
SleepBeta: Engaging Adolescents and their Parents with Sleep Data

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Abstract

Sleep is an important issue in families. Sleep is critical to remain healthy and perform well in school. However, in the case of adolescents, sleep often gets affected by their lifestyle, e.g., school work, part-time jobs, and extensive use of technologies. In this research, we work with adolescents to explore their sleep patterns and related lifestyle factors. We designed an app, SleepBeta, that allows adolescents to examine possible correlations between sleep and lifestyle data. Through a 3-week field study, we investigate how adolescents use SleepBeta to make sense of their data, and if and how they share and discuss their data with family members. Preliminary findings from 4 adolescents indicate that personal data can help adolescents learn about their sleep and provide reassurance about good sleep. However, none of the participants discussed the data or their insights with family members. As we continue this study, we seek to delve deeper into the social implications of sleep data and possible reasons for sharing or withholding it from parents and peers.

Author Keywords

Sleep tracking; adolescents; personal informatics.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous;

Introduction

Sleep is an important issue in families. Getting enough good-quality sleep is important to stay healthy and to feel well in everyday life. Conversely, lack of sleep can negatively affect our behavior, feelings, social relationships, and how well children and parents perform at school and at work.

Particularly in adolescents, sleep or the lack thereof, can become an issue. Sleep needs and sleep patterns are naturally changing as children grow up. During adolescence, children will want to go to bed later at night and get up later in the morning [2]. Beyond that, the lifestyle is changing during adolescence, and stress at school and through part-time jobs can negatively affect sleep. Several studies warn of technologies, as social media engagement, playing video games, and watching TV can reduce the amount of sleep adolescents get [1, 5]. Spending time with family, on the other hand, can positively impact the sleep habits of adolescents through regular and early bedtime [5].

Hence, the aim of our research is to work with adolescents and their families to explore their sleep habits and perhaps create a greater awareness of the importance of sleep. Unlike the various sleep studies that collect data about adolescents [1, 5], our aim is to empower adolescents by helping them collect and reflect on personal data about their sleep and related lifestyle factors. To this end we designed a web-based prototype, SleepBeta, to collect sleep and lifestyle data, and to help adolescents explore possible relationships between these data, e.g., if they sleep less on days that they feel stressed.

Through this research we are also interested in exploring social relationships around sleep and related lifestyle data. In particular, we are interested if and how adolescents share or discuss their data within the family, as well as if they discuss it with peers.

Sleep Data and Social Relationships

There is a growing body of research on sleep-tracking in HCI [3, 4, 7, 10]. However, this work is predominantly focused on individuals. Some studies have examined the role of social influence through social media (i.e., Facebook) on sleep. These studies either show that social relationships enacted online take away time from sleeping, or conversely that they improve sleep by helping people wind down after a stressful day [9, 12]. However, data on sleep itself is not the issue of these social interactions.

Perhaps, the only study in HCI to address sleep in a social context is the work by Jørgensen et al. [6]. They asked children (aged 9-12) to collect Fitbit sleep and exercise data and to share it with their parents. They found that for some parents it was reassuring to know their child's patterns, and for some children it helped them prove their own case. However, several family members felt uncomfortable with this surveillance approach. Hence, Jørgensen et al argue that "monitoring technology led to fewer opportunities for building trust between the children and the parents because it decreased the children's possibilities for being untrustworthy" [6]p.7]. Monitoring and sharing data removed opportunities for children to act freely and to voluntarily share information about their activities, which in turn took away opportunities for building trust between child and parent.



Figure 1: Screen mock-up of SleepBeta, showing sleep data (i.e., sleep efficiency) for the last month. Blue signifies enough sleep, whereas red (as in the 1st and 4th week) signifies that the user had less sleep than recommended. The information on the bottom highlights correlations with lifestyle factors, indicating a positive correlation with physical activity, and a negative correlation with caffeine.

SleepBeta Design

Inspired by related work we focused on the design of a system that helps adolescents collect and analyse sleep data, and we left it up to the adolescent to decide if and what they want to share with parents or peers.

SleepBeta has been designed to help users explore possible correlations between their sleep data and other lifestyle data, e.g., stress, exercise, caffeine. It is aimed to help people understand if and how what they do in daily life is related to how well they sleep. For example, the screenshot in Figure 1 illustrates a positive correlation between sleep efficiency and physical activity, meaning that on days when the user exercises more they also fall asleep more quickly.

SleepBeta imports sleep and exercise data from Fitbit devices. Additional lifestyle data can be tracked through a diary in SleepBeta. Based on related work on what factors impact the sleep of adolescents [5], we added questions about perceived stress, caffeine, snacking, time spent playing video games, watching TV, social media, time spent with friends, and time spent with family before bedtime. Spearman correlation coefficients were calculated for each pair of variables with missing values pair-wisely removed.

Studies of an earlier version of SleepBeta with adults showed the promise of this approach. These adults were already tracking their sleep and were interested in ways to gain more insights from their data. We found that contextual information about lifestyle data helped these adults make sense of their sleep patterns. Some participants were able to confirm presumptions through data, or to take actions to improve their sleep [8].

Field Study Design

The aim of this study is to explore if SleepBeta helps adolescents explore and understand how their sleep affects their everyday lives, and vice versa. A related question is if adolescents share or discuss their data with peers or family members.

To date we have recruited 4 adolescents (1 female, 3 male, aged 13-17 years). Participants were asked to track their sleep and collect lifestyle data for 3 weeks, with at least 1 week during school time. They received a Fitbit Charge HR device to track their sleep. Based on card sorting activities with each participant at the start of the study, we selected 5 questions that were relevant to their lifestyle which we asked them to track on a daily basis through the SleepBeta app.

We conducted interviews at the start and the end of the field study. During the first interview we discussed lifestyle and sleep habits of our participants. During this interview we also introduced the participants to the Fitbit app and we showed them how to enter and read data on SleepBeta. The second interview was conducted at the end of the 3-week period and focused on their interactions with SleepBeta, i.e., their data, possible insights from the data, and if they shared or discussed their data with others.

The findings here are based on our interview notes and selective transcripts from audio recordings. We hope that these observations will give a flavor of our work. By the time of the workshop we expect to present a more mature understanding based on data from a larger study cohort.

Findings to Date

Examining Sleep

All four participants were interested in learning more about their sleep at the start of the study, and all of them tracked their sleep and lifestyle data throughout the 3 week period. However, the insights gained from SleepBeta from these participants were modest.

Participant 1 perhaps gained most from this study, as he learnt that late night snacking, social media and video games might negatively impact his sleep. However, he inferred these insights from the initial discussion around the card sorting activity about which factors are relevant and might impact his sleep. As a result of this discussion, he started to avoid snacks and video games at night, and hence these possible relationships did not show up in his SleepBeta data.

"What I tried to change – I tried not to eat too late at night, and I tried not to drink water too late at night as well." Participant 1

Participant 4 received reassurance from SleepBeta that his sleep patterns were already healthy. Participant 4 was a competitive rower, keen to learn how he could improve his sleep to improve his performance in training and competitions. From SleepBeta he learnt that he had healthy sleep habits, i.e., that his sleep length was consistently around the recommended average of 9¼ hours. He also observed restlessness over night, but he slept better on days that he exercised. Hence for him SleepBeta provided reassurance, but like all other participants he saw no need to continue tracking.

Participants 2 and 3 gained no significant insights. Participant 2 already slept well, which was confirmed by SleepBeta. Participant 3 on the other hand knew about her irregular sleep patterns, and seeing it on SleepBeta did not change her perspective on sleep.

The participants were not concerned about their abnormal sleep patterns during holidays. All four participants went to bed later at night and they slept longer in the morning, but it did not matter to them or their parents. Hence in the future we will focus on getting participants to track sleep more than just 1 week during their school time to see if they can identify possible relationships between sleep and their performance and stress at school.

Sharing and Discussing Data

Unfortunately, none of the participants reported any data sharing with family members or peers. This is perhaps not surprising, given the modest insights gained by the participants so far.

Based on the observations in related work [6], it is not inconceivable that participant 1 would share his lifestyle changes (no snacks at night, less social media use and video game play late at night) with his parents to gain trust. Likewise, one can imagine that participant 4 might share his observations that he gets the recommended amount of sleep with his rowing coach. Unfortunately, we do not have any evidence for either of these speculations from the interview data.

Conclusions

We are at the start of exploring how adolescents make sense of sleep and related lifestyle data, and how they might share and discuss these data with family

members and peers. While this research is at an early stage, we hope that by the time of the workshop we will have more insights on the social implications of sleep data, i.e., for child-parent relationships.

Two 'data relationships' the authors are especially interested in discussing at the workshop

Firstly, we are interested in data relationships in the context of sleep data that adolescents collect through Fitbit and other consumer devices (sleep time, interruptions, and sleep efficiency) and their interactions with peers, as well as with their parents.

Secondly, in another project we explore self-tracking in the context of upper limb therapy [11]. Here we are interested in the relationship between post-stroke patients and their occupational therapists. In particular, we are interested to explore how the lived experience of patients and the professional experience of therapists are brought to bear to analyse personal data.

Short Personal Biography

Bernd Ploderer is a Lecturer in Human-Computer Interaction at Queensland University of Technology (QUT), Honorary Fellow at the University of Melbourne, and co-founder of Quantified Self Melbourne.

Dr Ploderer's research focuses on social technologies for healthy living. He has examined how people collaborate through social media to pursue their passions and exchange support to quit smoking. His current work aims to support people to manage their health and well-being, i.e., in the domains of sleep and stroke rehabilitation. The research is focused on harnessing data from wearable and mobile applications

and on fostering collaboration between people collecting data, their families, and health professionals.

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