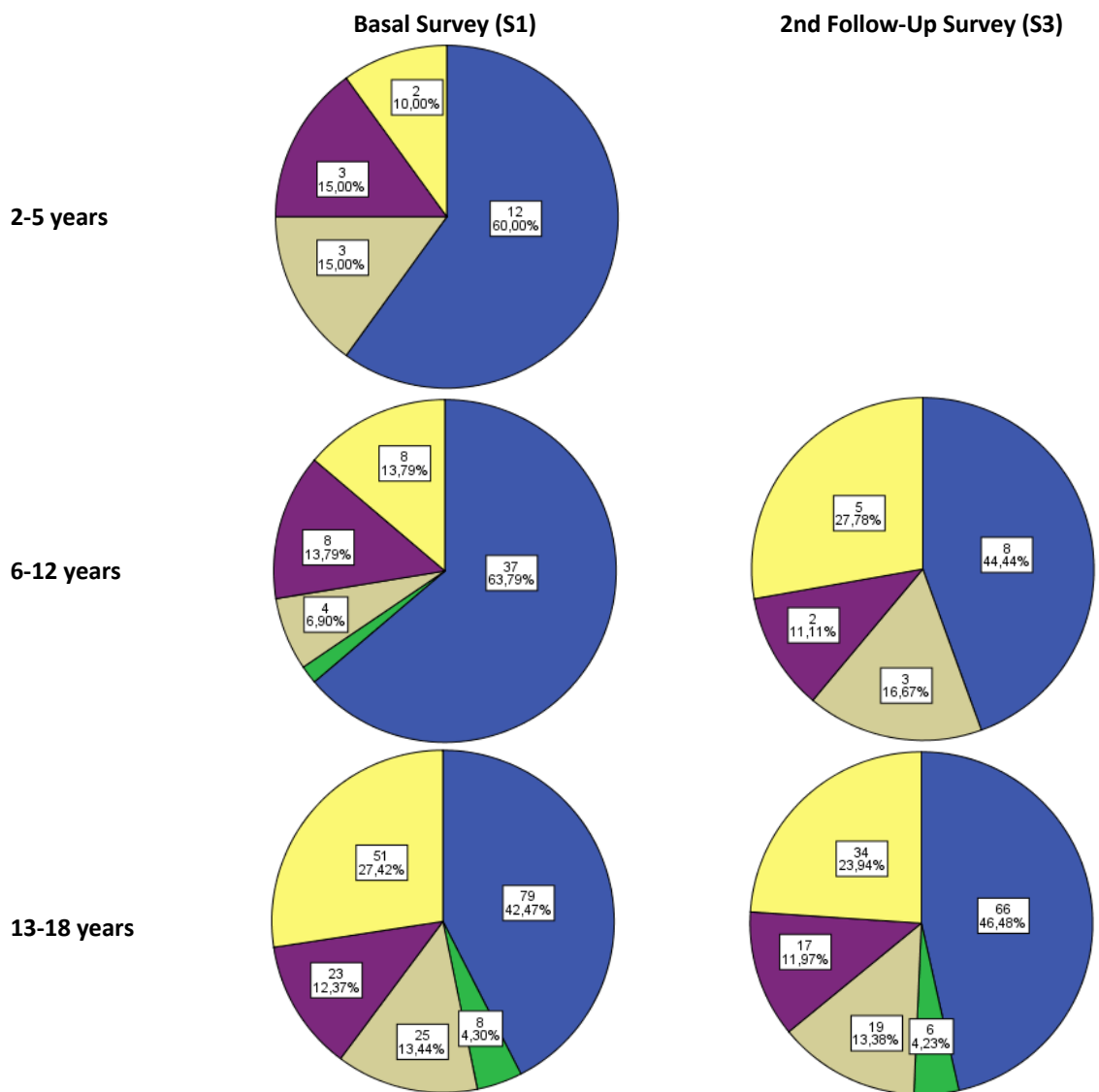


FIGURE 38



2.3.2. SDSC - Sleep Disturbance Scale for Children

The following cut-off values have been considered:

- Initiating and maintaining sleep problems: $9,9 \pm 3,11$
- Sleep breathing problems: $3,77 \pm 1,45$
- Arousal problems: $3,29 \pm 0,84$
- Sleep wake transition problems: $8,11 \pm 2,41$
- Excessive daytime sleepiness problems : $7,11 \pm 2,57$
- Sleep hyperhidrosis: $2,87 \pm 1,69$
- Global cut-off value for SDSC: 39

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Initiating and maintaining sleep problems

			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	Chi-Square	p-value
6-12 years	No	Count %	47 97,9%	18 100,0%	65 98,5%	0,381*	0,537
	Yes	Count %	1 2,1%	0 0,0%	1 1,5%		
	Total	Count %	48 100,0%	18 100,0%	66 100,0%		
13-18 years	No	Count %	128 89,5%	97 88,2%	225 88,9%	0,112	0,738
	Yes	Count %	15 10,5%	13 11,8%	28 11,1%		
	Total	Count %	143 100,0%	110 100,0%	253 100,0%		

* $p < 0.05$, ** $p < 0.005$, *** $p < 0.0005$.

+ Does not accomplish the Chi-Square assumption of cell frequencies.

TABLE 32

Sleep breathing problems

			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	Chi-Square	p-value
6-12 years	No	Count %	46 95,8%	18 100,0%	64 97,0%	0,773*	0,379
	Yes	Count %	2 4,2%	0 0,0%	2 3,0%		
	Total	Count %	48 100,0%	18 100,0%	66 100,0%		
13-18 years	No	Count %	133 93,0%	101 91,8%	234 92,5%	0,127	0,722
	Yes	Count %	10 7,0%	9 8,2%	19 7,5%		
	Total	Count %	143 100,0%	110 100,0%	253 100,0%		

* $p < 0.05$, ** $p < 0.005$, *** $p < 0.0005$.

+ Does not accomplish the Chi-Square assumption of cell frequencies.

TABLE 33



Arousal problems

			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	Chi-Square	p-value
6-12 years	No	Count %	40 83,3%	17 94,4%	57 86,4%	1,372	0,241
	Yes	Count %	8 16,7%	1 5,6%	9 13,6%		
	Total	Count %	48 100,0%	18 100,0%	66 100,0%		
13-18 years	No	Count %	121 84,6%	93 84,5%	214 84,6%	<0,000	0,988
	Yes	Count %	22 15,4%	17 15,5%	39 15,4%		
	Total	Count %	143 100,0%	110 100,0%	253 100,0%		

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 34

Sleep wake transition problems

			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	Chi-Square	p-value
6-12 years	No	Count %	42 87,5%	18 100,0%	60 90,9%	2,475*	0,116
	Yes	Count %	6 12,5%	0 0,0%	6 9,1%		
	Total	Count %	48 100,0%	18 100,0%	66 100,0%		
13-18 years	No	Count %	129 90,2%	99 90,0%	228 90,1%	0,003	0,956
	Yes	Count %	14 9,8%	11 10,0%	25 9,9%		
	Total	Count %	143 100,0%	110 100,0%	253 100,0%		

*p<0.05, **p<0.005, ***p<0.0005.

* Does not accomplish the Chi-Square assumption of cell frequencies.

TABLE 35

Excessive daytime sleepiness problems

			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	Chi-Square	p-value
6-12 years	No	Count %	46 95,8%	18 100,0%	64 97,0%	0,773*	0,379
	Yes	Count %	2 4,2%	0 0,0%	2 3,0%		
	Total	Count %	48 100,0%	18 100,0%	66 100,0%		
13-18 years	No	Count %	106 74,1%	86 78,2%	192 75,9%	0,559	0,455
	Yes	Count %	37 25,9%	24 21,8%	61 24,1%		
	Total	Count %	143 100,0%	110 100,0%	253 100,0%		

*p<0.05, **p<0.005, ***p<0.0005.

* Does not accomplish the Chi-Square assumption of cell frequencies.

TABLE 36

Sleep hyperhidrosis

			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	Chi-Square	p-value
6-12 years	No	Count %	46 95,8%	18 100,0%	64 97,0%	0,773*	0,379
	Yes	Count %	2 4,2%	0 0,0%	2 3,0%		
	Total	Count %	48 100,0%	18 100,0%	66 100,0%		
13-18 years	No	Count %	138 96,5%	106 96,4%	244 96,4%	0,004	0,953
	Yes	Count %	5 3,5%	4 3,6%	9 3,6%		
	Total	Count %	143 100,0%	110 100,0%	253 100,0%		

*p<0.05, **p<0.005, ***p<0.0005.

+ Does not accomplish the Chi-Square assumption of cell frequencies.

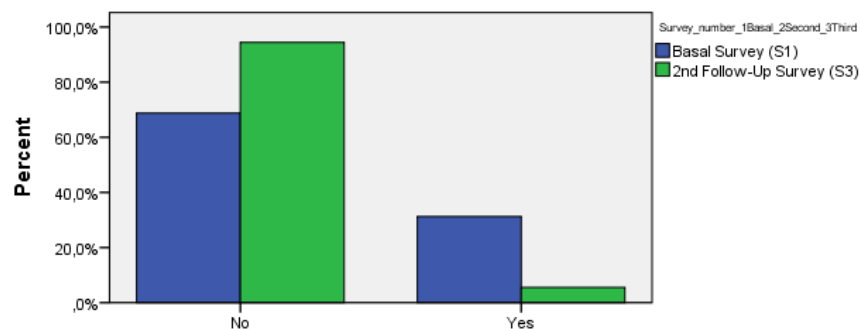
TABLE 37

SDSC TOTAL

			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	Chi-Square	p-value
6-12 years	No	Count %	33 68,8%	17 94,4%	50 75,8%	4,706	0,030*
	Yes	Count %	15 31,3%	1 5,6%	16 24,2%		
	Total	Count %	48 100,0%	18 100,0%	66 100,0%		
13-18 years	No	Count %	67 46,9%	59 53,6%	126 49,8%	1,144	0,285
	Yes	Count %	76 53,1%	51 46,4%	127 50,2%		
	Total	Count %	143 100,0%	110 100,0%	253 100,0%		

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 38



Bar chart showing significant differences in the “SDSC TOTAL” variable in subjects between 6-12 years when compared within the different surveys.

FIGURE 39

2.3.3. BEARS – (Bedtime Issues, Excessive daytime sleepiness, night Awakenings, Regularity and duration of sleep, Snoring)

Legend:

- PAOQ: Parents-oriented questions
- STOQ: Students-oriented questions

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2-5 years. Yes/No questions.

			Basal Survey (S1)	Total	Chi-Square	p-value
BEARS2-5_PAOQ_1. Does your child have any problems going to bed?	No	Count %	14 93,3%	14 93,3%	-	-
	Yes	Count %	1 6,7%	1 6,7%		
	Total	Count %	15 100,0%	15 100,0%		
BEARS2-5_PAOQ_2a. Does your child seem overtired or sleepy a lot during the day?	No	Count %	13 86,7%	13 86,7%	-	-
	Yes	Count %	2 13,3%	2 13,3%		
	Total	Count %	15 100,0%	15 100,0%		
BEARS2-5_PAOQ_2b. Does he still take naps?	No	Count %	15 100,0%	15 100,0%	-	-
	Yes	Count %	15 100,0%	15 100,0%		
	Total	Count %	15 100,0%	15 100,0%		
BEARS2-5_PAOQ_3. Does your child wake up a lot at night?	No	Count %	12 92,3%	12 92,3%	-	-
	Yes	Count %	1 7,7%	1 7,7%		
	Total	Count %	13 100,0%	13 100,0%		
BEARS2-5_PAOQ_4a. Does your child have a regular bedtime and wake time?	No	Count %	1 7,1%	1 7,1%	-	-
	Yes	Count %	13 92,9%	13 92,9%		
	°	Count %	14 100,0%	14 100,0%		
BEARS2-5_PAOQ_5. Does your child snore a lot or have difficulty breathing at night?	No	Count %	11 73,3%	11 73,3%	-	-
	Yes	Count %	4 26,7%	4 26,7%		
	Total	Count %	15 100,0%	15 100,0%		

*p<0.05, **p<0.005, ***p<0.0005.

No statistics were computed because answers are only available for the Basal Survey.

Descriptive data are shown.

TABLE 39

2-5 years. Time questions.

		N	Mean	SD	ANOVA F	p-value
BEARS2-5_PAOQ_4b. Bed time	Basal Survey (S1)	12	22:10	0:36	-	-
BEARS2-5_PAOQ_4c. Wake-up time	Basal Survey (S1)	12	8:30	1:01	-	-

No statistics were computed because answers are only available for the Basal Survey.

Descriptive data are shown.

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 40



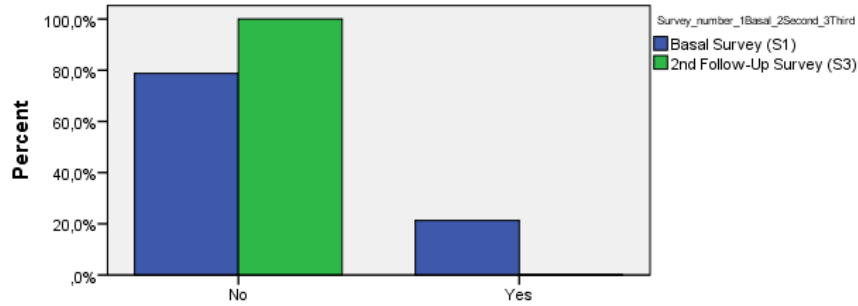
6-12 years. Yes/No questions.

			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	Chi-Square	p-value
BEARS6-12_PAOQ_1. Does your child have any problem at bedtime?	No	Count %	46 93,9%	16 94,1%	62 93,9%	0,001 ⁺	0,971
	Yes	Count %	3 6,1%	1 5,9%	4 6,1%		
	Total	Count %	49 100,0%	17 100,0%	66 100,0%		
BEARS6-12_PAOQ_2. Does your child have difficulty waking in the morning, seem sleepy during the day or take snaps?	No	Count %	40 81,6%	16 94,1%	56 84,8%	1,530	0,216
	Yes	Count %	9 18,4%	1 5,9%	10 15,2%		
	Total	Count %	49 100,0%	17 100,0%	66 100,0%		
BEARS6-12_PAOQ_3a. Does your child seem to wake up a lot at night?	No	Count %	44 89,8%	16 94,1%	60 90,9%	0,285 ⁺	0,593
	Yes	Count %	5 10,2%	1 5,9%	6 9,1%		
	Total	Count %	49 100,0%	17 100,0%	66 100,0%		
BEARS6-12_PAOQ_3b. Have they sleepwalked or had nightmares	No	Count %	44 89,8%	17 100,0%	61 92,4%	1,877 ⁺	0,171
	Yes	Count %	5 10,2%	0 0,0%	5 7,6%		
	Total	Count %	49 100,0%	17 100,0%	66 100,0%		
BEARS6-12_PAOQ_5. Does your child have loud or nightly snoring or any breathing difficulties at night?	No	Count %	44 89,8%	17 100,0%	61 92,4%	1,877 ⁺	0,171
	Yes	Count %	5 10,2%	0 0,0%	5 7,6%		
	Total	Count %	49 100,0%	17 100,0%	66 100,0%		
BEARS6-12_STOQ_1. Do you have any problems going to bed?	No	Count %	43 89,6%	15 88,2%	58 89,2%	0,024	0,878
	Yes	Count %	5 10,4%	2 11,8%	7 10,8%		
	Total	Count %	48 100,0%	17 100,0%	65 100,0%		
BEARS6-12_STOQ_2. Do you feel tired a lot?	No	Count %	38 82,6%	15 88,2%	53 84,1%	0,294	0,587
	Yes	Count %	8 17,4%	2 11,8%	10 15,9%		
	Total	Count %	46 100,0%	17 100,0%	63 100,0%		
BEARS6-12_STOQ_3a. Do you wake up a lot at night?	No	Count %	42 89,4%	16 94,1%	58 90,6%	0,332 ⁺	0,564
	Yes	Count %	5 10,6%	1 5,9%	6 9,4%		
	Total	Count %	47 100,0%	17 100,0%	64 100,0%		
BEARS6-12_STOQ_3b. Do you have trouble getting back to sleep?	No	Count %	37 78,7%	16 100,0%	53 84,1%	4,047	0,044 ⁺
	Yes	Count %	10 21,3%	0 0,0%	10 15,9%		
	Total	Count %	47 100,0%	16 100,0%	63 100,0%		

*p<0.05, **p<0.005, ***p<0.0005.

⁺ Does not accomplish the Chi-Square assumption of cell frequencies.

TABLE 41



Bar chart showing significant differences in the “BEARS6-12_STOQ_3b. Do you have trouble getting back to sleep?” variable in subjects between 6-12 years when compared within the different surveys.

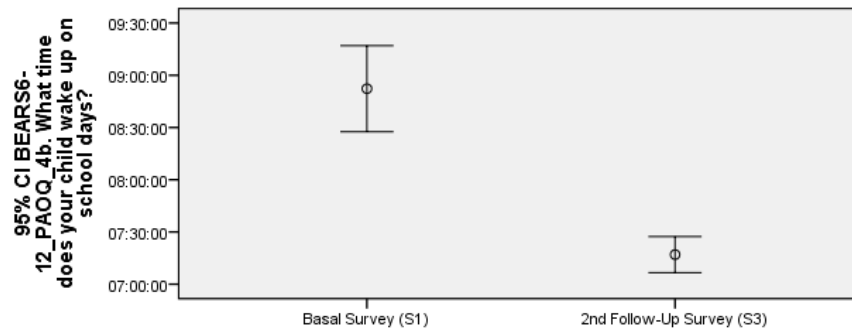
FIGURE 40

6-12 years. Time questions.

		N	Mean	SD	ANOVA F	p-value
BEARS6-12_PAOQ_4a. What time does your child go to bed on school days?	Basal Survey (S1)	41	22:24	0:49	0,682	0,413
	2nd Follow-Up Survey (S3)	15	22:36	0:42		
	Total	56	22:27	0:47		
BEARS6-12_PAOQ_4b. What time does your child wake up on school days?	Basal Survey (S1)	39	8:52	1:16	22,664	<0,000***
	2nd Follow-Up Survey (S3)	15	7:17	0:18		
	Total	54	8:25	1:18		
BEARS6-12_PAOQ_4c. What time does your child go to bed on weekend?	Basal Survey (S1)	36	22:27	0:48	2,016	0,162
	2nd Follow-Up Survey (S3)	14	22:49	0:46		
	Total	50	22:33	0:48		
BEARS6-12_PAOQ_4d. What time does your child wake up on weekend?	Basal Survey (S1)	36	9:15	1:03	0,514	0,477
	2nd Follow-Up Survey (S3)	14	9:02	0:53		
	Total	50	9:12	1:00		

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 42



Error bar chart (95% CI) showing significant differences in the “BEARS6-12_PAOQ_4b. What time does your child wake up on school days?” variable in subjects between 6-12 years when compared within the different surveys.

FIGURE 41



13-18 years. Yes/No questions.

		Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	Chi-Square	p-value
BEARS13-18_PAOQ_5. Does your teenager snore loudly or nightly?	No	Count 74 51,7%	61 56,5%	135 53,8%	0,555	0,456
	Yes	Count 69 48,3%	47 43,5%	116 46,2%		
	Total	Count 143 100,0%	108 100,0%	251 100,0%		
BEARS13-18_STOQ_1. Do you have any problems falling asleep at bedtime?	No	Count 123 85,4%	88 80,0%	211 83,1%	1,301	0,254
	Yes	Count 21 14,6%	22 20,0%	43 16,9%		
	Total	Count 144 100,0%	110 100,0%	254 100,0%		
BEARS13-18_STOQ_2. Do you feel sleepy a lot during the day, in school, while driving?	No	Count 98 68,1%	70 63,6%	168 66,1%	0,544	0,461
	Yes	Count 46 31,9%	40 36,4%	86 33,9%		
	Total	Count 144 100,0%	110 100,0%	254 100,0%		
BEARS13-18_STOQ_3a. Do you wake up a lot at night?	No	Count 124 86,1%	90 81,8%	214 84,3%	0,866	0,352
	Yes	Count 20 13,9%	20 18,2%	40 15,7%		
	Total	Count 144 100,0%	110 100,0%	254 100,0%		
BEARS13-18_STOQ_3b. Do you have trouble getting back to sleep?	No	Count 127 88,2%	95 87,2%	222 87,7%	0,062	0,803
	Yes	Count 17 11,8%	14 12,8%	31 12,3%		
	Total	Count 144 100,0%	109 100,0%	253 100,0%		

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 43

13-18 years. Time questions.

		N	Mean	SD	ANOVA F	p-value
BEARS13-18_STOQ_4a. What time do you usually go to bed on school nights?	Basal Survey (S1)	140	22:34	0:43	0,002	0,967
	2nd Follow-Up Survey (S3)	109	22:34	0:43		
	Total	249	22:34	0:43		
BEARS13-18_STOQ_4b. What time do you go to bed on weekends?	Basal Survey (S1)	141	00:49	1:34	0,075	0,784
	2nd Follow-Up Survey (S3)	108	00:46	1:25		
	Total	249	00:48	1:30		

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 44

2.3.4. SSR – (Sleep Self Report)

Who says bedtime?

			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	S1 vs S3 Chi-Square / p-value
2-5 years	Mom or dad (only)	Count %	9 60,0%	- -	9 60,0%	-
	Mom or dad and myself	Count %	5 33,3%	- -	5 33,3%	
	Myself only	Count %	1 6,7%	- -	1 6,7%	
	Others	Count %	15 100,0%	- -	15 100,0%	
	Total	Count %	26 53,1%	6 33,3%	32 47,8%	
6-12 years	Mom or dad (only)	Count %	12 24,5%	8 44,4%	20 29,9%	3,468* / 0,325
	Mom or dad and myself	Count %	10 20,4%	3 16,7%	13 19,4%	
	Myself only	Count %	1 2,0%	1 5,6%	2 3,0%	
	Others	Count %	49 100,0%	18 100,0%	67 100,0%	
	Total	Count %	34 23,6%	18 16,4%	52 20,5%	
13-18 years	Mom or dad (only)	Count %	14 9,7%	4 3,6%	18 7,1%	6,831* / 0,077
	Mom or dad and myself	Count %	95 66,0%	86 78,2%	181 71,3%	
	Myself only	Count %	1 0,7%	2 1,8%	3 1,2%	
	Others	Count %	144 100,0%	110 100,0%	254 100,0%	
	Total	Count %	9 60,0%		9 60,0%	

*p<0.05, **p<0.005, ***p<0.0005.

* Does not accomplish the Chi-Square assumption of cell frequencies.

TABLE 45

Do you think you have sleeping problems?

			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	S1 vs S3 Chi-Square / p-value
2-5 years	No	Count %	15 100,0%	- -	15 100,0%	-
	Total	Count %	15 100,0%	- -	15 100,0%	
6-12 years	Yes	Count %	45 93,8%	17 100,0%	62 95,4%	1,114* / 0,291
	No	Count %	3 6,3%	0 0,0%	3 4,6%	
	Total	Count %	48 100,0%	17 100,0%	65 100,0%	
13-18 years	Yes	Count %	128 88,9%	95 86,4%	223 87,8%	0,596 / 0,440
	No	Count %	16 11,1%	15 13,6%	31 12,2%	
	Total	Count %	144 100,0%	110 100,0%	254 100,0%	

*p<0.05, **p<0.005, ***p<0.0005.

* Does not accomplish the Chi-Square assumption of cell frequencies.

TABLE 46



Do you like getting to sleep?

			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	S1 vs S3 Chi-Square / p-value
2-5 years	Yes	Count %	1 7,1%	- -	1 7,1%	-
	No	Count %	13 92,9%	- -	13 92,9%	
	Total	Count %	14 100,0%	- -	14 100,0%	
6-12 years	Yes	Count %	5 10,2%	3 16,7%	8 11,9%	0,523 / 0,470
	No	Count %	44 89,8%	15 83,3%	59 88,1%	
	Total	Count %	49 100,0%	18 100,0%	67 100,0%	
13-18 years	Yes	Count %	7 4,9%	6 5,5%	13 5,1%	0,053 / 0,818
	No	Count %	137 95,1%	103 94,5%	240 94,9%	
	Total	Count %	144 100,0%	109 100,0%	253 100,0%	

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 48

SSR Subscales for subjects between 2-5 years

		N	Mean	SD	ANOVA F	p-value
Subscale Routines to go to bed	Basal Survey (S1)	15	3,87	1,642	-	-
	Total	15	3,87	1,642		
Subscale Anxiety related to sleep	Basal Survey (S1)	15	7,13	2,200	-	-
	Total	15	7,13	2,200		
Subscale Quality of Sleep	Basal Survey (S1)	15	9,33	0,900	-	-
	Total	15	9,33	0,900		
Subscale Reject to Sleep	Basal Survey (S1)	15	5,33	1,113	-	-
	Total	15	5,33	1,113		

TABLE 49

SSR Subscales for subjects between 6-12 years

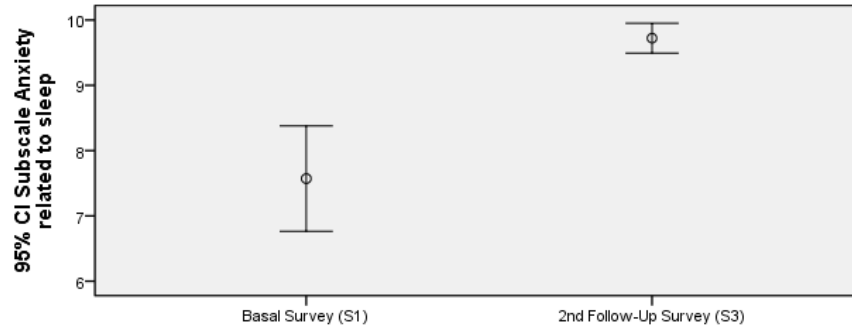
		N	Mean	SD	ANOVA F	p-value
Subscale Routines to go to bed	Basal Survey (S1)	49	4,92	1,351	2,890	0,094
	2nd Follow-Up Survey (S3)	18	5,50	0,857		
	Total	67	5,07	1,259		
Subscale Anxiety related to sleep	Basal Survey (S1)	49	7,57	2,814	10,318**	<0,000***
	2nd Follow-Up Survey (S3)	18	9,72	0,461		
	Total	67	8,15	2,595		
Subscale Quality of Sleep	Basal Survey (S1)	49	8,45	1,634	0,057	0,812
	2nd Follow-Up Survey (S3)	18	8,56	1,580		
	Total	67	8,48	1,608		
Subscale Reject to Sleep	Basal Survey (S1)	49	4,61	1,565	4,487**	0,010****
	2nd Follow-Up Survey (S3)	18	5,44	0,922		
	Total	67	4,84	1,463		

*p<0.05, **p<0.005, ***p<0.0005.

** Does not accomplish the assumption of equal variances (Levene's test).

*** Welch's' p-value is given.

TABLE 50



Error bar chart (95% CI) showing significant differences in the “Subscale Anxiety related to sleep” variable in subjects between 6-12 years when compared within the different surveys.

FIGURE 42



Error bar chart (95% CI) showing significant differences in the “Subscale Reject to Sleep” variable in subjects between 6-12 years when compared within the different surveys.

FIGURE 43

SSR Subscales for subjects between 13-18 years

		N	Mean	SD	ANOVA F	p-value
Subscale Routines to go to bed	Basal Survey (S1)	144	0,96	1,750	0,370	0,543
	2nd Follow-Up Survey (S3)	110	1,10	1,949		
	Total	254	1,02	1,836		
Subscale Anxiety related to sleep	Basal Survey (S1)	144	1,70	2,580	0,815	0,367
	2nd Follow-Up Survey (S3)	110	2,03	3,169		
	Total	254	1,84	2,849		
Subscale Quality of Sleep	Basal Survey (S1)	144	3,24	2,238	2,467	0,118
	2nd Follow-Up Survey (S3)	110	3,70	2,452		
	Total	254	3,44	2,339		
Subscale Reject to Sleep	Basal Survey (S1)	144	1,04	1,546	0,783	0,377
	2nd Follow-Up Survey (S3)	110	1,23	1,790		
	Total	254	1,12	1,655		

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 51

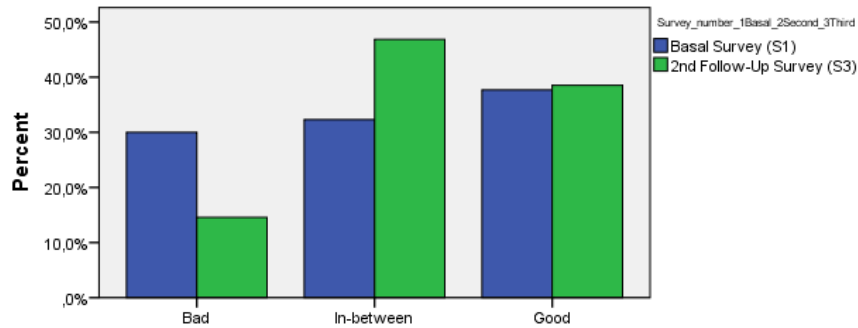
2.3.5. Academic performance

Behavior at school

			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	S1 vs S3 Chi-Square / p-value
13-18 years	Bad	Count	39	14	53	8,651 / 0,013*
		%	30,0%	14,6%	23,5%	
	In-between	Count	42	45	87	
		%	32,3%	46,9%	38,5%	
Good	Count	49	37	86		
	%	37,7%	38,5%	38,1%		
Total		Count	130	96	226	
		%	100,0%	100,0%	100,0%	

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 52



Bar chart showing significant differences in the “Behavior at school” variable in subjects between 13-18 years when compared within the different surveys.

FIGURE 44

Averaged mark for subjects between 6-12 years

No data available.

Averaged mark for subjects between 13-18 years

		N	Mean	SD	ANOVA F	p-value
Averaged mark	Basal Survey (S1)	130	6,957	0,702		
	2nd Follow-Up Survey (S3)	96	7,052	0,668		
	Total	226	6,997	0,688		

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 53

2.4. Results for Turkey’s subjects

2.4.1. Wake up time, sleep hours and breakfast

Descriptive table.



		Average wake up time	Average breakfast time	Average breakfast duration (in minutes)	Elapsed time (in hours) between wake up and leaving home time*	Average total sleep hours in school days	Average time (in minutes) between wake up time and breakfast	
Basal Survey (S1)	2-5 years	Count	-	-	-	-	-	
		Mean	-	-	-	-	-	
		SD	-	-	-	-	-	
	6-12 years	Count	89	89	89	33	-	89
		Mean	7:46	8:16	23	0,79	-	31
		SD	1:17	1:23	9	0,57	-	28
	13-18 years	Count	-	-	-	-	-	-
		Mean	-	-	-	-	-	-
		SD	-	-	-	-	-	-
2nd Follow-Up Survey (S3)	2-5 years	Count	-	-	-	-	-	
		Mean	-	-	-	-	-	
		SD	-	-	-	-	-	
	6-12 years	Count	89	89	89	56	89	89
		Mean	7:13	7:39	19	0,71	9,2	27
		SD	1:13	1:20	10	0,39	1,3	20
	13-18 years	Count	-	-	-	-	-	-
		Mean	-	-	-	-	-	-
		SD	-	-	-	-	-	-

* Subjects showing 'Leaving home time' after 12:00 have been excluded for this analysis.

TABLE 54

Breakfast type.

- Milky
- Fruits
- Juice
- Cereals and Bread
- Others

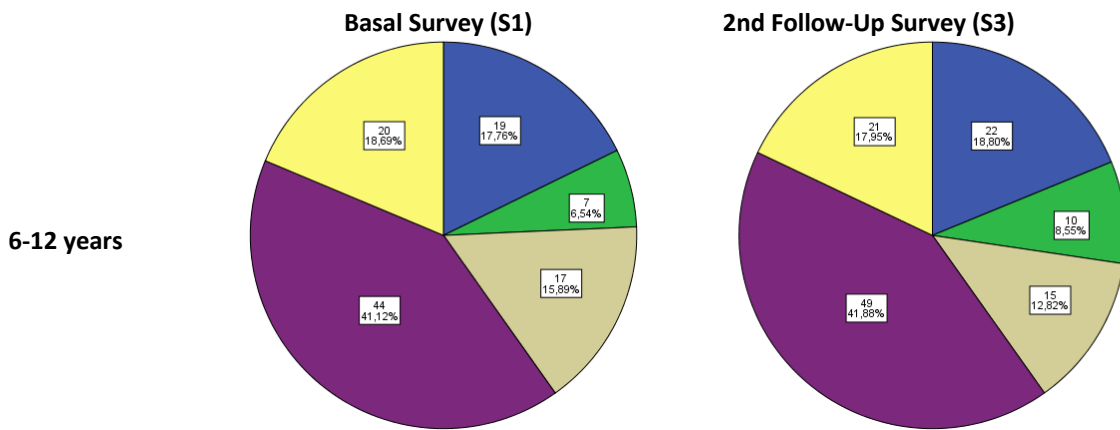


FIGURE 45

2.4.2. SDSC - Sleep Disturbance Scale for Children

The following cut-off values have been considered:

- Initiating and maintaining sleep problems: $9,9 \pm 3,11$
- Sleep breathing problems: $3,77 \pm 1,45$
- Arousal problems: $3,29 \pm 0,84$
- Sleep wake transition problems: $8,11 \pm 2,41$
- Excessive daytime sleepiness problems : $7,11 \pm 2,57$
- Sleep hyperhidrosis: $2,87 \pm 1,69$
- Global cut-off value for SDSC: 39

Initiating and maintaining sleep problems

			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	Chi-Square	p-value
6-12 years	No	Count %	68 81,0%	70 79,5%	138 80,2%	0,054	0,817
	Yes	Count %	16 19,0%	18 20,5%	34 19,8%		
	Total	Count %	84 100,0%	88 100,0%	172 100,0%		

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 55

Sleep breathing problems

			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	Chi-Square	p-value
6-12 years	No	Count %	75 89,3%	79 89,8%	154 89,5%	0,011	0,917
	Yes	Count %	9 10,7%	9 10,2%	18 10,5%		
	Total	Count %	84 100,0%	88 100,0%	172 100,0%		

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 56



Arousal problems

			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	Chi-Square	p-value
6-12 years	No	Count %	58 69,0%	62 70,5%	120 69,8%	0,040	0,841
	Yes	Count %	26 31,0%	26 29,5%	52 30,2%		
	Total	Count %	84 100,0%	88 100,0%	172 100,0%		

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 57

Sleep wake transition problems

			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	Chi-Square	p-value
6-12 years	No	Count %	64 76,2%	65 73,9%	129 75,0%	0,124	0,725
	Yes	Count %	20 23,8%	23 26,1%	43 25,0%		
	Total	Count %	84 100,0%	88 100,0%	172 100,0%		

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 58

Excessive daytime sleepiness problems

			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	Chi-Square	p-value
6-12 years	No	Count %	54 64,3%	61 69,3%	115 66,9%	0,491	0,483
	Yes	Count %	30 35,7%	27 30,7%	57 33,1%		
	Total	Count %	84 100,0%	88 100,0%	172 100,0%		

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 59

Sleep hyperhidrosis

			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	Chi-Square	p-value
6-12 years	No	Count %	75 89,3%	83 94,3%	158 91,9%	1,456	0,288
	Yes	Count %	9 10,7%	5 5,7%	14 8,1%		
	Total	Count %	84 100,0%	88 100,0%	172 100,0%		

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 60



SDSC TOTAL

			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	Chi-Square	p-value
6-12 years	No	Count %	29 34,5%	34 38,6%	63 36,6%	0,313	0,576
	Yes	Count %	55 65,5%	54 61,4%	109 63,4%		
	Total	Count %	84 100,0%	88 100,0%	172 100,0%		

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 61

2.4.3. BEARS – (Bedtime Issues, Excessive daytime sleepiness, night Awakenings, Regularity and duration of sleep, Snoring)

Legend:

- PAOQ: Parents-oriented questions
- STOQ: Students-oriented questions

2-5 years. Yes/No questions.
No data available.

2-5 years. Time questions.
No data available.

6-12 years. Yes/No questions.

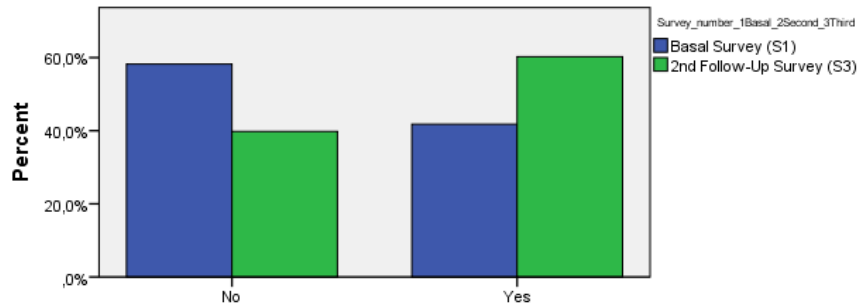
			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	Chi-Square	p-value
BEARS6-12_PAOQ_1. Does your child have any problem at bedtime?	No	Count %	60 73,2%	72 81,8%	132 77,6%	1,829	0,176
	Yes	Count %	22 26,8%	16 18,2%	38 22,4%		
	Total	Count %	82 100,0%	88 100,0%	170 100,0%		
BEARS6-12_PAOQ_2. Does your child have difficulty waking in the morning, seem sleepy during the day or take naps?	No	Count %	54 65,9%	58 65,9%	112 65,9%	<0,000	0,994
	Yes	Count %	28 34,1%	30 34,1%	58 34,1%		
	Total	Count %	82 100,0%	88 100,0%	170 100,0%		
BEARS6-12_PAOQ_3a. Does your child seem to wake up a lot at night?	No	Count %	58 70,7%	65 73,9%	123 72,4%	0,208	0,648
	Yes	Count %	24 29,3%	23 26,1%	47 27,6%		
	Total	Count %	82 100,0%	88 100,0%	170 100,0%		
BEARS6-12_PAOQ_3b. Have they sleepwalked or had nightmares	No	Count %	65 79,3%	74 84,1%	139 81,8%	0,662	0,416
	Yes	Count %	17 20,7%	14 15,9%	31 18,2%		
	Total	Count %	82 100,0%	88 100,0%	170 100,0%		
BEARS6-12_PAOQ_5. Does your child have loud or nightly snoring or any breathing difficulties at night?	No	Count %	46 58,2%	35 39,8%	81 48,5%	5,676	0,017*
	Yes	Count %	33 41,8%	53 60,2%	86 51,5%		



	Total	Count %	79 100,0%	88 100,0%	167 100,0%		
BEARS6-12_STOQ_1. Do you have any problems going to bed?	No	Count %	50 62,5%	68 77,3%	118 70,2%	4,375	0,036*
	Yes	Count %	30 37,5%	20 22,7%	50 29,8%		
	Total	Count %	80 100,0%	88 100,0%	168 100,0%		
BEARS6-12_STOQ_2. Do you feel tired a lot?	No	Count %	62 77,5%	64 72,7%	126 75,0%	0,509	0,476
	Yes	Count %	18 22,5%	24 27,3%	42 25,0%		
	Total	Count %	80 100,0%	88 100,0%	168 100,0%		
BEARS6-12_STOQ_3a. Do you wake up a lot at night?	No	Count %	54 67,5%	66 75,0%	120 71,4%	1,155	0,283
	Yes	Count %	26 32,5%	22 25,0%	48 28,6%		
	Total	Count %	80 100,0%	88 100,0%	168 100,0%		
BEARS6-12_STOQ_3b. Do you have trouble getting back to sleep?	No	Count %	67 83,8%	83 94,3%	150 89,3%	4,892	0,027*
	Yes	Count %	13 16,3%	5 5,7%	18 10,7%		
	Total	Count %	80 100,0%	88 100,0%	168 100,0%		

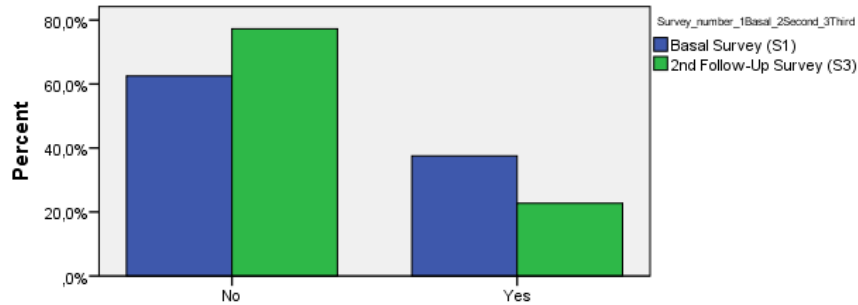
*p<0.05, **p<0.005, ***p<0.0005.

TABLE 62



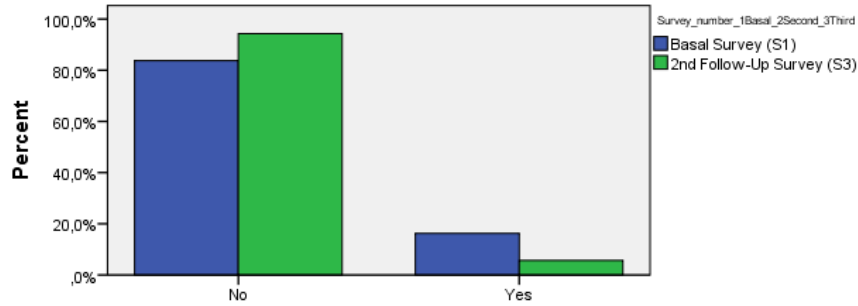
Bar chart showing significant differences in the “BEARS6-12_PAOQ_5. Does your child have loud or nightly snoring or any breathing difficulties at night?” variable in subjects between 6-12 years when compared within the different surveys.

FIGURE 46



Bar chart showing significant differences in the “BEARS6-12_STOQ_1. Do you have any problems going to bed?” variable in subjects between 6-12 years when compared within the different surveys.

FIGURE 47



Bar chart showing significant differences in the “BEARS6-12_STOQ_3b. Do you have trouble getting back to sleep?” variable in subjects between 6-12 years when compared within the different surveys.

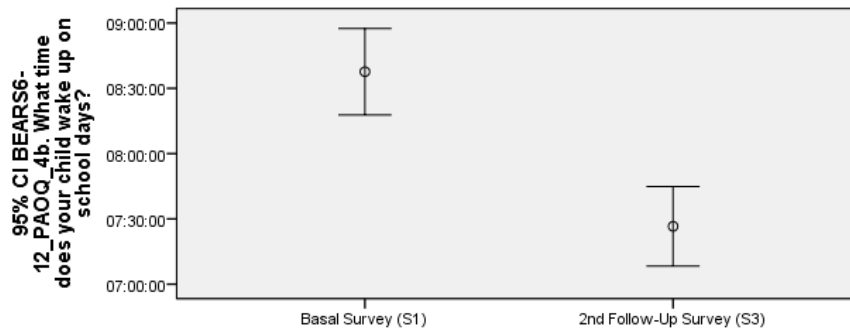
FIGURE 48

6-12 years. Time questions.

		N	Mean	SD	ANOV A F	p-value
BEARS6-12_PAOQ_4a. What time does your child go to bed on school days?	Basal Survey (S1)	71	22:07	0:41	-	-
	2nd Follow-Up Survey (S2)	-	-	-		
	Total	71	22:07	0:41		
BEARS6-12_PAOQ_4b. What time does your child wake up on school days?	Basal Survey (S1)	51	8:37	1:10	26,524	<0,000** *
	2nd Follow-Up Survey (S2)	75	7:26	1:19		
	Total	126	7:55	1:23		
BEARS6-12_PAOQ_4d. What time does your child wake up on weekend?	Basal Survey (S1)	51	8:45	1:05	-	-
	2nd Follow-Up Survey (S2)					
	Total	51	8:45	1:05		

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 67



Error bar chart (95% CI) showing significant differences in the “BEARS6-12_PAOQ_4b. What time does your child wake up on school days?” variable in subjects between 6-12 years when compared within the different surveys.

FIGURE 49

13-18 years. Yes/No questions.

No data available.

13-18 years. Time questions.

No data available.



2.4.4. SSR – (Sleep Self Report)

Who says bedtime?

			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	S1 vs S3 Chi-Square / p-value
6-12 years	Mom or dad (only)	Count %	57 72,2%	48 53,9%	105 62,5%	6,318* / 0,097
	Mom or dad and myself	Count %	2 2,5%	2 2,2%	4 2,4%	
	Myself only	Count %	19 24,1%	37 41,6%	56 33,3%	
	Others	Count %	1 1,3%	2 2,2%	3 1,8%	
	Total	Count %	79 100,0%	89 100,0%	168 100,0%	

*p<0.05, **p<0.005, ***p<0.0005.

* Does not accomplish the Chi-Square assumption of cell frequencies.

TABLE 68

Do you think you have sleeping problems?

			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	S1 vs S3 Chi-Square / p-value
6-12 years	Yes	Count %	55 69,6%	62 70,5%	117 70,1%	0,014 / 0,906
	No	Count %	24 30,4%	26 29,5%	50 29,9%	
	Total	Count %	79 100,0%	88 100,0%	167 100,0%	

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 69

Do you like getting to sleep?

			Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	S1 vs S3 Chi-Square / p-value
6-12 years	Yes	Count %	8 10,1%	11 12,5%	19 11,4%	0,233 / 0,630
	No	Count %	71 89,9%	77 87,5%	148 88,6%	
	Total	Count %	79 100,0%	88 100,0%	167 100,0%	

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 70

SSR Subscales for subjects between 2-5 years

No data available.



SSR Subscales for subjects between 6-12 years

		N	Mean	SD	ANOVA F	p-value
Subscale Routines to go to bed	Basal Survey (S1)	79	4,53	1,289	1,213	0,272
	2nd Follow-Up Survey (S3)	88	4,74	1,140		
	Total	167	4,64	1,213		
Subscale Anxiety related to sleep	Basal Survey (S1)	79	7,47	2,286	0,016	0,899
	2nd Follow-Up Survey (S3)	88	7,42	2,554		
	Total	167	7,44	2,424		
Subscale Quality of Sleep	Basal Survey (S1)	79	7,41	1,857	0,094	0,759
	2nd Follow-Up Survey (S3)	88	7,31	2,230		
	Total	167	7,35	2,057		
Subscale Reject to Sleep	Basal Survey (S1)	79	4,72	1,377	0,357	0,551
	2nd Follow-Up Survey (S3)	88	4,58	1,659		
	Total	167	4,65	1,529		

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 71

SSR Subscales for subjects between 13-18 years

No data available.

2.4.5. Academic performance

Behavior at school

		Basal Survey (S1)	2nd Follow-Up Survey (S3)	Total	S1 vs S3 Chi-Square / p-value
6-12 years	Good	Count 100,0%	89 100,0%	89 100,0%	-
	Total	Count 100,0%	89 100,0%	89 100,0%	

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 72

Averaged mark for subjects between 6-12 years

		N	Mean	SD	ANOVA F	p-value
Averaged mark	Basal Survey (S1)	89	7,862	1,350	2,852	0,093
	2nd Follow-Up Survey (S3)	89	8,210	1,400		
	Total	178	8,036	1,382		

*p<0.05, **p<0.005, ***p<0.0005.

TABLE 73

Averaged mark for subjects between 13-18 years

No data available.

IV. DISCUSSION

The sample has been distributed by nationalities and ages and it is clearly asymmetrical: 87.6 % of the sample belongs to Spanish scholars: 52,9 % of students aged between 6 and 12 and con 29 % if teenagers. It is important to take this asymmetry into account while assessing the results. Additionally, 44.4 % of surveys belong to basal surveys (S1) and the remaining ones belong to following up questionnaires, which adds value to the final results.

Due to this population distribution, the surveys have been assessed firstly by countries and ages and secondly by globally comparing the results of the three countries.

Evaluation of the surveys-questionnaires.

1) BEARS

BEARS is a highly recommended test for general screening of sleeping disorders in children. It allows us to see the difference between children with high probability of suffering from sleeping disorders and those ones with lower or scarce probability of suffering from sleeping disorders. In this way we do know from the start, which population will need a closer follow up, guidance or treatment if needed. As we previously mentioned, the BEARS questionnaire is recommended by the Clinical Practice Guideline on Sleep Disorders in Childhood and Adolescence in Primary Care, edited by the Spanish National Health Board. Questions related to breathing have not been assessed because breathing itself is not the object of our study.

1.1 SPAIN.

Spanish data enclosed in TABLES 14, 15 and 16.

a) Age group: 2 to 5 year olds.

A noticeable decrease on affirmative answers can be appreciated, which means there are sleep disturbances during those early years either before going to bed and while falling asleep. The results show overnight awakenings and sleepiness the day. It is important to remark that, for children aged 2 to 5, the questions were directed to parents and tutors. Moreover, the natural evolution of sleeping patterns in children since they are 2 until they are 5 and the changes in the regularity of sleep might also give light to all the affirmative answers provided on the questionnaires, no matter the actions taken.

Between 24% and 30% of children in Silla still take naps on a regular basis.

b) Age group: 6 to 12 year olds.

As it can be seen on TABLE 74, either on the questions answered by students and on the questions answered by parents, there is a fall on the amount of problems related to sleep and sleep disorders, once families start following the guidance given by teachers at schools. The answers given by parents have statistical meaning. The answers given by the students, have not been considered statistically.

By considering the origin of the answer (parents or students) as we can see on TABLE 74, there is a qualitative difference between parents and students when noticing if they have sleeping disturbances. Parents might have had false expectations on that subject. However, there is not much difference between them while answering questions related to the sensation of sleepiness during daytime or those questions about the number of awakenings during the night.

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	PARENTS			STUDENTS		
	BASAL % (N)	SEGMENT % (N)	SIG.ES	BASAL % (N)	SEGMENT % (N)	SIG.ES
PROBLEMS TO FALL ASLEEP	13,1 (521)	6,9 (390)	YES	7,8 (510)	5,4 (404)	NO
SLEEPY / TIRED	9,0 (520)	2,8 (422)	YES	10,3(486)	4,6 (37)	YES
FREQUENT AWAKENINGS	29,3 (82)	26,1 (88)	YES	7,8 (499)	2,6 (390)	NO
PARASOMNIAS	20,7 (82)	15,9 (88)	YES			

TABLE 74

c) Age group: 13 to 18 year olds.

SEE TABLE 18.

The questionnaires have been answered by the students themselves and we can observe again a decrease on the number of answers positively related to sleep disturbances once the students have followed their families and teachers guidelines and they have assumed their own responsibility for healthy sleeping habits. All of the answers are significantly relevant statistically except the answer about night awakenings, which cannot be taken into account because there was a loss of answers in the follow-up surveys

1.2. ITALY.

The group of children between 2 to 5 year olds could not be assessed because it was not big enough.

The group of children between 6 to 12 years olds could not be followed and assessed because of the great loss of samples between the initial survey and the follow up surveys. Taking those results into account would mean an alteration of the results.

Age group: 13 - 18 years old.

There is not a decrease on the quantity of affirmative answers. We can even appreciate a slight increase of affirmative answers which indicates sleeping disorders are present. None of the answers are taken into account statistically.

1.3 TURKEY

Age group: 6 - 12 year olds

PARENTS	STUDENTS
---------	----------

	BASAL % (N)	SEGMT % (N)	SIG.ES	BASAL % (N)	SEGMT% (N)	SIG.ES
PROBLEMS TO FALL ASLEEP	26,8 (82)	18,2 (88)	NO	37,5 (80)	22,7 (88)	YES
SLEEPY / TIRED	34,1 (88)	34,1 (88)	NO	32,5 (80)	25,5 (88)	NO
FREQUENT AWAKENINGS	29,3 (82)	26,1 (88)	NO	16,3 (80)	5,7 (88)	NO
PARASOMNIAS	20,7 (82)	15,9 (88)	NO			

TABLE 75

There is not a noticeable decrease of affirmative answers except on the answer related to going to sleep disorders.

By comparing the three countries, it is relevant to see the big difference between the positive results on the Spanish population and the scarce results on the Italian and Turkish populations. The proximity and availability of the medical team, institutional support and the continuous formation have been vital for the good results in Spain and the noticeable difference between countries. On the other hand, there is not a correlation with the findings on the other two scales/questionnaires and the assessment on school performance. This difference justifies the use of the three scales, which value the same events in three different ways.

2) SDSC

The SDSC questionnaire, assesses the quality of sleep of the students polled, globally and in different subscales, it also assesses various aspect of sleep. A global score above 39 indicates a high probability of sleeping disorders. Each subscale, at the same time, has a cut-off point clearly defined. Thus, together with the global assessment, the subscales let us know what kind of sleeping disturbance is taking place on each sample. Due to the objective of this study, we will assess three of the five subscales directly related to school performance and behaviour.

2.1 SPAIN. SILLA.

In the three age groups assessed, there is a decrease, with statistical relevance, on the quantity of students who exceed the cut-off point, in the global assessment of the SDSC in the follow up test. Such results mean that, at the end of the Project both parents and students have the feeling that their quality of sleep has improved. In that way, from a global point of view, students from the three groups of age, have personally noticed an improvement on their quality of sleep after following the healthy sleeping habits guidelines. The improvement is significantly important in the age group of students between 13 and 18 years old. The investigators thought the most noticeable improvement would take place in the intermediate age group, students aged between 6 and 12, who are the ones stick to parental rules at home. That assumption could not be proved.

In the subscale which assesses the problems related to the beginning and continuation of sleep in teenagers, there is a clear improvement on the quality of sleep: There is an 85.5% of answers in the third survey, in relation with the basal survey, the percentage of students who exceed the cut-off point, which is an indicator of a poor quality of sleep, decreased from 22.5% to 12.3%. We find the same situation on the subscale assessing Excessive Day Sleepiness (SDE).

Although within the group of students aged between 6 and 12 there is a discreet increase (from 3.4% to 4.2%) without statistical significance, we can see that, within the group of students aged between 13 and 18, the decrease on the percentage of the students who suffered from Excessive Day Sleepiness (SDE) has statistical significance, going down from a 27.0% in the basal survey and the 13.5% on the third survey.

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One of the factors which most influences the school performance is the frequency of arousal disorders (nightmares, terrors...) Both in the age group 6-12 years old (21,3% in the basal survey and 15,2% in the third survey, with 77,1% of surveys in comparison with the basal one) and in the age group 13 -18 years old (36,5% versus 24,6% with 85,5% of surveys in comparison with the basal one) the decrease on the number of those disorders has got statistical relevance. The scientific evidence available shows the influence of the quality and duration of sleep on arousal disorders, which means the decrease on arousal disorders would be directly related with the better results obtained on the global scale.

Finally, we find a similar situation on the subscale of transition to sleep-wakefulness disorders, in which a clear decrease can be seen especially between 6 - 12 year olds and 13-18 year olds, both results with statistical relevance.

The assessment of the SDSC scale in students from Silla, with a simple which reinforces the statistical result, shows a clear trend of an obvious decrease of sleeping disorders after the implementation of healthy sleeping habits guidelines

2.2. ITALY.

In the assessed age groups (6 - 12 and 13 – 18 years old) we can see a decrease on the percentage of students who exceed the cut-off point, that is to say, once more we verify a global improvement of the quality of sleep. However, the scarce number of samples aged between 6 and 12 influences the assessment of that age group. Students aged between 13 and 18 the decrease (53.1% versus 46.4%) of the number of students with problems related with sleep, set a clear trend of sleep disorders decrease, although the results have not statistical relevance. At this stage it should be pointed out that, in previous literature, in this age group the tendency throughout the teenage years is the opposite: the increase of sleeping related disorders during the teenage years⁽²²⁾.

It should also be noticed the obvious contradiction between data on the subscale which assesses the problems related to the beginning and continuation of sleep, which shows an increase of nearly one point (10,5% versus 11,8 %) on the follow up survey and the subscale that values Day Excessive Sleepiness that shows a decrease, although without statistical meaning, on the follow up survey (25,9% vs 21,8% of a total of 110 samples) has not been justified in this case by an improvement of the subscale of transition to sleep-wakefulness disorders because, in this case, the problems remain or there is even a small increase.

The design of the study (descriptive study) does not allow us to reach cause-effect conclusions.

2.3. TURKEY.

This population assesses exclusively students aged between 6 and 12 years old.

The situation in the samples from Ünye, Turkey, is similar to Remedello's, Italy. It is clearly seen that there is a decrease on the number of students who exceed the cut-off zone in the follow-up survey (65.5% versus 61,4%) which indicates there is a slight global improvement on the quality of sleep. It should also be noticed the obvious contradiction between data on the subscale which assesses the problems related to the beginning and continuation of sleep, which shows an increase of one and a half points (19.0% versus 20.5 %) on the follow up survey and the subscale that values Day Excessive Sleepiness that shows a decrease, although without statistical meaning, on the follow up survey (35.7% versus 30.7%) of a total of 88 samples. The decrease has not been justified in this case by an improvement of the subscale of transition to sleep-wakefulness disorders because, in this case, the problems remain or there is even a small increase.

Summary by countries.

SDSC		GLOBAL(%)		ESD (%)		Start-continuing (%)	
		Basal	Follow-up	Basal	Follow up	Basal	Follow up
SPAIN	2-5 year olds	44,3	34,4	4,3	2,1	7,4	6,9
	6-12 year olds	29,8	21,5	3,4	4,2	7,5	6,3
	13-18 year olds	63	40,9	27	13,5	22,5	12,3
ITALY	6-12 year olds	31,3	5,6	4,2	0	2,1	0
	13-18 year olds	53,1	46,4	25,9	21,8	10,5	11,8
TURKEY	6-12 year olds	65,5	61,4	35,7	30,7	19	20,5

TABLE 76

In the global score there is a tendency of improvement in the three countries and in every age group whereas in the ESD scales and in the subscale of transition to sleep-wakefulness disorders the results for each country and age groups are significantly different

3) SSR

3.1 SPAIN. Silla

Two aspects stand out: the increase on the sensation of having a sleeping disorder in both age groups (6-12 year olds and 13-18 year olds) specially in the think they have got a sleeping disorder on the basal survey and 92.6% also think so in the follow-up survey, which is statistically relevant) and the increase, also in both groups, of the amount of students who finally decide by themselves when they must go to bed. They assume this matter as a personal decision by following the guidelines of healthy sleeping, which was one of the initial goals of

the Project. Students get the power to decide and take the habit of sleep as a personal responsibility.

Although the design of the study does not allow us to discover the real cause for such positive changes, they really show there is room and need for investigation about sleep and to find out if the importance of learning about sleep and rest is directly related to the increase of the sensation students get of having a sleeping disorder. However, the extra knowledge about sleep and good guidance do not improve the pleasure of sleeping. In both age groups the answer to the question ‘Do you like getting to sleep?’ is mainly negative.

The SSR verifies, on the other hand, an improvement on the subjective sensation of our quality of sleep through the study within both age groups, and creating better sleep routines in the 6 to 12 years old group, and special decrease on the levels of anxiety about sleeping in the group of students aged between 13 and 18. (SEE FIGURES 33 and 34).

3.2 ITALY.

The Italian results are very similar to those found out in Spain, in the three questions. Interesting to see the results of the subscale ‘anxiety related to sleep’ in the 6 to 12 years old group. SEE TABLE 50 and FIGURE 42.

3.3 TURKEY.

According to the samples in the basal survey, 72.2 % indicate that parents set up bedtime. On the contrary, in Italy, only 24.2% of the samples indicate that parents set up their children’s bedtime. However, in Spain, 83.7% of students said that their parents told them what time they should go to bed. Once again, we see an empowering attitude in students, after getting extra information and guidance, in order to decide what time they should go to bed (see TABLE 68). Once again, the answer to the question ‘Do you like getting to sleep?’ is negative.

In this case, there is not any difference between the basal survey and the follow up survey regarding to any improvement of the four parameters that this scale measures: routines, anxiety, quality and refusal to sleep.

Summary Table by countries (TABLE 77) shows similar results in the three countries:

SDSC		Student says bedtime		Sleeping Problems		Start-continuing (%)	
		Basal	Follow-up	Basal	Follow up	Basal	Follow up
SPAIN	6-12 year olds	9,3	12,5	82,7	92,6	67,8	67,1
	13-18 year olds	65	70,3	87,4	90,1	88,9	89,4
ITALY	6-12 year olds	2	5,6	93,8	100	89,8	83,8
	13-18 year olds	0,7	1,8	88,9	86,4	95,1	94,5
TURKEY	6-12 year olds	24,1	41,6	69,6	70,5	89,9	87,5

TABLE 77

4) SCHOOL PERFORMANCE

Due to the differences in the way teachers mark students' performance in the three countries, the concept of school performance has been unified by classifying it into: good performance, intermediate performance and bad performance.

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We are going to consider as the 'target group', those students who have performed badly in the basal survey.

4.1. SPAIN.

In the three age groups there is a downward trend in the number of students with bad school performance, although it has no statistical meaning. SEE TABLE 27.

The behaviour at the moment of the survey (good, fair, bad), in both groups, children aged between 2 and 5 and children aged between 6 and 12, has significant effects on the results. In children aged between 2-5 years old, the percentage of children with good behaviour rises considerably on the second and third survey, compared with the basal survey. Within the group of children aged from 6 to 12, it seems that there are more children who modify their behaviour from bad to fair. In that way, there is a rise on the average school mark if we compare the basal survey (7.1 out of 10 points) with the latest surveys (7.45 out of 10).

FIGURE 50 shows the results related to behaviour in children aged between 2 and 5 in Silla, Spain.

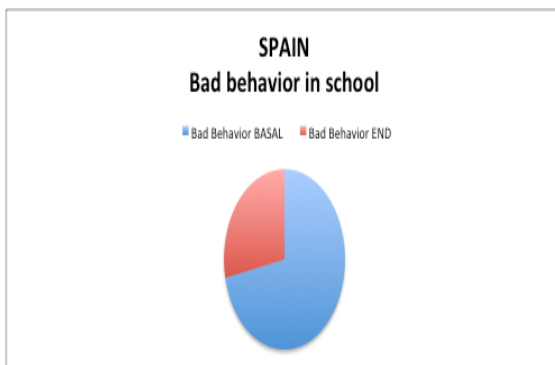


FIGURE 50

4.2. ITALY.

In Italy, within the samples studied, age group 13-18, the results show a noticeable decrease on the number of students classified under a bad performance at school. Figures go from 30.0% in the basal survey down to 14.6%, $p < 0,013$.

4.3. TURKEY.

In both surveys, basal and follow-up survey, 100% of students are classified under the label 'good performance'.



CONCLUSIONS

Once the data obtained has been analysed we can reach some conclusions:

- There is an improvement in the quality of sleep in students from the three countries after implementing the guidelines decided by teachers and parents. This global improvement shows differences between the samples of the three countries
- Throughout the Project the students have increased their degree of self-responsibility when deciding their own sleeping times. Such empowering has not led students to have the sensation of Excessive Daytime Sleepiness. On the contrary, there has been a decrease of such sensation, moreover students have generally improved their school marks, especially in the case of Spain.
- The involvement of teachers in the Project by designing themselves the guidelines to be applied in class and also being in charge of the implementation at school and at home, has proved to be the key for success. Their task has been learning and introducing the measures in their daily timetable, during their lectures in a continuous way, for more than a year and a half, after their training. Teachers really understood what the project was about and they did a wonderful work. Moreover, the choice of a group of students who have collaborated closely with teachers by designing and sharing the guidelines of healthy sleeping habits with the rest of the students, has also been a distinguishing factor for raising awareness about the importance of sleep for school success.
- The asymmetry of some answers and the fact that students from Silla have obtained better results because of the quality of the project monitoring, shows that SHASTU project needs strict guidance and direct and constant contact with doctors. Teachers and health professionals must work together, not to mention the important role of the institutional support.

This work presents some limitations which need to be estimated:

- The study has been assessed in a very subjective way by means of questionnaires which were not officially validated in Spanish, Italian and Turkish.
- The results for some age groups could not be assessed because of the scarce number of students / families involved. En determinados grupos de edad no se han podido valorar los resultados por el escaso número de alumnos participantes.

Nevertheless, the initial premise has been confirmed and the answers to the three initial questions are affirmative. In this way, the researchers believe that extra knowledge about rest and healthy sleeping habits, together with measures to respect our chronobiological rhythms are cost-efficient. The SHASTU guidelines should be taught and implemented in schools in the European Union, in order to lead the next European generations into a healthier and happier future.

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