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Impact of television on the quality of sleep in preschool children

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ABSTRACT

Objectives: We aimed to investigate the impact of different habits concerning television (TV) use and the time of day in which TV is watched on the sleep quality of young children.**Methods:** Parents of 100 healthy children (58% boys, mean age of 2.7 ± 1.5 years) attending a routine health check completed the Sleep Disturbance Scale for Children (SDSC) and a questionnaire concerning TV and electronic media use. Children were divided into those with a normal (SDSC-) or abnormal (SDSC+) questionnaire score. TV viewing habits were compared between groups.**Results:** The total sleep time and total TV viewing time were not different between groups. A TV set was inside each child's bedroom in 51% of participants. Children with a TV in their bedroom showed significantly higher scores in the "sleep terrors," "nightmares," "sleep talking," and "tired when waking up" responses of the SDSC ($P = 0.02, 0.01, 0.01, \text{ and } 0.01$, respectively). Children with a TV in their room had an odds ratio (95% confidence interval) of 3.29 (1.08–9.99) for having an abnormal SDSC. Evening TV viewers had significantly higher SDSC scores compared with those who watched TV earlier during the day ($P = 0.04$).**Conclusions:** The presence of a TV set in the child's bedroom was associated with significant reductions in the quality of young children's sleep. Evening exposure to TV was associated with significantly worse sleep quality.

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1. Introduction

Television (TV), computers, smartphones, tablets, video game consoles, and other electronic media devices have become increasingly available for children and adolescents. Children and adolescents have also increased their exposure to media, raising the number of hours per day watching TV [1], surfing on the Internet, or playing video games [2]. In recent surveys, almost 100% of all adolescents in the US had at least one electronic device in their bedroom: 57% had a TV set, 28% a computer, 90% music players, and 64% cell phones [2,3]. Electronic devices have become more lightweight and portable; children can take a small tablet or smartphone everywhere with them, even to bed before going to sleep or during the night. Parental control seems to be far more difficult considering the omnipresence and small size of electronic devices [4].

The extent to which this sharp increase in the use of electronic media and TV may affect children's sleep has been demonstrated by several studies in older children and adolescents [5–7]. The use of multiple electronic devices and TV may even worsen the effect on the quality of sleep [8]. Furthermore, screen time has been associated with a decrease in the total hours of sleep time [9,10].

There are several possible mechanisms for linking sleep disruption to the use of TV. The most evident cause is the displacement of sleep initiation due to more and later use of TV viewing [2]. However, the exposure to the light emitted from TV screens or from other electronic devices may affect the natural circadian rhythm in children [2,11,12].

In toddlers and preschool children, TV viewing seems to be more consistently associated with emotional and peer relation problems than an e-game or computer use [13,14]. Despite findings that these young children are apparently spending even more time viewing TV than older children, there have been fewer studies on the impact of media use on sleep for this age group [4].

Considering that early childhood is a phase of progressive neuronal myelination and maturation of their cerebral cortex, the impact of TV on the quality of sleep is especially a concern. As sleep disorders have significant effects on the neurocognitive development

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of young children [15], the exposure to factors that may affect the normal circadian rhythm or sleep quality is of concern. Despite previously published evidence on the negative effects of TV and electronic media on the sleep quality of schoolchildren [16] and adolescents [2,17], there is still a lack of information on younger preschool children. In the present study, we aimed to investigate the impact of different habits concerning TV use and the time of the day when it is watched on sleep quality specifically in young children (ie, toddlers and preschoolers).

2. Methods

2.1. Subjects

Sampling consisted of healthy children aged 1–6 years who attended a health supervision check in the pediatric outpatient clinic of the Pontificia Universidad Católica de Chile in Santiago, Chile. Subjects were recruited from January 2013 to January 2014. The Chilean health supervision system is designed to provide routine health checks to all children on a regular schedule, that is, every month until the 6th month, then every two months until the first year, and subsequently every 3–4 months. Families were contacted in the waiting room before the health check. Parents completed two questionnaires before being called by their pediatrician. If the mother or father was not present, we accepted the grandmother having filled in the questionnaire if she was the primary carer for the child during most of the day. This was considered acceptable as in Chile it is quite usual for grandmothers to stay with their grandchildren while the parents are working, often until late in the evening. Grandparents frequently take the grandchildren to the doctor, feed them, and are aware of the child's habits. No randomization or preselection was intended. Children were included if (i) they were healthy, (ii) received no medication, and (iii) the parents consented and completed the study questionnaires. Children with any acute or chronic respiratory, cardiac, metabolic, or neurologic diseases were excluded.

Parental education was investigated separately for either parent. If the grandmother answered the questionnaire, we asked her to answer questions referring the education of the child's parents. The highest graduation level from school was scored on a four-point rating scale using "no graduation/primary school," "secondary school," "high school," and "college/university." The completed questionnaires were then returned to the investigator. The present study was approved by the ethical board of Pontificia Universidad Católica de Chile.

2.2. Sleep disturbance scale for children

The Sleep Disturbance Scale for Children (SDSC) is a 26-item questionnaire [18], with answers based on a Likert scale with values from 1 to 5. The SDSC consists of six subscales: disorders of initiating and maintaining sleep (DIMS), sleep-breathing disorders (SBD), disorders of arousal (DA), sleep-wake transition disorders (SWTD), disorders of excessive somnolence (DOES), and sleep hyperhidrosis (SHY).

The original version of the SDSC was validated in 1157 healthy children [18], and it has been used in several studies and for other ages [19–22]. The Spanish version [23] was adapted and applied to the parents of subjects participating in the current study. SDSC provides a total score that ranges from 26 to 130. A total SDSC score of >39 was considered abnormal [18]. Children were divided into those with an abnormal SDSC questionnaire score (SDSC+) and those with a normal score (SDSC-).

2.3. TV questionnaire

Parents were asked about the total hours of TV their children viewed, and also about their use of audiovisual media such as

smartphones, tablets, or computer games. In addition, they were asked about the quality and content of the programs watched by their children. There were 20 questions in total concerning the use of TV and audiovisual media. The types of TV programs were assessed and categorized as children's programs (educational, fairy tales, music shows), or action/violent content (eg, action, police movies, series, news, etc.). The number and location of TVs – inside or outside the child's room – were investigated as well.

The influence of the time of day at which TV was switched on and off was specifically investigated. Children were divided into three TV viewing groups depending on the times of day they typically watched: predominantly morning (06:00–13:00), afternoon (13:00–20:00), and evening (after 20:00).

2.4. Statistics

Descriptive statistics were used to outline subject characteristics, and the results of the questionnaire. Mean \pm standard deviation (SD) as well as median (minimum and maximum) were used to describe normally, and non-normally distributed variables, respectively.

Comparisons between SDSC+ and SDSC- were then made using the Student's *t*-test (for normally distributed variables) and the Mann-Whitney *U*-test (for non-normally distributed variables). Percentages were compared among the groups using chi-squared statistics.

In addition, correlations between each SDSC subscale's score and hours of watching TV were calculated using Spearman's rank correlation coefficient r_s .

Odds ratios (OR) and their 95% confidence intervals (CI) for having an abnormal SDSC score as the dependent variable were calculated using logistic regression analysis. The independent variable was the location of TV (ie, a TV set inside the child's room). The model was adjusted by age, gender, and maternal educational level.

Analysis of variance (ANOVA) was used in order to compare the SDSC total score and subscale scores between TV viewing groups. The Bonferroni test was used for multiple-comparison correction. A *P*-value of <0.05 was considered to be statistically significant. All analyses were performed using Statistical Package for Social Science (SPSS) Statistics 20.0.

3. Results

Of $n = 110$ initially recruited children, $n = 6$ had to be excluded from the study as they were using medication. Four of the completed questionnaires had to be excluded as they were not complete, leaving $n = 100$ finally included subjects. All included children were from Hispanic origin.

Table 1 reports details on demographic characteristics of the study sample. Most questionnaires were answered by children's mothers (76%), only a few by their fathers (3%), with those completed by both parents (8%), or their grandmother (13%) making up the balance. Of the total sample, 58% were boys; their mean age was 2.7 ± 1.5 years. Of the included children, 53% went to a kindergarten or school, and 73% of their mothers had a high educational level, that is, college/university. During weekdays, 6% of the children went to bed before 20:00, 27% between 21:00 and 22:00, 40% between 22:00 and 23:00, and 27% after 23:00. On weekends, corresponding figures were 7%, 11%, 32%, and 50%, respectively.

TV was switched on for an average of 2.5 ± 0.9 h/day. There was only one family (1%) without a TV set in its household, whereas the majority (82%) had more than two TVs at home. A TV set was inside the child's bedroom in 51% of the included subjects. Sixty percent reported having used the TV as a sleep routine before going to bed. Video games were played by 7% of the children, and 11% used the parental smartphone for playing.

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