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# Sleep Patterns in Infancy as a Predictor of Insomnia in College Students

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The purpose of this study is to determine whether sleeping patterns as an infant predict sleeping patterns in adulthood. More specifically, this study focuses on whether lack of routine schedules and not learning self-soothing techniques is associated with insomnia and frequent napping as an adult. The topic compares sleep patterns between two very different age groups, infants and adults. Age comparisons are a natural change occurring over time, which relates to developmental psychology. Past research on sleep has provided information about the various sleep habits for infants, information about insomnia, and the importance of good sleep habits to live a healthier and happier life.

Infant sleep behaviors and techniques for putting an infant to sleep are described in a book by Leach (1987). The strategies include leaving the infant to cry, staying with the child until sleep is inevitable, and a compromise between the two extremes. Leach emphasizes the importance of a routine and making sure the child does not feel completely deserted, which is the balance between the two extremes. She encourages parents to be there for there children, but to demonstrate that they are "completely boring" at this time of night (1987, p. 300). This uninteresting presence lets a child know that they are loved, but that it is time to go to sleep. Once the child realizes that their mother will not play, he falls into the routine and allows himself to fall asleep on a schedule every night. This routine is important for developing lasting sleep habits.

Infants can be labeled as "night wakers," meaning that when they awake in the night they cry for their parents (Anders, 1985). Others are labeled as soothers, these infants can relax themselves and fall back asleep. A work by Spock and Rothenberg specifies the different categories of "night wakers" and similar sleeping problems (1985). Spock and Rothenberg made

categories for sleep difficulties which include "chronic resistance to sleep in infancy - going-to-bed type," "waking-in-the-night type," and "the spoiled baby who vomits (1985, p. 250). With the "going-to-bed type," parents must walk around with their child for an extended period of time before it will fall asleep. The "walking-in-the-night type" goes to bed normally but wakes one night with pain or anxiety, then repeats the behavior to gain attention on succeeding nights. The "spoiled baby who vomits" is also a learned response by the infant. When the infant vomits, parents are at its side helping it to recover, they then repeat the habit to obtain the same affection and care. In each of these cases the infant is looking for care from parents instead of using self-soothing techniques to fall asleep. Regular sleep patterns are important development in children (Anstead, 2000). Both of these aspects, having a bed-time routine and learning self-soothing techniques, are important to sleep quality in infancy. They provide infants the tools to sleep more effectively. These methods are also important in adulthood, and the absence of them may relate to problems in sleeping.

Insomnia is defined as inadequate or poor sleep based on quality of sleep, number of wakings in a night, length of time sleeping, and length of time spent awake during the night (Vincent et. al. 2006). Causes of insomnia can be transient or chronic (Schenck, 2008). Transient insomnia is related to sickness, stress, and traveling. Chronic insomnia is a disruption in sleep every night for more than 6 months. If untreated, insomnia can increase the risk for severe depression. When patients are treated for insomnia, they often report little change, even when sleep patterns improve. These poor sleep habits are also correlated with anxiety and increased worrying (Jansson-Fröjmark & Lindblom 2008).

The impact of insomnia is severe. The lack of sleep can cause several negative results during the day (Schenck, 2008). These include soreness in the body, feeling tired, having a hard

time concentrating, an inability to remember things, not feeling motivated, low productivity and being short-tempered. Social problems may also occur due to insomnia. Problems in relationships, with family members, in friendships and with coworkers are all likely to occur. Another effect of insomnia, chronic sleep loss, is an extremely dangerous consequence to the disorder. Feeling overwhelmingly tired increases the probability of car and industrial accidents. Also, negative health impacts such as an inability to control weight and coronary heart disease are related to chronic sleep loss. It is clear that insomnia is dangerous, unhealthy, and continuously impacts those who suffer in all areas of their lives.

Another aspect of poor sleep is daytime sleep, or napping. Research by Link and Ancoli-Israel suggests that this habit is correlated with lower GPAs in high school students. This is because sleep is related to cognitive functioning (Howell et. al. 2004). Low quality in sleep is reported by approximately 15% of college students. Almost all young adults tend to feel worn-out in the morning, even when they've had an average night of sleep. Also correlated with sleep patterns is physical activity (Atkinson 2007). Typically, a person falls asleep when their body temperature is lowering and wakes up when their body temperature is rising. Research has shown that physical activity helps to facilitate this sleep-wake cycle. Sleep quality is clearly a dynamic topic that is affected by many factors. The overall quality of sleep one experiences could be disrupted by any number of these variables.

Sleep quality includes both quantitative and qualitative aspects of sleep (Buysse et. al., 1988). Length of sleep, the number wakings in a night, and restfulness of sleep all make up sleep quality. I plan to use the Pittsburgh Sleep Quality Index (PSQI) to rate the quality of college students' sleep both now and as an infant. This scale is useful because it is a dependable standardized index of sleep. It has been tested several times and provides both an easily

understood and practical evaluation of sleep. Questions in the PSQI have originated from clinical experience with patients with sleeping problems, meta-analyses of other sleep quality scales, and experience using the PSQI in clinical settings.

Although a wide variety of research has been done on sleep patterns for many age groups, more research needs to be done to address this specific topic. Missing from the research is a developmental study of how sleep patterns in infancy, or at a young age in general, impact sleep quality in adulthood. I chose to design this study because I have observed diverse sleep patterns of college students. I wanted to know if poor sleep habits are correlated with sleep patterns in infancy because my experience as a nanny has exposed me to many sleep behaviors in infants and toddlers. I am curious to see if a baby with sleeping difficulties usually ends up having sleep problems in adulthood.

I plan on surveying 75 college students about their sleep habits over the past month. I then would mail their caregiver a separate survey to learn about and their sleep habits as an infant. Caregivers would be designated by the student to make sure we survey the main provider of care during infancy and young childhood. I would then match these results to see if they are correlated. I predict that college students that score high on the PSQI will also score high on the caregiver survey. This means that students that have poor sleep quality now most likely had low sleep quality as an infant as well. I also predict that college students who score low on the PSQI will also score low on the caregiver survey. These sleep quality of these students would be high, and their infancy sleep quality score would most likely also be high. Poor sleep quality is likely to have been derived from the lack of a routine schedule in infancy and the absence of self-soothing techniques. These students probably experience more symptoms of insomnia, including negative stressors and health effects. Conversely, higher sleep quality is probably a result of

caregivers using a routine schedule and encouraging infants to soothe themselves when upset. These students are probably less stressed out overall and are probably healthier overall.

## Methods

*Participants*

For this study, college students from a large public university in a Midwest town would be used. Participants would be both male and female undergraduate students who are 18- to 23-years old and of all ethnic backgrounds. The socio-economic status of participants would most likely be middle to upper class. After the initial study, more research would need to be done in order to test the generalizability of the study in low-income areas. Subjects would be recruited to take a 10 minute survey for a monetary reward of $5. An extra $15 would be awarded to students who are able to recruit a parent or caregiver to take part in a survey about their child as an infant. Therefore, there would be no monetary reward for parents except that their child is receiving funds. Seventy-five college students would be surveyed, in hopes that all or most would obtain a survey from a parent or caregiver as well. Therefore there would also be adult participants in the study who cared for the college students when they were infants.

These caregivers would most likely be between the ages of 35- to 70-years old and of both sexes. Even though it is anticipated that both sexes would be included, there would probably be more female caregivers in this study because of the strong gender roles in our society. The socio-economic status and ethnicity of caregivers would most likely mirror that of their children, so no drastic differences between the groups would be expected.

College students would be selected through advertising on campus. Flyers would be posted in academic buildings where students have class, coffee shops, and any public posting place. The advertisement would describe the study briefly and include information about who

can participate. The flyer would also the $5 compensation for participation and the extra $15 for parent or caregiver participation, for a total of $20 possible. A contact e-mail would be provided to register for the survey or to obtain more information. A website link would also be available for students to share information with their parents more easily. This website would contain information about participation in the study, ethical guidelines, goals of the study, and benefits to this research.

Subjects would read and sign an informed consent form before beginning the survey. They would be able to take a copy of this form with them when they leave. Two consent forms would also be mailed with the survey to parents and caregivers, one form for them to keep and one for them to return with the survey. The data from caregivers would only be used if the consent form was signed and returned before the results are calculated. Because the study will not use deception, there would be no need for extensive debriefing. At the end of the study the subject would be asked if they have any questions or concerns and would then be able to leave unharmed.

*Materials/Procedures*

This study is longitudinal because the same population is being studied from one period of time to another. The main difference is that college students will be interviewed and their parents will be asked to respond to questions about these students when they were infants. This makes the study retrospective as well. The surveys will be taken by participants in a classroom on campus, where a proctor can distribute and collect surveys from students. The survey will take 5-10 minutes for students to complete. They will be compensated with the first payment of $5 whether or not they finish the survey. This measure is necessary in case any of the questions should happen to make a student feel uncomfortable. Students will provide us with a home

address so we can mail their caregiver a survey as well. This survey will include a self-addressed stamped envelope to return the survey and consent form to us. The total scoring time of each survey will take 5-10 minutes.

*Measures*

I chose to use the Pittsburgh Sleep Quality Index for this study (Buysse, 1988). This sleep quality scale includes questions about the quality of sleep over the last month using a self-report method. The index includes 19 questions that are self-rated and five questions rated by a roommate. I will only be using the primary 19 questions for this study because not all college students have roommates and the roommate questions were not used to score sleep quality in the original PSQI. They were purely used for informational purposes. The survey used for this study, the PSQI, is included in the appendix (Appendix A).

The questions in the PQSI focus on a wide range of sleep behaviors and qualities. Some are about sleep duration and latency, which is the number of times a person wakes up in a night. Other questions ask how often sleep problems occur and how intense the problems are. The questions are composed into seven groups, each group is balanced on a scale from 0-3. The components to sleep, which make up each group, are “sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications and daytime dysfuntion” (Buysee, 1998). The seven groups are then added to make a total PSQI score, ranging from 0-21 points. Excellent sleep quality is indicated by low scores, where as poor sleep quality is specified by higher scores. An illustration of scoring procedures can be found in the appendix (Appendix B).

Each individual student would then be compared with the survey from their caregiver. Only results from students who had a caregiver return a survey would be used. Hopefully at

least 50 parents and caregivers would return the survey, allowing for a total sample size of 50. In order to score quality of sleep as an infant I have created my own survey. The caregiver questions would be specifically about the student's sleep habit as an infant. Some examples of questions on the survey include: "on a scale from 0-3 (0 being never and 3 being always) did you put your infant to bed at a different time each night?," "how often did your infant nap irregularly?," and "how often did you pick up your infant when they cried in their crib at bedtime or naptime?" All seven questions in the caregiver survey would be rated on a scale from 0-3. The numeric score from these questions would be added up to create an infancy sleep quality score, with possible scores ranging from 0-21 points, similar to the PSQI score. Lower scores would indicate good sleep quality as an infant, higher scores would indicate poor sleep quality as an infant. The caregiver survey can be found in the appendix (Appendix C).

## Data Analysis Plan

The overall design of this study would be a correlational. This is because I am comparing two continuous variables. The independent variables would be sleep quality score as in infancy and sleep quality score as an adult. The dependent variable is age. I plan on using a correlation test to find out whether or not scores in infancy and adulthood are related. The comparisons to perform would include matching up each individual's sleep quality score as an infant and as a college student. This information could be displayed on a scatterplot as shown in Figure 1.

I would expect to find that students scoring high on the PSQI would also score high on the caregiver survey. These results would confirm that poor sleep quality in infancy is correlated with reduced sleep quality in college. I would also expect to find that students scoring low on

the PSQI would have lower scores on the caregiver survey. These students would have had high sleep quality as an infant and in college, confirming my hypothesis.

These findings would be important because parents and caregivers would realize that the sleep habits they teach their children early on will probably impact them for the rest of their lives. This would result in better sleep habits being taught and learned, allowing more children and adults to grow up without the harmful effects of insomnia. Sleep quality is a predictor of several important life factors, and it is important to provide infants with proper tools to face the already challenging world.

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# Appendix A

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## PITTSBURGH SLEEP QUALITY INDEX (PSQI)

**Name**_____ **ID#**_____ **Date**_____ **Age**_____

**Instructions:**
*The following questions relate to your usual sleep habits during the past month ONLY. Your answers should indicate the most accurate reply for the majority of days and nights in the past month.*
*Please answer all questions.*

1. **During the past month, when have you usually gone to bed at night?**
   USUAL BED TIME_____
2. **During the past month, how long (in minutes) has it usually taken you to fall asleep each night?**
   NUMBER OF MINUTES_____
3. **During the past month, when have you usually gotten up in the morning?**
   USUAL GETTING UP TIME_____
4. **During the past month, how many hours of *actual sleep* did you get at night? (This may be different than the number of hours you spend in bed.)**
   HOURS OF SLEEP PER NIGHT_____

For each of the remaining questions, check the one best response. Please answer *all* questions.

5. **During the past month, how often have you had trouble sleeping because you……..**

**(a) cannot get to sleep within 30 minutes**

| Not during the past month_____ | Less than once a week_____ | Once or twice a week_____ | Three or more times a week_____ |
|---|---|---|---|

**(b) Wake up in the middle of the night or early morning**

| Not during the past month_____ | Less than once a week_____ | Once or twice a week_____ | Three or more times a week_____ |
|---|---|---|---|

**(c) Have to get up to use the bathroom.**

| Not during the past month_____ | Less than once a week_____ | Once or twice a week_____ | Three or more times a week_____ |
|---|---|---|---|

**(d) Cannot breathe comfortably.**

| Not during the past month_____ | Less than once a week_____ | Once or twice a week_____ | Three or more times a week_____ |
|---|---|---|---|

**(e) Cough or snore loudly.**

| Not during the past month_____ | Less than once a week_____ | Once or twice a week_____ | Three or more times a week_____ |
|---|---|---|---|

**(f) Feel too cold.**

| Not during the past month_____ | Less than once a week_____ | Once or twice a week_____ | Three or more times a week_____ |
|---|---|---|---|

**(g) Feel too hot.**

| Not during the Past month_____ | Less than once a week_____ | Once or twice a week_____ | Three or more times a week_____ |
|---|---|---|---|

**(h) Had bad dreams.**

| Not during the Past month_____ | Less than once a week_____ | Once or twice a week_____ | Three or more times a week_____ |
|---|---|---|---|

**(i) Have pain.**

| Not during the Past month_____ | Less than once a week_____ | Once or twice a week_____ | Three or more times a week_____ |
|---|---|---|---|

**(j) Other reason(s), please describe**_____
_____

**How often during the past month have you had trouble sleeping because of this?**

| Not during the Past month_____ | Less than once a week_____ | Once or twice a week_____ | Three or more times a week_____ |
|---|---|---|---|

6. **During the past month, how would you rate your sleep quality overall?**
   Very good _____
   Fairly good _____
   Fairly bad _____
   Very bad _____
7. **During the past month, how often have you taken medicine (Prescribed or "over the counter") to help you sleep?**

| Not during the Past month_____ | Less than once a week_____ | Once or twice a week_____ | Three or more times a week_____ |
|---|---|---|---|

8. **During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?**

| Not during the Past month_____ | Less than once a week_____ | Once or twice a week_____ | Three or more times a week_____ |
|---|---|---|---|

9. **During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?**
   No problem at all _____
   Only a very slight problem _____
   Somewhat of a problem _____
   A very big problem _____
10. **Do you have a bed partner or share a room?**
    No bed partner or do not share a room _____
    Partner/ flatmate in other room _____
    Partner in same room, but not same bed _____
    Partner in same bed _____
11. **If you have a bed partner or share a room, ask him/her how often in the past month you have had……**

**(a) Loud snoring.**

| Not during the Past month_____ | Less than once a week_____ | Once or twice a week_____ | Three or more times a week_____ |
|---|---|---|---|

**(b) Long pauses between breaths while asleep.**

| Not during the Past month_____ | Less than once a week_____ | Once or twice a week_____ | Three or more times a week_____ |
|---|---|---|---|

**(c) Legs twitching or jerking while you sleep.**

| Not during the Past month_____ | Less than once a week_____ | Once or twice a week_____ | Three or more times a week_____ |
|---|---|---|---|

**(d) Episodes of disorientation or confusion during sleep.**

| Not during the Past month_____ | Less than once a week_____ | Once or twice a week_____ | Three or more times a week_____ |
|---|---|---|---|

**(e) Other restlessness while you sleep: please describe**_____
_____

| Not during the Past month_____ | Less than once a week_____ | Once or twice a week_____ | Three or more times a week_____ |
|---|---|---|---|

[Buysse DJ, Reynolds CF, Monk TH, Berman SR, DJ Kupfer (1989) The Pittsburgh Sleep Quality Index: A New Instrument for Psychiatric Practice and Research, **Psychiatry Research**, 28: 193-213].

# Appendix B

**Scoring Instructions for the Pittsburgh Sleep Quality Index**

The Pittsburgh Sleep Quality Index (PSQI) contains 19 self-rated questions and 5 questions rated by the bed partner or roommate (if one is available). Only self-rated questions are included in the scoring. The 19 self-rated items are combined to form seven "component" scores, each of which has a range of O-3 points. In all cases, a score of "0" indicates no difficulty, while a score of "3" indicates severe difficulty. The seven component scores are then added to yield one "global" score, with a range of O-21 points, "0" indicating no difficulty and "21" indicating severe difficulties in all areas.

Scoring proceeds as follows:

**Component 1: Subjective sleep quality**

Examine question #6, and assign scores as follows:

| Response | Component 1 score |
|---|---|
| "Very good" | 0 |
| "Fairly good" | 1 |
| "Fairly bad" | 2 |
| 'Very bad" | 3 |

Component 1 score: _____

**Component 2: Sleep latency**

1. Examine question #2, and assign scores as follows:

| Response | Score |
|---|---|
| 15 minutes or less | 0 |
| 16-30 minutes | 1 |
| 31-60 minutes | 2 |
| > 60 minutes | 3 |

Question #2 score: _____

2. Examine question #5a, and assign scores as follows:

| Response | Score |
|---|---|
| Not during the past month | 0 |
| Less than once a week | 1 |
| Once or twice a week | 2 |
| Three or more times a week | 3 |

Question #5a score: _____

3. Add #2 score and #5a score

Sum of #2 and #5a: _____

4. Assign component 2 score as follows:

| Sum of #2 and #5a | Component 2 score |
|---|---|
| 0 | 0 |
| l-2 | 1 |
| 3-4 | 2 |
| 5-6 | 3 |

Component 2 score: _____

**Component 3: Sleep duration**

Examine question #4, and assign scores as follows:

| Response | Component 3 score |
|---|---|
| > 7 hours | 0 |
| 6-7 hours | 1 |
| 5-6 hours | 2 |
| < 5 hours | 3 |

Component 3 score: _____

**Component 4: Habitual sleep efficiency**

(1) Write the number of hours slept (question # 4) here: _____

(2) Calculate the number of hours spent in bed: _____

Getting up time (question # 3): _____

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- Bedtime (question # 1): _____

Number of hours spent in bed: _____

(3) Calculate habitual sleep efficiency as follows:

(Number of hours slept/Number of hours spent in bed) X 100 = Habitual sleep efficiency (%)

(_____/_____) x 100=_____ %

(4) Assign component 4 score as follows:

| Habitual sleep efficiency % | Component 4 score |
|---|---|
| > 65% | 0 |
| 7564% | 1 |
| 65-74% | 2 |
| < 65% | 3 |

Component 4 score: _____

**Component 5: Sleep disturbances**

(1) Examine questions # 5b-5j, and assign scores for *each* question as follows:

| Response | Score |
|---|---|
| Not during the past month | 0 |
| Less than once a week | 1 |
| Once or twice a week | 2 |
| Three or more times a week | 3 |

#5b score _____

c score _____

d score _____

e score _____

f score _____

g score _____

h score _____

i score _____

j score _____

(2) Add the scores for questions # 5b-5j:

Sum of # 5b-5j: _____

(3) Assign component 5 score as follows:

| Sum of # 5b-5j | Component 5 score |
|---|---|
| 0 | 0 |
| l-9 | 1 |
| 10-16 | 2 |
| 19-27 | 3 |

Component 5 score: _____

**Component 6: Use of sleeping medication**

Examine question # 7 and assign scores as follows:

| Response | Component 6 score |
|---|---|
| Not during the past month | 0 |
| Less than once a week | 1 |
| Once or twice a week | 2 |
| Three or more times a week | 3 |

Component 6 score: _____

**Component 7: Daytime dysfunction**

(1) Examine question # 8, and assign scores as follows:

| Response | Score |
|---|---|
| Never | 0 |
| Once or twice | 1 |
| Once or twice each week | 2 |
| Three or more times each week | 3 |

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Question # 8 score: _____

(2) Examine question t 9, and assign scores as follows:

| Response | Score |
|---|---|
| No problem at all | 0 |
| Only a very slight problem | 1 |
| Somewhat of a problem | 2 |
| A very big problem | 3 |

Question # 9 score: _____

(3) Add the scores for question # 8 and # 9:

Sum of #8 and #9: _____

(4) Assign component 7 score as follows:

| Sum of #8and #9 | Component 7 score |
|---|---|
| 0 | 0 |
| l-2 | 1 |
| 3-4 | 2 |
| 5-6 | 3 |

Component 7 score: _____

**Global PSGI Score**

Add the seven component scores together:

Global PSGI Score: _____

Appendix C

**Caregiver Survey**

*Please rate the following questions on a scale from 0-3, 0 being never and 3 being always.*

Did you put your infant to bed at a different time each night?

0 1 2 3

How often did your infant nap irregularly?

0 1 2 3

How often did you pick up your infant when they cried in their crib at bedtime or naptime?

0 1 2 3

How often did you provide your infant with sleeping medications such as Nyquil when he/she wasn't sick?

0 1 2 3

How long did it typically take your infant to fall asleep once in bed?
*(0 being right away, 3 being a very long time)*

0 1 2 3

How often did your infant refuse to sleep even when it was tired?

0 1 2 3

How difficult were the sleeping patterns of this infant in comparison to other infants?
*(0 being easier than most infants, 3 being more difficult than most infants)*

0 1 2 3

Figure 1