

A Transdisciplinary Toolbox of Methods
to Assess Cultural Beliefs and Practices about Adolescent Sleep

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OVERVIEW

By most accounts, contemporary American teenagers exhibit significant sleep problems. A national study noted that 45% of adolescents report insufficient sleep on school nights and 28% complain they feel “irritable and cranky” due to little sleep (Carskadon, Mindell, & Drake, 2006; National Sleep Foundation, 2006). Over half (56%) of adolescents (15-17 years) receive less than 7 hours of sleep which is below the 8-hour recommendation for this age group (National Sleep Foundation, 2014; Hirshkowitz et al., 2015). Sleep deficits and inconsistent sleep timing generate public health concerns because they place adolescents at risk for a host of developmental difficulties, including risky behavior and substance use, internalizing problems, obesity and academic underachievement (National Sleep Foundation, 2006).

Efforts to improve teenage sleep must acknowledge that sleep, although a biological imperative is also a culturally and socially embedded practice. Sleeping arrangements in the home, bed and wake times, and the value placed upon sleep have strong cultural and moral underpinnings (Shweder, Balle-Jensen, & Goldstein, 1995; Worthman & Melby, 2002). Cultural variations in other daily activities and the social or physical environment of the home can influence the quantity, quality, and regularity of sleep (El-Sheikh, Buckhalt, Mize, & Acebo, 2006). A number of studies suggest that ethnic minority teenagers experience greater sleep problems (e.g., Roberts, Roberts, & Chen, 2002); however, the reasons for these disparities, much like our understanding of social and cultural influences on sleep, are not well understood. Hence research is needed that goes beyond simply demonstrating demographic variations, to provide a deeper understanding of the role of cultural beliefs and practices in teenage sleep.

With support from an NIH OppNet program on “Basic Social and Behavioral Research on Culture, Health, and Wellbeing” (R24HL123014), we established an interdisciplinary team to develop a transdisciplinary toolbox of methods to conduct basic behavioral research on the role of cultural beliefs and practices in teenage sleep. The team included: (1) a developmental psychologist with expertise in the study of the social lives of ethnic minority and immigrant teenagers (Andrew J. Fuligni, Ph.D.); (2) a pediatric clinician and scientist of affective development with expertise in the biology and treatment of teenage sleep (Ronald E. Dahl, M.D.); (3) an anthropologist who is a noted expert on the study of cultural beliefs and practices relevant for child health and development (Thomas S. Weisner, Ph.D.); (4) a neuroscientist with expertise in the development of the adolescent brain, particularly the mesolimbic reward system and the prefrontal regulatory regions (Adriana Galván, Ph.D.), (5) a clinical psychologist specializing in the study and treatment of affective and sleep problems during adolescence (Dana McMakin, Ph.D.), and (6) a developmental psychologist with interests in daily family processes among ethnic-minority youth (Kim M. Tsai, Ph.D.).

We pursued the following three aims:

- 1. Develop and refine a transdisciplinary conceptual and heuristic model of the impact of cultural beliefs and practices on teenage sleep.*
- 2. Inductively develop a new toolbox of methods to study the impact of cultural beliefs and practices on teenage sleep.*

3. Deductively test and refine the new methods, culminating in a finalized toolbox of methods to be used in future empirical and intervention projects.

This manual presents the results of our efforts for dissemination and use by the broader community of researchers and practitioners interested in adolescent sleep: (1) a transdisciplinary conceptual model that drove the development of methods, (2) a qualitative interview of adolescents and parents designed to assess cultural beliefs and practices surrounding sleep, (3) initial quantitative measures of cultural beliefs about sleep derived from the piloting of the qualitative interviews, and (4) sample protocols of the assessment of nightly sleep, daily experience, and diurnal cortisol that can be incorporated with the qualitative interview.

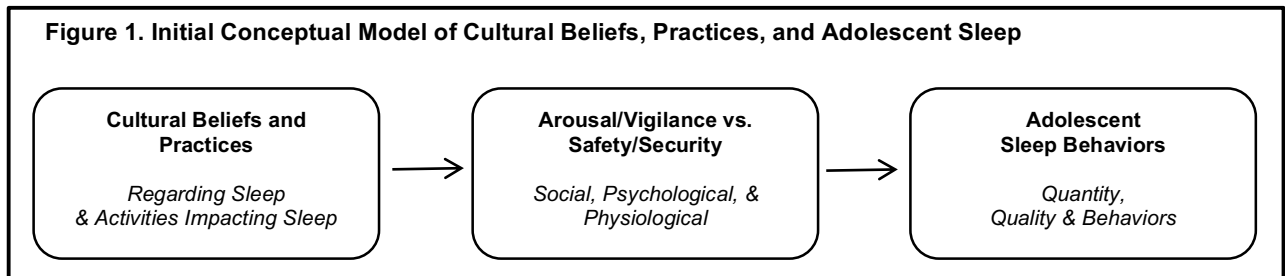
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CONCEPTUAL MODEL

Initial Model and Themes

Prior to developing measures, we believed it to be important to develop and refine a transdisciplinary conceptual model that reflects the insights and perspectives from the different disciplines that have contributed to the study of sleep, and as represented in our research team. As shown in [Figure 1](#), we began with a basic model that emphasizes cultural beliefs and practices that could trigger the opponent-processes of arousal/vigilance and safety/security that shape adolescent sleep.



The model stems from the integration of a neurobehavioral approach to understanding sleep and the developing brain with a social and cultural approach to understanding adolescent experience and family life. It was based on the following four themes.

(1) From a neurobehavioral perspective, sleep and vigilance represent opponent processes.

Vigilance to threat requires waking awareness, responsiveness, and arousal, while sleep requires the opposite (Dahl, 1996). Behaviorally, sleep requires the loss of vigilance, awareness, and responsiveness to the external environment. For ancestral humans, who lived in dangerous environments with many nocturnal carnivorous predators, safety was largely conferred by social groups (Worthman & Melby, 2002). It is not surprising then, that human sleep and vigilance systems evolved in ways that react powerfully to feelings of belonging, connection, as well as the presence of trusted others. That is, social threats and conflicts activate vigilance and arousal, and social support and connection promote feelings of safety and the lowered-arousal states that allow for sleep.

These sleep and vigilance dynamics change across development. At the onset of puberty and across the adolescent transition there are profound changes across all relevant levels: a) there are dramatic changes in sleep (Buchmann et al., 2011; Feinberg & Campbell, 2010); b) changes in arousability within sleep (Busby & Pivik, 1983); c) changes in circadian regulation that influence the timing of sleep and its influence by light and social cues (Carskadon, 2011); d) changes in social contexts that create feelings of safety and threat (e.g., transitioning from family to peers), and e) changes in where and with whom teenagers sleep in the home. It is not surprising that sleep problems increase dramatically across this developmental interval.

(2) Neurologically, the developing affective and regulatory regions of the brain often put teenagers in a state of heightened sensitivity to arousal accompanied by inconsistent regulation of that arousal.

Accumulating evidence from developmental cognitive neuroscience research shows that at the onset of puberty, there are marked neural changes that lead to a heightened state of

arousal during both sleep and awake states. The heightened arousal that is observed in adolescence, and which may contribute to sleep problems, is directly related to changes in the dopamine system during this developmental window. Extant data from rodent and nonhuman primates studies show that reorganization of the dopamine system is a hallmark of adolescent neurobiology. For example, dopamine receptor expression (Andersen, Dumont, & Teicher, 1997), firing rates of dopamine neurons (McCutcheon & Marinelli, 2009), and arousal-related release of dopamine (Laviola, Pascucci, & Pieretti, 2001) peak in adolescence. In humans, fMRI studies have revealed similar U-shaped developmental trajectories in dopamine-rich regions, with peaks in neural activation in adolescents relative to children and adults (Galvan, 2010) for review). These dopaminergic changes are thought to have meaningful consequences for a host of behaviors that characterize adolescence, including shifts in motivation, changes in social relationships and increased sensitivity to environment input. Surprisingly, however, how these dopamine-mediated changes relate to changes in adolescent sleep remains a mystery.

(3) *Socially, adolescents from different ethnic groups differentially engage in activities that increase arousal and vigilance (e.g., socialize with peers, studying) and safety and security (e.g., family meals).*

Adolescents engage in activities and have experiences that both trigger arousal and enhance security, and these practices can differ across ethnic groups. For example, as ethnic minorities, adolescents from Latino, Asian, and African American backgrounds experience higher levels of prejudice and discrimination from adults and peers (Greene, Way, & Pahl, 2006; Phinney & Chavira, 1995), which has been shown to be associated with disturbed sleep among adults with Latin American backgrounds (Steffen & Bowden, 2006). Adolescents from Asian backgrounds are in families with very high levels of academic investments, and these youths tend to enroll in more difficult classes and spend more time studying each day as compared to their peers from other ethnic groups (Fuligni & Hardway, 2006; Larson & Verma, 1999). Indeed, study time accounted for a portion of the lower amount of sleep among the Chinese students in the Fuligni & Hardway (2006) study. Adolescents with Mexican backgrounds tend to come from families with lower socioeconomic backgrounds with higher levels of economic stress, which tends to be associated with higher levels of family conflict and adolescent anxiety and worry (Conger et al., 1992; Parke et al., 2004). The limited economic resources of some families, along with their larger family sizes, makes them more likely to live in more crowded homes in which they share rooms and potentially beds with other family members (Hernandez, 2004). Students from ethnic minority backgrounds may also tend to have long commutes to school in the morning. School commuting time actually was an important reason why the African American students in the Adam et al. (2007) study had less sleep at night compared to students from non-Hispanic White backgrounds.

On the other hand, any observed ethnic differences in sleep problems may not be as great as they could be because of other factors associated with safety and security in adolescents' lives that are beneficial for sleep. For example, adolescents from Latino and Asian backgrounds report similar levels of cohesion and emotional closeness with their parents as do those from European backgrounds (Fuligni, 1998). In addition, a sense of identification with and obligation to the family is stronger among those from Latino, Asian, and African American backgrounds (Fuligni, Tseng, & Lam, 1999; García-Coll & Vázquez García, 1995). This culturally-based familial connection provides a sense of security and

meaning to adolescents' lives, and is associated with more positive affect (Fuligni & Pedersen, 2002; Telzer & Fuligni, 2009). Parental control and monitoring is also higher in some ethnic groups, such as families from Asian backgrounds (Chao & Tseng, 2002). Therefore, despite activities (e.g., studying) that may increase arousal and vigilance, positive features of family climate can nurture important feelings of safety and security necessary for restful sleep.

(4) Families from different cultural groups hold varying cultural beliefs about the importance and practice of sleep, which can shape the extent to which they engage in different practices that create arousal/vigilance and safety/security.

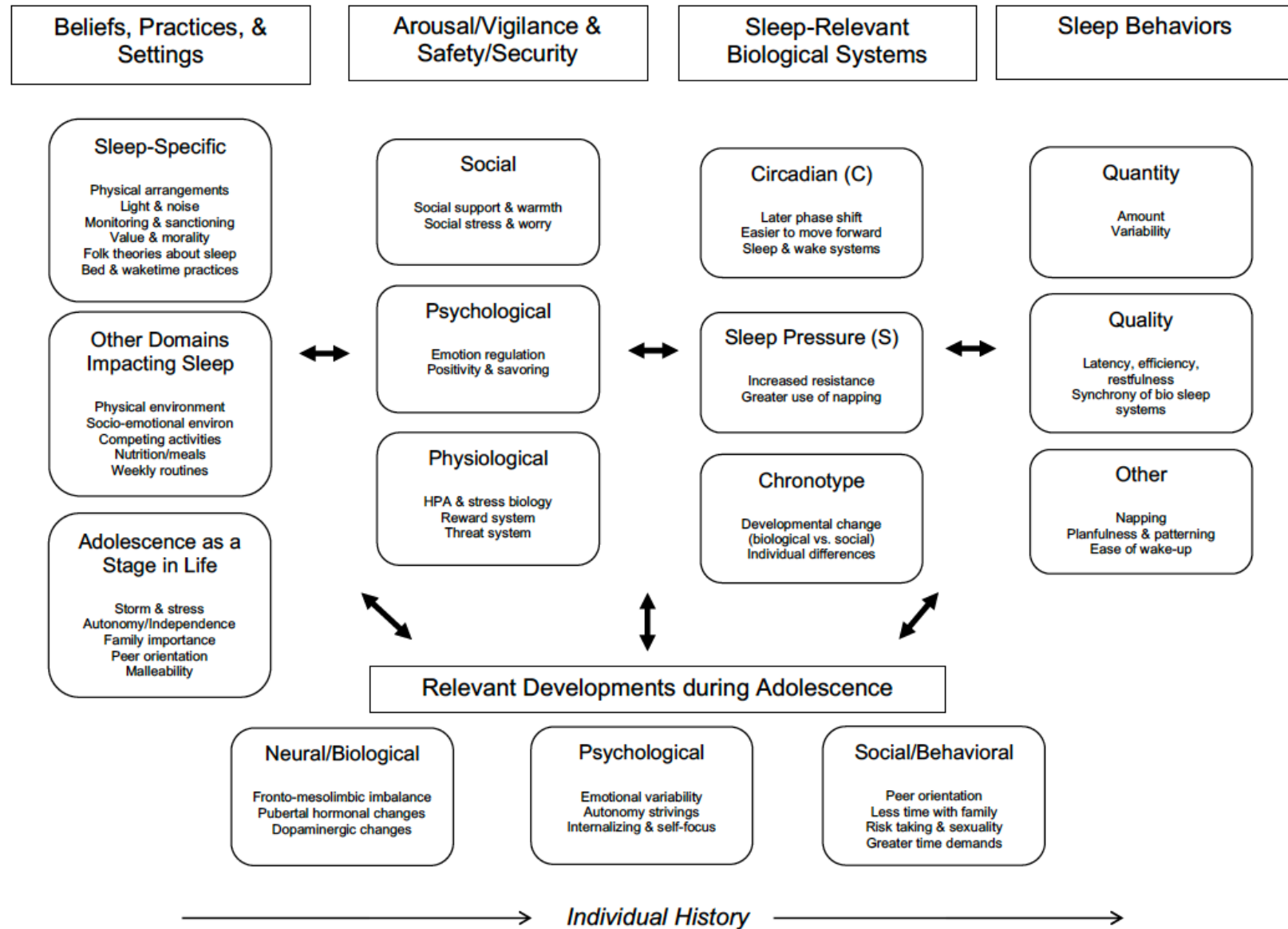
The social activities and experiences discussed above have significant cultural and moral bases to them. The importance of sleep and beliefs about what constitutes good and appropriate sleep can differ across groups, with some families seeing it as a primary activity that should not be compromised and others seeing it as a behavior or practice that can be adjusted to accommodate other daily activities (Worthman & Melby, 2002). Beliefs and sleep practices differ as to the appropriate settings and arrangements for sleep, in terms of shared rooms or beds (Shweder et al., 1995; Worthman & Brown, 2007). Communities with joint and extended households and shared family residence have larger and more varied family where adolescents sleep can affect co-sleeping and sleeping arrangements. Cultural views about parent supervision of sleep likely stem from beliefs about the appropriateness of parental authority, which demonstrates significant cultural variation (Chao, 1994).

Culture also may influence other activities and experiences which, in turn, may have an influence upon sleep. Late-night studying can directly interfere with both sleep time and quality and the stress placed upon high achievement can differ across ethnic and cultural groups (Fuligni & Hardway, 2006). Time spent with peers, socializing, dating, and attending parties also differs across groups, having implications for sleep schedules (Fuligni, 1998). Models of the impact of cultural beliefs and practices on teenage sleep must take into account these other domains.

Final Model

We started with these themes and held a series of discussions to develop a more complete model that would drive our measurement development. We followed an explicit format to break down disciplinary boundaries and stimulate the creation of new, transdisciplinary ideas and models that nevertheless maintain the most valuable core principles offered by each new discipline. First, team members assigned readings on the theme relevant to their disciplinary expertise. Next, different team members – for whom the theme was not in their area of expertise – led the discussion of the theme, highlighting and reframing the basic principles, and discussing new insights that the presenter obtained from the readings. The team member who assigned the readings briefly responded to the presentation, offering any factual corrections and reacting to the new insights offered by the presenter. Finally, the entire group engaged in a discussion about the theme.

The discussions led to an iterative process by which the Initial Model in [Figure 1](#) was elaborated, discussed, and refined. The resulting conceptual model, presented in [Figure 2](#), was intended to provide a framework and guide to the constructs and topics to be assessed in the measures and methods.

Figure 2. *Conceptual Model of Cultural Beliefs, Practices, and Adolescent Sleep*

THE ECOCULTURAL FAMILY INTERVIEW ON SLEEP (EFI-SLEEP)

Background

The EFI-Sleep (EFI-S) is the first of our series of methods and techniques for understanding the meanings, practices, intentions, goals, contexts, beliefs and concerns about sleep. The EFI-S is a guided conversation regarding sleep, from the point of view of the participant. The participants take pictures of all the contexts and relevant circumstances of sleep for them (their room, bed, electronics, friends and whatever else that they see as relevant) and share those with the interviewer. They then provide a narrative, stories, and vignettes about sleeping and how they experience it during a conversational interview (the EFI-S) with prompts and themes introduced by the interviewer. In our pilot research, and other EFI studies, most study participants want to talk about these topics once framed as a collaborative conversation, with sufficient joint trust and rapport (Weisner, 1996; Weisner, 2011; Weisner, 2017). The EFI prototype has been used in many other studies in the last 20 years or so, contributing to a wide range of topics other than sleep (Weisner, 2005; Weisner, 2016). Versions of the EFI have been used in studies of working poor families (Duncan, Huston, & Weisner, 2007; Weisner & Duncan 2014); studies about the intersection of work and family life (Yoshikawa, Weisner, & Lowe, 2006); research on families with children with developmental disabilities (Bernheimer & Weisner, 2007; Daley & Weisner, 2003; Gallimore, Bernheimer, & Weisner, 1999; Matheson, Olson & Weisner, 2007; Weisner, Matheson, Coots & Bernheimer, 2005); studies including children with leukemia and their caregivers (Tremolada, Bonichini, Weisner, Basso & Pillon, 2013); research on youth and ADHD (Lasky, et al., 2016; Mitchell, Weisner, et al., 2017; Weisner, Murray, et al., 2017); research with adults with autism in India (Daley, 2016); and research with Mexican parent-adolescent dyads about cultural values and family responsibilities (Telzer, Tsai, Gonzales & Fuligni, 2015; Tsai, Telzer, Gonzales & Fuligni, 2013).

Sleep is part of a routine of everyday life in a particular family and cultural community. The EFI-S focuses on how various aspects of one's daily life affects their sleep routine. The routine of sleep has a script, with specific practices (involving electronics, people, settings, feelings, competing activities, and so forth). Daily diaries or checklists of activities and time spent doing them, and other time allocation or experience sampling approaches can also assess daily routines. However the EFI-S adds another, deeper dimension by including the point of view of the participant in their own narrative, with photos and other aids to capture the context, beliefs and meaning of sleep as a part of a routine daily activity.

The EFI-S can stand on its own as a method, but ideally it is part of a suite of methods such as those included in this sleep toolkit (survey, daily checklist, cortisol, sleep actigraphy). The world is not linear, additive and decontextualized and certainly is not for the topic of youth and sleep. At the same time, the world can be usefully modeled *as if it were* linear, additive and decontextualized, with surveys, questionnaires, assessments, physiological and actigraphy measures and so forth. The EFI-S provides evidence about that non-linear world, and can be linked to other measures that assume linearity and where

context is deliberately bracketed out. The EFI-S is a valuable tool by itself, but it will be most useful when integrated with tools assessing biological models of the sleep process, cultural models of beliefs and practices in the family, neural models of adolescent motivational tendencies and regulatory control, and social models of daily experience and family life among ethnic minority and immigrant teenagers.

The EFI-S can and should be modified to meet the particular themes and research questions of specific studies. The EFI-S in our prototype covers a wide range of topics to offer a general framework. However, studies that are concerned with more clinical issues or particular illnesses, or done with different ethnic groups, or in different cultural communities around the world certainly will need to focus on that cultural context, and modify the prototype EFI-S we have prepared here. Unlike the notion that a method must be rigid and fixed, the EFI-S presumes flexibility and adaptation to the research questions, constraints of time and the nature of the population studied. However, the overall model for narrative conversations (minimizing yes/no or how much questions), the use of photos and participant-provided data, are always going to be important for the method. A qualitative method like the EFI-S is essential to ensure the understanding of beliefs, sleep patterns, and mechanisms accounting for diversity in sleep.

Description

Conversational interviewing

EFI-S is not a question-response survey or fully-structured interview. It is a guided conversation about the family and adolescent daily routine. The conversation is always directed towards questions of sleep and contexts relevant for sleep, but the goal also is listening to the narrative of the adolescent and parent about related issues regarding sleep that matter to him/her, even if not immediately apparent as to the relevance based on our prior theory.

Conversational interviewing is not an easy skill to acquire as an interviewer, since it is a blend of asking questions and providing prompts, as well as active listening with a third ear – while at the same time, moving through a set of topic questions. The EFI-Sleep conversational interview has similarities with clinical conversations in some respects. There is a relationship with the study participant that many might not be too familiar with, in that some of the control and power over the conversation lies with the adolescent or parent, not with the EFI-sleep interviewer. By ceding some of the narrative control to the participant, we can learn more of their experience and point of view. The intent of this method, then, is that *joint* control of the interview will lead to the discovery of new evidence that would not otherwise have been learned if the interview were a pre-structured Q & A survey with fixed responses and topics. That largely fixed survey or questionnaire format gives almost all control over the topics, vocabulary, responses, timing – most everything, to the researcher.

Perhaps some otherwise-skilled and experienced interviewers who are familiar with survey interviewing, or questionnaire-style formats done verbally, are unused to or uncomfortable with not controlling the interview situation. This is understandable; in social science, if one mentions the terms “interview” or “questions” – what typically comes up (for

both researchers and families) as the default script is the survey or questionnaire in the familiar pre-framed question – response format; or a yes/maybe/no type of question; and then repeat this over and over. Often the most valuable EFI-S conversations cede some considerable control to the teen or parent; the interview is about the narrative, the beliefs and ideas of the interviewee! It is up to the researcher to listen closely to the point of view of the interviewee and draw that person out to describe what sleep is like for them; the practices around sleep – how they engage in sleep; and their beliefs and values regarding sleep, rest, activity, tradeoffs between these, and so forth. These are the data to be drawn out. In this type of interview, topics will arise at different points during the conversation, even though the conversational prompts to guide the topics in general are there as an important guide to be followed ([see show cards](#); [see EFI-S conversational probes](#)). Hence participants may circle back to a topic that came up earlier, or may bring up a topic before they would have come up on the rough protocol, or schedule of topics the interviewer is following. The interviewer has to be fluid enough to hold the topics in memory and guide the conversation along to provide a narrative about each topic as they come up, and skip onto a topic if it occurs during the narrative earlier or at multiple points.

Recommended Materials for the EFI-S

Digital camera. The adolescent will have been provided a digital camera at a prior home visit about 1 to 2 weeks prior to the EFI-S ([see instructions for camera use](#)). They will have taken photos of people, places, situations that are important to him or her related to sleep. At the EFI-S interview visit, the pictures are extremely useful in highlighting aspects (e.g., events, people, objects) related to their sleep routines. Thus, the photos also are evidence in their own right regarding what teens thought would be important to reflect in the photos about their daily routines and issues about sleep. Photos can capture the actual places teens sleep and the settings and objects they want to present as important (such as electronics, siblings, bedtime routines, etc.). The photos could also include people and circumstances outside their bedroom if they think it affects sleep (peers, girlfriends/boyfriends, work, parents, etc.). Our EFI-S has provided cameras thus far only to the teens; however, parents or others in the household could also be included in the photo aspects of the EFI if this was thought to be valuable.

(NOTE: there may be circumstances when providing cameras and using photos is not feasible. If the EFI-S is done at home, observe the sleeping space and other relevant settings in the home if possible. Take photos of the sleeping areas yourself if possible. Do the EFI-S without the photos; doing the EFI-S without photos is better than not doing it!)

Show Cards. Show cards are simply large laminated cards listing the main topics and themes that the researcher would like to cover. The show cards which accompany the EFI-Sleep interview are there to remind the adolescent, parent and the interviewer of the topics that should be covered during the conversation ([see show cards](#)). During the EFI-S, the interviewer can show the show cards to the participants and keep them out on a table, couch or wherever the interview is happening, to give the participant an idea of what topics will be covered. The interviewer has memorized these topics, and keeps the conversation/interview flowing by bringing up the topics, listening to the adolescent and parent, and moving ahead when there is a sufficient response. Sufficient means that the adolescent and parent has nothing more to say on that topic, and the interviewer sees that

there is enough information to code or index (identify the content as relevant for a given topic) of that topic. Our experience with the EFI-S pilot interview and other studies is that parents and teens rarely ever look at the show cards after initially putting them out, but having them there provides a reassurance and occasional touch point for bringing up topics not yet covered in the conversation, as needed. Show cards eliminate the feeling on the part of some participants that there are going to be as-yet hidden, unexpected topics brought up, that the interviewer knows. It brings the participant into the agenda of the interviews from the start. Show cards do not limit the topics of discussion. If anything, they often open up the conversation to other issues suggested by the cards and relevant to the participant.

Vignettes. We developed vignettes to engage in a more focused conversation with participants about their beliefs regarding the importance of sleep and factors that shape their sleep routines and their quality of sleep ([see vignettes](#)). These vignettes were developed based upon the common experiences that adolescents from our pilot sample shared during the EFI-S. For example, one vignette describes a situation in which the adolescent must decide whether to sleep or stay up longer to spend time with a friend. Adolescents are asked to describe what decision they would make and the factors that shaped their decision. The vignettes are typically introduced at the end of the EFI-S, however they can be used at the any point during the interview. The EFIs were useful as they complemented the EFI-S topics and helped to expand on specific issues.

Useful Tips for Conducting an EFI-Sleep

It is not necessary or required as part of the EFI-Sleep to say all of the comments and phrases listed below verbatim to the participants – these are just some guidelines and scripts that might come in handy to keep the conversation flowing, focused on sleep and context, but not Q and A-like. You will develop your own techniques adapted to that parent and teen, but there are always awkward pauses in interviews, and even experienced fieldworkers are at a loss for what to say at times, or the parent or teen is just not very voluble. These kinds of phrases can help. Additionally, we have provided effective conversational probes that we developed for the EFI-S ([see EFI-S conversational probes](#)).

1. How to start the interview:

- *Hello! So just to remind you what we're doing here and what this is all about, we're interested in what parents, kids, and families do every day about sleep. We really want to learn from **you** about **your** experiences and in **your** own words. We have topics we want to be sure to cover during our conversation; these are guides. These topics are on these cards here, just to remind us about some of the things we'd like to ask you about. Like here, for example, is one on school schedules and homework as it affects sleep, here is one on sleep schedules – when your family members wake up and go to sleep usually, your own sleep schedule, any concerns about sleeping well. Other topics might come up too – things that matter to you but are not on the cards – we want to hear about these experiences as well.*
- *At the moment, we are talking with families from a wide range of situations and backgrounds, just to help us learn about experiences with your teens and sleep. We want to understand these experiences and how you are thinking and what you are doing about sleep.*

- *This of course is not a quiz or test – we are learning from what you and other adolescents tell us about sleep and what affects sleep. There is no “right answer”! The “right answer” is whatever is really going on with you and your family about sleep.*

2. Integration of adolescents’ pictures into the interview:

- *I’m excited to see the pictures that you took! Let’s get started by going through each picture individually and you can share with me why you took the picture.*
- *What is this a picture of? Can you tell me why you took a picture of this? Who are the people in the picture? What are these things? How is it related to your sleep?*
- *Thank you for taking these pictures. I’ve learned so much about your sleep and daily life. Let me put the camera aside for now. There some other topics that I need to cover.*
- After going through and discussing each picture with the adolescent, you’ll be surprised to find that many of the EFI-Sleep topics have already been covered! The photos often provide an entrée into a lot of topics about sleep, though probably not everything. There no doubt will be a few remaining EFI-topics that you still need to cover or want to expand on.
- Sometimes interviewers arrive and find that the teen has not taken photos. Asking the teen to take photos right then can help. Or you can ask what they would have taken photos of.
 - *Are there other things that you didn’t get a chance to take a picture of?*
 - *If you could take more pictures – what would you take?*

3. Daily life and sleep: Get into a topic by using the respondent’s train of thought to help get them inside their activities. Draw participants out regarding their sleep; **why things occur the way they do**, who is involved, what resources are needed to sustain them (social investment, transportation, electronics and technology, food), what tasks need to get done, **the goals and values they are reaching for with regard to sleep**, and how typical, stable and predictable the sleep situations and activities are. What are their concerns? What are the parent’s and the teen’s intentions?

- *Walk me through a typical weekday, such as this week, for instance. I’m interested in learning about your experiences and what your sleep situations are like. Let’s start with the school week for you. Walk me through a typical morning for you.*
 - Note: This sleep interview assumes the teen is in a regular school schedule. If the teen is not – work with the routine that the teen in fact has. It may be based on work, part-time programs in a school, helping at home, or none of these.
- **Why do they do them a certain way?:** *What if you could change any aspect of your routine? What would you change? Why?*
- **Conflicts:** *How important is it that they get done the way they are getting done? What is not getting done that should be? These conflicts could be directly or indirectly relevant to sleep.*

4. Ask open-ended questions: Ask questions that lead to descriptions, emotions, narratives, experiences, exemplars. Avoid yes/no questions, or how much? questions (unless that is what the participant describes, or that is the nature of the question!)

- *Who/what/when/where/why/how?*
- *Walk me through your morning/night when you wake up or prepare for sleep.*
- *What do you know about [topic] and what perhaps do you not really know about it?*
- *So your child's sleep concerns you? Tell me more about that.*
- *Can you give me an example of that?*

5. Push on conflict, feelings and motivations related to sleep routines: A goal is to understand what is concerning the parent and what is satisfying and positive for the parent.

- *How is this routine working for you?*
- *Imagine you could change some things about your sleep situations; what would you want to change?*

6. Reassure participants as needed:

- *You know, we're interviewing many parents and teens so there's a lot of variety. You know people say all kinds of things, nobody will hear what you are saying except myself, my boss, and the people whom you've already met.*
- *We're interested in **your** experiences. The more we can learn about you and your kids, the more it helps. Life can be tough, and many people don't know that, so it helps for other parents, for people in the schools and people in the community, to know about these things.*

7. Don't finish until all major topics have been covered!! Minimize or eliminate false negatives in analyzing interviews. Check cards! (You can do this along with the parent if that is useful; this brings the parent into the collaborative project of doing the interview to completion. The cards can prompt parents to cover difficult topics they might not want to talk about (conflicts with spouse, children; difficult personal or family circumstances) or those they just have not seen as relevant to sleep as yet (and for them may not be relevant!).

- *There are some topics here on the cards that we have to get covered and we haven't gotten to yet. Let's talk about those, and then get ready to wrap up our conversation.*
- *So, we didn't talk much about _____. Can you tell me more? What's going on?*

8. Minimize or eliminate false negatives: There are few or no false negatives in the EFI-Sleep. If the adolescent or parent does not bring something up or say enough to be sufficient for coding, the interviewer brings it up and asks. Not all the topics, details and so forth are going to be relevant for many cases (e.g., questions about siblings if there are no sibs, or work schedules if the teen has not paid work), but they should be raised or mentioned if they don't come up otherwise. An important goal for the EFI-S procedure is that there are no false negatives: if a teen or parent did not have much to say on a topic, this is not because they were asked about that topic.

9. Conclusion/Wrapping Up:

- *We are getting near the end of our conversation. If you could talk to others about your child's sleep issues, say a doctor, your child's teachers, his/her friends, or*

others, and tell them about some of the important issues that matter to you and your child and family about sleep problems – what would you want to tell them?

- *As we near the end of the conversation – are there any topics that we have not gotten to yet that you would like to bring up? Are there things that might be related to sleep that perhaps we have not talked about at all, or enough – something we have forgotten to bring out?*

10. Questions to Avoid:

- Dichotomous questions (yes/no)
- Leading questions (predetermined categories)
- “Why” questions (depending on context, “why” questions can imply a rational answer v. responses generated by impulse)
- Not so good to ask, usually: *“How important is getting a lot of sleep?”* for example – this can lead to a “very, somewhat, not very” kind of scaled answer.

Instructions for Camera Use

Provide a camera kit for the adolescent:

- Choose a digital camera that is simple to use for adolescents. In our study, we used the Nikon Coolpix L20. Place camera, [Photography Instructions Card](#), extra batteries/battery charger in a sturdy bag (e.g., pencil case).
- It is also possible for adolescents to use their own camera or a cell phone to take pictures. In this situation, ask the teen what type of phone/camera they have. Do you have the right cables that you can link and upload the photos from their device to a laptop during the interview?

Drop off camera kit at least one week in advance of the scheduled interview.

- Explain the importance of the camera and pictures to the adolescent and parent.
- Show the adolescent the camera kit and how to use the camera (most adolescents will have no trouble using the camera!).
- Review the [Photography Instructions Card](#) with the teen.
- Remind the adolescent that they have a week to take pictures. They can start tonight by taking pictures of activities (e.g., setting alarm clock, brushing teeth) as they are getting ready for bed. They can continue to take pictures across the week of other activities (e.g., schoolwork, sleep over) or people (e.g., parent, sibs, friend) that influence their sleep.
- Reassure adolescents that there are no “right” or “wrong” kinds of pictures to take. We are interested in THEIR daily routines related to sleep. There are no pictures “too mundane” to take.
- Reassure adolescents and parents that these pictures are for research purposes only and will not be shared with others. Remind the teens/parents not to upload the photos, or share them with others. Remind the teens of the rule for no nudity or illegal activities.
- Check in with the adolescent at least once during the week to ensure that they are taking pictures and to ask if they have any questions.

Photography Instructions Card

Print these instructions (double sided) on a laminated card and include in the camera kit.

Front side of card:

Photography Instructions: EFI-Sleep Study

Over the next week or so, take about 25 pictures of everything that you can think of that *matters for your sleep*. Some of the most common types of photo topics are listed below. But in addition there might be other aspects of your sleep weekly routines that only you know and you could take a picture of something about that aspect. When we return, we will ask you about your photos, and give you \$\$\$!

- Places where you sleep
- Things in your room that are related to what you do in your room, and when you sleep, such as your electronics, phone, etc.
- People connected to your sleep and wake up schedules, such as your family, friends, boy/girl friends, and others.
- Activities that you do before you sleep and after you wake
- Other events or experiences in your life that influence your sleep schedules, that may make it easier or more difficult to sleep.
- And anything else!???

Back side of card:

- Your photos are only for you and your participation in our research project; no one other than you and our researcher team will ever see them. They will not be published or otherwise ever made available outside of research use with any identifiable people or non-public places in them.
- Please do not take photos of any illegal activities, nudity, or anything else that would be inappropriate to have in a photograph. Otherwise, however, please take photos of anything you feel is important in your daily life. Do not upload any of these photos onto your computer or onto the Internet. The photos are for the purposes of this research study only.
- Remember that we are loaning you the camera; we cannot give you the camera! We have to use the same cameras to give to many other teens in our research project after you have finished with it. (All your photos are deleted from the camera, of course, before we give the camera to the next person.)
- Most importantly, enjoy using the camera during the next week to capture whatever it is that is important to you! Have fun doing it!
- If you have any questions at any time about the photos or using the camera call this number and someone will get back to you: (###) ### - ####

EFI-S SHOW CARDS

The following show cards are used to cover important topics during the interview. Print and laminate onto cardstock paper and secure with a binder ring.

CARD 1**PHYSICAL ARRANGEMENTS**Where

- Type of room(s) (E.g., bedroom, couch in living room, etc.)
- Size of room
- Consistency/ Predictability (Is the same during the night, across nights)
- Proximity to other rooms
- Include other rooms where adolescent sleeps during the week

What

- Type of bed
- Dedicated sleeping space? (E.g., Pets or people coming through)
- Noise (e.g., noise in house, outside; How does it affect your sleep?)
- Light (e.g., Type of lights; Leave light on at night?)
- Temperature
- Media/ distractions

Who

- Alone vs. others
- Who controls space?
- Rules?

CARD 2A**ROUTINES**Bedtime routines

- Typical activities before bedtime
 - Ramping up vs. down,
 - The length of time of activities & when they occur (routinized or random).
- Control and Monitoring of bedtime
- Preparation for bedtime
- How Patterned, routine and typical are bedtime routines
- Responsible for other's sleeping schedules?
- Activities and routines of other family members related to yours
- Affective tone of your bedtime and others' in HH
- Sleep latency, disruptions
- Weekends

CARD 2B
ROUTINES
Waketime routines

- Who's responsible?
- Optional or contested?
- Affective Tone
- Alarm vs. no alarm
- Routine of other family members related to yours
- Preparing for the day routine
 - Smoothness of schedule
 - Feeling rushed?
 - Responsibility for others to get up?
 - Efficiency
- Parental work schedule and waketime
- Transportation from the home issues
- Weekends

CARD 3
LOCAL THEORIES, VALUES AND MORALITY
About Sleep

- How much do you need
- How does your sleep amount and schedule work for you?
- Is sleep a desired or fearful thing
- Larks vs. owls
- Entity vs. incremental theories of sleep "type"
- What constitutes good or bad sleep
- What function does it serve
- Is it necessary to sleep a certain amount? To stay up on certain days

Values & Morality

- "success" vs. "failure" beliefs regarding sleep amount, schedule, quality, times
- "good" vs. bad sleeper?
- Value of sleep for health & other senses of well-being
- Sleeping / napping & "laziness"
- Morality of sleep arrangements
- Sleep as a resource or good you need to get enough of, or spend well compared to other resources you expend or want
- Parent-child discussion about sleep

CARD 4**BELIEFS ABOUT ADOLESCENCE AS A LIFE STAGE****Adolescence**

- Storm & stress/inherently difficult
 - Threatening nature of teenage
- Autonomy/independence/interdependence
- Peer influences vs. parents vs. sibs vs. other kin vs. teachers/employers
- Role of parents & family
- Impact of puberty/hormones/biology
 - Emotionality inherent in teens
 - Do teens' "brains changing"
 - What is changing in your body
- Trustworthiness of teenage
- Inherently good or bad time of life

CARD 5a**OTHER DOMAINS IMPACTING SLEEP**Physical Environment of the home

- Family size
- Home/apartment size
- Economic resources/poverty
- Physical condition of the home
- Noise, light, threat in neighborhood
- Nutrition & meals

Socio-Emotional Environment of the Home

- Parent-adolescent relationship
- Spousal/parental relationship
- Family cohesion/conflict
- Living arrangements of family members
- Predictability of family routines vs. chaos
- Scheduling & organizing of the day and week
- Teen sleeps in other locations? Naps? Divorce, girl/boyfriend homes?

CARD 5b**OTHER DOMAINS IMPACTING SLEEP**Other Activities

- Academics
- Sports/leisure; play on sports teams?
- Volunteering
- Work
- Social Life/ Peers
- Partying
- Romance/ Sexuality
- Media use
- Substance use
 - Including caffeine, energy drinks, stimulants.
 - Prescription meds?
 - Substance Use: marijuana, other drugs
 - Alcohol
- Risk taking
- Time in activities

EFI-S CONVERSATIONAL PROBES (Note: These are illustrations, examples, of ways to ask about various topics, if those topics are relevant. These are not survey items to ask in sequence!)

PHYSICAL ARRANGEMENTS

Where		
	General probes	Additional probes and key points for parents
Type of room (e.g., bedroom, couch in living room, etc)	<ul style="list-style-type: none"> Where do you sleep? 	<ul style="list-style-type: none"> Ask about TC (target child)
Size of room	<ul style="list-style-type: none"> Can you describe your room? What pieces of furniture do you have? How does the size of the room work for you? 	<ul style="list-style-type: none"> How does the room work for TC? Is there anything you would want to be different about TC's room?
Consistency/Predictability (e.g., same across nights)	<ul style="list-style-type: none"> Do you always sleep in your own bed? Are there times when you sleep somewhere else? How often does this happen? 	<ul style="list-style-type: none"> Ask about TC
Proximity to other rooms	<ul style="list-style-type: none"> How close is your room to other rooms in your home? 	<ul style="list-style-type: none"> Ask about TC
Other rooms where teen sleeps during the week	<ul style="list-style-type: none"> Where else do you sleep? Are there times when you fall asleep somewhere else (e.g., living room)? How often does this happen? Why does it happen? 	<ul style="list-style-type: none"> Ask about TC
What		
Type of bed	<ul style="list-style-type: none"> What type of bed do you have? How do you like it? Is it comfortable? Does it give you any problems for your sleep? 	<ul style="list-style-type: none"> Ask about TC
Dedicate sleeping space? Pets or people coming through?	<ul style="list-style-type: none"> Is this space used for anything else (e.g., office space)? Are there pets and people coming through? 	<ul style="list-style-type: none"> Ask about TC

Noise	<ul style="list-style-type: none"> • What can you hear in your bedroom? At night when you sleep? In the morning when you wake up? • How do these noises affect your sleep? • Do you wear earplugs? 	<ul style="list-style-type: none"> • Ask about TC
Light	<ul style="list-style-type: none"> • Do you prefer your room dark when you sleep? • Do you receive a lot of natural light coming through your window? Does this ever bother you? <p>Additional probes</p> <ul style="list-style-type: none"> • What kind of lights do you have in your room? Do you turn them off at night? Do you wear a mask? 	<ul style="list-style-type: none"> • Ask about TC
Temperature	<ul style="list-style-type: none"> • How is the temperature in your room? Affect your sleep? • Is there AC/heat? Do you use a fan/heater? 	<ul style="list-style-type: none"> • Ask about TC
Media/Distractions	<ul style="list-style-type: none"> • Is there a TV, laptop, etc in your room? • Where do you keep your phone during the night? 	<ul style="list-style-type: none"> • Any rules regarding TC's media use?
Who		
Alone vs others. When do you all sleep/wake?	<ul style="list-style-type: none"> • Do you share your bed or room with anyone? • How is that working out? 	<ul style="list-style-type: none"> • Ask about TC
Who controls space?	<ul style="list-style-type: none"> • Who controls this space? Are there any rules? 	<ul style="list-style-type: none"> • If TC shares a room, how is it working out for TC? Any conflicts? • What would be the ideal sleeping arrangement for TC?

BED AND WAKE UP ROUTINES

Bedtime		
	General probes	Additional probes and key points for parents
Typical activities before bedtime. Ramping up vs down, rousing or not, length of time of activities and when they occur (routinized or random)	<ul style="list-style-type: none"> • Get a general sense of what time adolescent gets home from school and their general routines when they get home. • Within this past week, what did you normally do before you got ready for bed? • How long do you spend in these activities? • Do you do these activities alone or with others? • Is this a time when you are winding down? Ramping up? 	<ul style="list-style-type: none"> • Get a general sense of what time parent comes from work and their general routines when they get home. • Ask about TC's activities before bedtime. Some parents may be more knowledgeable than others. • Any conflicts about TC's evening routine?
Control and monitoring of bedtime	<ul style="list-style-type: none"> • Does anyone tell you to get ready for bed? If so, how do you respond? Are you reluctant to go to bed? Does it take multiple reminders? How often does this happen? • What time do you usually get ready for bed? • What determines when you sleep? The actual time? How tired/sleep you feel? • Are there any rules regarding your bedtime and bedtime routines? 	<ul style="list-style-type: none"> • Ask about TC's bedtime routine. Some parents may be more knowledgeable than others. • Do you tell TC to get ready for bed? What do you say to TC? How does TC respond? • Do you feel that it's your responsibility to monitor TC's bedtime and related routines?
Preparation of bedtime	<ul style="list-style-type: none"> • How do you prepare for sleep? Any particular routines that help you sleep (fall asleep, sleep better)? • How long does this take? 	<ul style="list-style-type: none"> • Ask about TC • Any changes that you would like to see in TC's bedtime routines?
How patterned, routine and typical are bedtime routines	<ul style="list-style-type: none"> • How typical is this routine? • Are there times when this doesn't happen? Why? 	<ul style="list-style-type: none"> • Ask about TC • How consistent is TC's bedtime?

Responsible for other's sleeping schedules	<ul style="list-style-type: none"> • Are you responsible for any one else's bedtime? • Do you get ready for bed with anyone else (e.g., sibling)? 	<ul style="list-style-type: none"> • Ask about TC
Activities and routines of other family members related to yours	<ul style="list-style-type: none"> • What else is everyone doing when you are getting ready for bed? Who's awake/asleep? 	<ul style="list-style-type: none"> • How do other family members' activities impact TC's sleep?
Affective tone of your bedtime and others' in the household	<ul style="list-style-type: none"> • Can you describe the environment at home when you are getting ready for bed? Winding down? Ramping up? • How do you feel when you are getting ready for bed? Still awake? Sleepy? • Would you like to sleep later or earlier, if you could? 	<ul style="list-style-type: none"> • What kind of mood is TC in at night?
Sleep latency	<ul style="list-style-type: none"> • How long does it take for you to fall asleep? • What do you think about when you are in bed? • What keeps you up at night? 	<ul style="list-style-type: none"> • Ask about TC • Has TC always been this way?
Sleep disruptions	<ul style="list-style-type: none"> • Do you wake up during the night? How come? How often? • How long does it take to fall back asleep when you wake up? 	<ul style="list-style-type: none"> • Ask about TC • Has TC always been this way?
Weekends?	<ul style="list-style-type: none"> • How are your routines the same or different during the weekends? 	<ul style="list-style-type: none"> • Does TC stay up later on weekends? How do you feel about that?
Waketime		
Who's responsible	<ul style="list-style-type: none"> • Who wakes you up in the morning? What is your general response? • Are there any rules related to your morning routine? 	<ul style="list-style-type: none"> • Do you wake TC up in the morning? How often? How does TC respond?
Optional or	<ul style="list-style-type: none"> • Are you reluctant to wake up in the 	<ul style="list-style-type: none"> • Are there any conflicts with TC in the

contested? Battling with someone about it?	morning? Does it take multiple reminders to get you up?	morning? <ul style="list-style-type: none"> Is TC reluctant to get up and/or go to school in the morning?
Affective tone	<ul style="list-style-type: none"> How do you feel when you wake up? Sleepy? Refreshed? Ready for the day? How often do you feel this way? Would you wake up earlier or later, if you could? 	<ul style="list-style-type: none"> What kind of mood in TC in? Is TC well rested? Look forward to the day?
Alarm vs no alarm. What is used as an alarm. Is the alarm snoozed often?	<ul style="list-style-type: none"> What is used as an alarm? Do you use an alarm all the time? Is the alarm snoozed often? For how long? Do you get out of bed right away? Or do you stay in bed even after you've woken up? How long? 	<ul style="list-style-type: none"> Ask about TC
Routine of other family members related to yours	<ul style="list-style-type: none"> Who else is up when you are awake? What are they doing? Does it affect your morning routine? Are you responsible for helping anyone else get ready in the morning? • <p>Additional probes</p> <ul style="list-style-type: none"> Do you have to share the bathroom with anyone else? 	<ul style="list-style-type: none"> Ask about TC
Preparing for the day routine. Smoothness of schedule. Feeling rushed? Responsibility for others to get up? Efficiency	<ul style="list-style-type: none"> What do you do in the morning to get ready for the day? Eat breakfast? Pack lunch? Pack your backpack? How long does this take? Do you feel you have enough time to get ready? Or feel rushed? Is there anything you would change about your morning routine? Do you have any responsibilities in the 	<ul style="list-style-type: none"> Ask about TC Does TC have enough time in the morning to get ready for school or for the day's activities? Is there anything about TC's morning routine that you wish were different?

	morning?	
Parental work schedule and wake time	<ul style="list-style-type: none"> • When do your parents wake up? Do you see them in the morning? • What time do your parents work? 	<ul style="list-style-type: none"> • Ask about parent's own work schedule
Transportation from the home issues	<ul style="list-style-type: none"> • How do you get to school? Carpool? • Are there ever any transportation issues? Issues being late to school/work/activity? 	<ul style="list-style-type: none"> • Ask about parents' transportation to work. • How does TC get to school?
Weekends	<ul style="list-style-type: none"> • How are your routines the same or different during the weekends? 	<ul style="list-style-type: none"> • Does TC sleep in on the weekends? How late? How do you feel about this?

LOCAL THEORIES, VALUES AND MORALITY

About sleep		
	General probes	Additional probes and key points for parents
How much do you need	<ul style="list-style-type: none"> • How much sleep do you need? • What about teenagers, in general? • What is the ideal amount of sleep? • Sleep deprivation: What is the minimal sleep you can “get by” with? For how many days? At what point would you know you would not be able to “get by” on any less sleep? 	<ul style="list-style-type: none"> • How much sleep do you think TC needs? • What about teenagers, in general? • What would be the ideal sleep for TC? • What changes in TC’s sleep and related routines do you wish were different?
How does your sleep amount and schedule work for you?	<ul style="list-style-type: none"> • How does your sleep amount and schedule work for you? • If you had a magic wand, what would you change about your sleep (amount, routine)? What is your ideal sleep and sleep environment? • What is getting in the way of you achieving this ideal? • Person specific factors: Is it something about yourself that you need to change? (e.g., motivation) • Context specific factors: Is it something about the environment that is preventing you from reaching this ideal? • What are the context-specific obstacles get in the way of sleep (e.g., school start time; particular daily routines)? • What are the fixed vs malleable features of the context? 	<ul style="list-style-type: none"> • Ask about TC • What are the major factors that influence sleep? Probe about parent’s own family, work and financial stressors. <p>Probe about sleep vs activities:</p> <ul style="list-style-type: none"> • What keeps TC up at night? • To what extent is staying up for these activities (e.g., schoolwork) OK? • What are some exceptions? • Is there anything TC can do to manage sleep vs activities (e.g., school) differently or better?
Is sleep a desired or fearful thing?	<ul style="list-style-type: none"> • Do you look forward to sleep? 	<ul style="list-style-type: none"> • Ask about TC

	<ul style="list-style-type: none"> • Are there times when you are reluctant to sleep? • Are there times when you try to put off or avoid sleep? <p>Are you missing out on anything when you are sleeping?</p> <p>Additional probes</p> <ul style="list-style-type: none"> • Do you wish you could sleep more or sleep less? Why? • If you could get by with less sleep, would you do that? <p>Are there times when you may be afraid to go to sleep? For example, some kids may have nightmares or bad dreams, so they may be afraid of sleeping.</p>	
Larks vs owls	<ul style="list-style-type: none"> • Would you categorize yourself as a morning or night person? Why? • Have you always been this way? Can someone switch from being a morning to night person and vice versa? How hard/easy would that be? <p>Morality of larks vs owls:</p> <ul style="list-style-type: none"> • Can you think of anyone you know who is a “lark” vs “owl” • Do you think being one type is better (e.g., more productive, smarter, organized) than the other? • Are there certain activities that you do better at night vs. morning? Does it have to be this way? 	<ul style="list-style-type: none"> • Has TC always been this way? How do you feel about it?
Entity vs incremental theories	<ul style="list-style-type: none"> • Is sleep malleable or is it an attribute of the individual? Is sleep part of who they are and 	

of sleep “type”	<p>their personality?</p> <ul style="list-style-type: none"> • Can people change their sleep habits? How difficult or easy would this be? • Are people born good sleepers or bad sleepers? 	
What constitutes good or bad sleep?	<ul style="list-style-type: none"> • Use Vignettes #5, & 6 • Give me an example of the absolute worst and best period of sleep you had. What was that like? What was going on in your life then? How long did it last for? How did it impact your functioning? How did you cope with it? • What is considered good sleep? On days when you wake up feeling that you had good sleep, how does that feel like and what contributed to that? • What is considered bad sleep? On days when you wake up feeling that you had bad sleep, how does that feel like and what contributed to that? • In general, what is a good versus bad sleep routine? 	<ul style="list-style-type: none"> • Was there a period of time when TC was a very “good sleeper?” Very “bad sleeper?” What was going on in TC’s life then that could have explained for that? • Can you tell when TC has had a good or bad night? How so? What is TC like on these days?
What function does it serve?	<ul style="list-style-type: none"> • What purpose does sleep serve for your body, mind, health, mood, well-being, etc? • What is going on in your body or mind when you are sleeping? • Think about a time when you didn’t sleep very much, how did that impact your day, daily functioning, etc? • Are there any risks associated with sleeping too little? 	<ul style="list-style-type: none"> • What purpose does sleep serve for teens, in particular? For adults? • Have you talked about these beliefs you have about sleep with TC?
Is it necessary to sleep a certain	<ul style="list-style-type: none"> • Use Vignette #1 	<ul style="list-style-type: none"> • Are there any exceptions regarding when it may be OK for TC to sleep

<p>amount? To stay up on certain days.</p>	<ul style="list-style-type: none"> • When you go to bed at night, do you ever think about how much sleep you should or would like to get? • If you had to wake up earlier than usual the next morning, would you go to bed earlier to get X hours of sleep? Is your bedtime flexible or fixed? • If you could get by with less sleep, would you do that? What sorts of things (activities, people) would you sacrifice sleep for? <p>Additional probes</p> <ul style="list-style-type: none"> • Do you think about what time you should or would like to get up the next morning? • Do you have to sleep X hours every night? If you slept later than usual one night, do you wake up later in the morning so that you can get your X hours of sleep? Is your waketime dependent on your bedtime? Or is your waketime fixed? • What sorts of things may keep you up at night? What sorts of things may wake you in the morning? 	<p>less or more?</p> <ul style="list-style-type: none"> • Do you wish that TC would manage his/her sleep routines differently?
<p>Values & Morality</p>		
<p>“success” vs “failure” beliefs regarding sleep amount, schedule, quality</p>	<ul style="list-style-type: none"> • Do you ever feel that sleep is something you need to be good at? (Give example of being good at a sport or at their job). • If you could think about sleep as a performance, would you say that you are good at sleep or bad at sleep? • What sorts of things help you be good at 	<ul style="list-style-type: none"> • Ask about TC

	<p>sleeping? What do people need to do in order to be good at sleeping?</p> <ul style="list-style-type: none"> • What sorts of things prevent you from being good at sleeping? • Can you control your sleep habits, time, quality? • How easy is it to be good at sleeping? Effortful? • Do you want to be better at sleeping? What is getting in the way? 	
“good” vs “bad” sleeper	<ul style="list-style-type: none"> • Would you consider yourself a good or bad sleeper? Why? • Additional probes • Are your friends good or bad sleepers? What makes them good or bad sleepers? 	<ul style="list-style-type: none"> • Is TC “good at sleeping?”
Value of sleep for health & other sense of well-being	<ul style="list-style-type: none"> • How is sleep related to overall health (psychological well-being, functioning during the day, etc)? • If someone gets poor sleep, how would that impact their mood, energy, focus, etc? • Additional probes • If someone gets good sleep, how would that impact their mood, energy, focus, etc? 	<ul style="list-style-type: none"> • Do you talk to TC about the function or purpose of sleep? What do you tell TC? How does TC respond? • What sorts of beliefs related to sleep did you grow up with?
Sleeping/ napping & laziness	<ul style="list-style-type: none"> • What are your thoughts about napping? Should people nap? Do you nap? Why? Why not? • What are your thoughts about sleeping in on the weekends? • Is there such a thing as sleeping too much? Sleeping too little? 	<ul style="list-style-type: none"> • How often does TC nap or sleep in (on weekends). What are you thoughts about this?

	<ul style="list-style-type: none"> • Do you think that sleeping too much could be an indicator of good or poor health (e.g., sickness, depression)? • Laziness? Wasting day away when one sleeps too much? 	
Morality of sleep arrangements	<ul style="list-style-type: none"> • How important is it for you to have your own bedroom? What does having a bedroom allow you to do that you otherwise could not do if you had to share? • How do you like having your own room/sharing your room? • Would it be okay and how would things be different if you had to share your room and/or bed with your sibling/parent/someone else? How would that affect your sleep? • What are appropriate and inappropriate types of sleeping arrangements? Why? 	<ul style="list-style-type: none"> • How important is it for you that TC has their own bedroom? • What does having a bedroom allow teen to do or have? Probe about beliefs relating to the bedroom as a place that teen can feel safe and feel in control of. • Are there any rules related to having their own bedroom (e.g., cleaning)
Sleep as a resource or good you need to get enough of, or spend well compared to other resources you expend or want.	<ul style="list-style-type: none"> • Use Vignettes #3 & 4 • Do you have the time or resources to sleep more, if you wanted to? What are the restraints on getting more sleep? • Is your sleep schedule flexible or tightly regulated? • Should people sleep as much as they want to? • How do you prioritize your sleep relative to other activities you have going on? What would and wouldn't you sacrifice sleep for? • Do you schedule in time for sleep as you may do for your other activities (e.g., going to the gym, socializing with friends)? 	<ul style="list-style-type: none"> • Ask about TC • Does TC have the opportunity to get enough sleep? What gets in the way of TC's sleep? Probe about sleep vs other activities.
Parent-child discussion about	<ul style="list-style-type: none"> • What do your parents tell you about sleep? 	<ul style="list-style-type: none"> • Do you talk to TC about sleep?

sleep	<ul style="list-style-type: none">• Do you agree?• Is there conflict with your parents about your sleep?	<ul style="list-style-type: none">• What kinds of messages related to sleep would you want to instill in TC?
Parental involvement in teen sleep (ask parents)		<ul style="list-style-type: none">• Do you enforce any rules regarding TC's sleep routines? If none, why not?• How much control do you feel you have in TC's sleep routines?• Do you feel the need to monitor TC's sleep?• Has it always been this way?

PEERS

	General probes	Additional probes and key points for parents
Peer culture & norms about sleep	<ul style="list-style-type: none"> • What do teens think about sleep? Do they need it? Do they get a lot of it? Not enough? Think it's important? • How is sleep prioritized in relation to other activities? • What is typical? Schoolday versus weekends. • Do you think your sleep is typical? 	
How much do friends get?	<ul style="list-style-type: none"> • Compared to yourself, do your friends get more or less sleep? Do they sleep/wake up later or earlier? • If different, why? Are there reasons why they sleep later/earlier or get more/less sleep than you? What do you think about that? How does that make you feel? • Do you have a particular friend who stays up really late at night or sleeps really early? Why do they do that? What do you think about that? 	<ul style="list-style-type: none"> • How do you think TC's sleep (amount, quality, routines) is similar to that of their peers? • If different, why?
Do you talk about sleep with friends? Complaining? Bragging?	<ul style="list-style-type: none"> • Do you and your friends ever talk about sleep (e.g., about getting too little or staying up late)? When does this usually happen (e.g., 1st period class, day of exam). • What do they say? How do you and your friends respond? • What about the weekends? Do you and your friends talk about staying up late? Sleeping in? • Do you think they are complaining or bragging? • What do you share and don't share with your friends about your sleep? 	<ul style="list-style-type: none"> • Does TC make comparisons about their own sleep to that of their peers?

<p>Can you monitor each other's sleep? (check on time of texting, FB posts)</p>	<ul style="list-style-type: none"> • Do you know when your friends go to bed or wake up? • Do you stay up later to chat with your friends? • Do you usually want to have the last text/chat/call at night? • When you wake up in the morning, are there usually missed text/chat msgs from the night before? How does that make you feel? <p>Additional probes</p> <ul style="list-style-type: none"> • Are you usually awake or asleep during the other person's last text, chat msg? • Do you and your friend text each other throughout the night? Do you wake up to check sometimes? 	
<p>When does interaction with peers take place? (in-person or electronically, fear of missing out, etc)</p>	<ul style="list-style-type: none"> • How do you keep in contact with your friends -- social media, phone, text, in-person other? 	<ul style="list-style-type: none"> • In what ways is TC connected to friends through technology and social media? What impact does this have on their sleep?

BELIEFS ABOUT ADOLESCENCE AS A LIFE STAGE

	General probes	Additional probes and key points for parents
Storm & stress/inherently difficult	<ul style="list-style-type: none"> • What are some of the challenges, difficulties and stressors of being a teen? • What are some of your concerns and worries about the teen years? • Is there anything you are afraid of happening/not happening? • Is it like this for everyone? <p>Additional probes</p> <ul style="list-style-type: none"> • What were your expectations about what the teenage years would be like? What were your concerns? • What are some of the changes you expect to happen or have happened already? 	
Autonomy/independence/interdependence	<ul style="list-style-type: none"> • In what ways do you feel that you are independent? What sorts of things do you do on your own? Would you want more independence? • What sorts of things should teens be able to do independently? How much independence should teens have? (have teens think about what their friends can and can't do) • Interdependence: What do you depend on others for, and what do they depend on you for? • What are your parents' expectations? <p>Additional probes</p>	<ul style="list-style-type: none"> • In what ways is TC independent? How important is it that TC is independent? • In what ways is TC not independent? How do you feel about that? • What are your expectations of TC? • What sorts of rules does TC have? • Does TC want more/less independence? How is that negotiated?

	<ul style="list-style-type: none"> • What does it mean to be independent? Interdependent with others? Autonomous (separate from others). • When did you start feeling more independent? Has it changed over the years? • If you could make the rules for your schedule, including sleep, what would they be? What keeps you from making the rules? If you could change one thing and it would happen, what rules would you change? • What are your favorite interdependent activities – things you like to do with others? • What is the difference between doing things alone, separately – and being independent or interdependent? 	
Peer influences vs parents vs sibs vs other kin vs teachers	<ul style="list-style-type: none"> • What types of influences do peers, parents, siblings, other kin and teachers have on teens? • Do any of these groups have a particularly stronger influence on teens? How so? <p>Additional probes</p> <ul style="list-style-type: none"> • If you could have less influence from someone or some group, and more influence from someone else – how would you change things? 	<ul style="list-style-type: none"> • Do you have any concerns about “outside influences” that TC may face? Friends? Other family members? Other adults? Media?

Role of parents & family	<ul style="list-style-type: none"> • How does your family shape who you might become? • What type of relationships should teens have with their parents? Describe the ideal parent-child relationship during this time. • How should parents and family be involved in teens' lives? Your life? • <p>Additional probes</p> <ul style="list-style-type: none"> • What role do and should parents and family play in teens' lives? 	<ul style="list-style-type: none"> • What do you like about the relationship you have with your child? • What changes in your relationship with your child would you like to make? • What are some key values you hope to instill in your child?
Impact of puberty/hormones/biology	<ul style="list-style-type: none"> • What are some of the biological and physical changes that teens go through? • How do these changes influence their behavior? • How do you feel about the changes you've gone through? Were you prepared? Excited? Nervous? <p>Emotionality:</p> <ul style="list-style-type: none"> • What sets teenagers off? What excites teenagers? • Are teens emotionally stable? Moody? Why does that happen? • Are all teens this way? 	<ul style="list-style-type: none"> • What were some of the significant changes that TC went through during puberty? • How did TC respond to these changes? • Were there discussions with TC about puberty? • How would you characterize TC's general temperament?
Trustworthiness of teenage	<ul style="list-style-type: none"> • Do you feel that your parents trust you? How so? • What are some examples of monitoring? • Do teens need to be monitored? <p>Overall, are teens responsible, dependable, trustworthy, good decision makers?</p>	<ul style="list-style-type: none"> • To what extent do you trust TC?

	<p>Additional probes</p> <ul style="list-style-type: none"> • How do you think adults view teenagers? Some people think that “disclosure” to (sharing between) parents, and from parents to teens, works better and maybe feels better than “monitoring” (checking up on kids). What do you think? 	
Inherently good or bad time of life	<ul style="list-style-type: none"> • What are the positive and negative aspects of the being a teenager? • What good things happen? What bad things happen? • Is it like this for everyone? 	
ADDITIONAL TOPICS		
Threatening nature of teenage years	<ul style="list-style-type: none"> • What are some of your concerns and worries about the teen years? • Is there anything you are afraid of happening/not happening? 	
Emotionality inherent in teens	<ul style="list-style-type: none"> • Do you believe that teens are moody? Why does that happen? • What sets teenagers off? • What excites teenagers? • Are all teens this way? 	

OTHER DOMAINS IMPACTING SLEEP

Physical environment of the home		
	General probes	Additional probes and key points for parents
Family size	<ul style="list-style-type: none"> Who are your family members? Who lives with you? How old are they? 	
Home size	<ul style="list-style-type: none"> Do you feel crowded or cramped in your house/apartment? In what rooms? All over? What about your home makes you feel that way? How about where you sleep? 	
Economic resources/poverty	<ul style="list-style-type: none"> Does your family have enough money for basic necessities, like food and paying the bills? Does your family have extra money to spend on extra things and activities (movies, vacations)? Do you hear your parents talk about finances at home? <p>What are some of the things your family cannot afford that you wish you could have?</p>	<ul style="list-style-type: none"> Do you discuss financial challenges with TC?
Physical condition of the home	<ul style="list-style-type: none"> Interviewer can take a look at the physical condition inside and outside the home 	
Noise, light threat in the neighborhood	<ul style="list-style-type: none"> Do you feel safe in this neighborhood? Do you have any concerns about safety in this neighborhood? Is there anything that makes you feel unsafe in this neighborhood? 	<ul style="list-style-type: none"> Any particular rules at home to ensure the safety of TC and your family?
Nutrition & meals	<ul style="list-style-type: none"> What sorts of things do you do to maintain a healthy life style? Diet? Exercise? 	
Socio-emotional environment of the home		
Parent-adolescent relationships	<ul style="list-style-type: none"> Describe your relationship with your mom? Dad? Do you have a better or closer relationship to one than the other? What types of leisure activities do you do with your 	<ul style="list-style-type: none"> Describe your relationship with TC? What do you wish could be different?

	<p>parents?</p> <ul style="list-style-type: none"> • What do you talk about with your parents? What things do you not talk with them about? What are they not talking to you about? • Is there anything you would change/wish was different in your relations with your Mom? Your Dad? Stepparents? 	
Spousal/parental relationship	<ul style="list-style-type: none"> • How are your parent 's relationships with each other? • What about situations of separation, divorce, step-parents, grandparents? • Spend time together? • Are there disagreements? • Is there anything you would change/wish was different? 	<ul style="list-style-type: none"> • Describe your relationship with your spouse. • What do you wish could be different?
Family conflict, cohesion	<ul style="list-style-type: none"> • In what ways do you feel close or distant to your family? • Are there ongoing conflicts at home? How are they resolved? 	<ul style="list-style-type: none"> • What do you wish could be different?
Living arrangements of family members	<ul style="list-style-type: none"> • Do any of your family members live elsewhere (at least some of the time if not all the time)? 	
Predictability of family routines vs chaos	<ul style="list-style-type: none"> • Do you feel that there is a general family routine at home? • What sorts of family routine activities do you have? (e.g., eating meals together, family vacations) • Do you know what to expect each day? Each week? • Any surprises? • Chaos? 	
Scheduling and organizing of the day and week	<ul style="list-style-type: none"> • Who takes care of organizing individual and family activities? • Do you usually know what activities are going on at home? Including activities you may or may not be 	

	involved in?	
Teen sleeps in other locations? Naps? Divorce, girl/boyfriend	<ul style="list-style-type: none"> • Do you sleep anywhere else, besides this home? • Sleepovers? • How often does this happen? 	
Other activities		
Academics	<ul style="list-style-type: none"> • Use Vignette #2 • How are classes going for you? What courses are you taking/want to take? What are your grades like? • Do you get a lot of schoolwork? How much time do you spend on assignments? Does this ever keep you up at night? Do you take naps while doing homework or before/after? • Importance of doing well in school. • School versus other activities? • What are your academic expectations? • What are your plans after finishing HS; going on for more schooling? Getting some kind of vocational, professional, business degree? 	<ul style="list-style-type: none"> • Ask about TC
Sports/leisure	<ul style="list-style-type: none"> • What activities are you involved in? How does this fit into your daily routine? • Compete with other activities? 	<ul style="list-style-type: none"> • Ask about TC
Volunteering	<ul style="list-style-type: none"> • What activities are you involved in? How does this fit into your daily routine? • Compete with other activities? 	<ul style="list-style-type: none"> • Ask about TC
Work	<ul style="list-style-type: none"> • What activities are you involved in? How does this fit into your daily routine? • Compete with other activities? 	<ul style="list-style-type: none"> • Ask about TC
Social life/peers	<ul style="list-style-type: none"> • Describe your main group of friends. What do you like to do together? How often do you see each other? • Cohesion. Conflict 	<ul style="list-style-type: none"> • Ask about TC
Partying	<ul style="list-style-type: none"> • Describe what goes on at the parties you attend. 	<ul style="list-style-type: none"> • Ask about TC

	<ul style="list-style-type: none"> • How does this change your bedtime and morning routine? 	
Romance/Sexuality	<ul style="list-style-type: none"> • Dating? Interested in any one? • How about spending time at your boyfriend's/girlfriend's place? Or meeting somewhere else during the day? At night? Weekend? Sleep over? 	<ul style="list-style-type: none"> • Ask about TC
Media use	<ul style="list-style-type: none"> • Which social media sites are you active on? How often do you use these? • What do you get out of them? • Any rules and parental regulations? • Typical day/ weekend: how many hours are you looking/texting/emailing/posting, etc.? 	<ul style="list-style-type: none"> • Ask about TC
Substance use	<ul style="list-style-type: none"> • Is there anything that you take to help get you going during the day? • Do you take prescription meds? • Alcohol? • Substance use? Other drugs? • What about your family? Friends? 	<ul style="list-style-type: none"> • Ask about TC
Risk taking	<ul style="list-style-type: none"> • Do you do anything that is unsafe or puts you in danger? • Anything you are not legally allowed to do? • Anything you know you shouldn't do? • What about your friends? Do they do any of these things? 	<ul style="list-style-type: none"> • Ask about TC
Competing scheduling	<ul style="list-style-type: none"> • Overall, do you feel that you have a packed and rigid schedule? Or flexible schedule? • Are there activities that get in the way of each other? • Are there any activities that you would drop? Do you wish you could do more? • What do you wish you had more time for? 	<ul style="list-style-type: none"> • Ask about TC
Relative importance	<ul style="list-style-type: none"> • How do you prioritize sleep on top of your other 	<ul style="list-style-type: none"> • Ask about TC

of activities vs. sleep	activities? <ul style="list-style-type: none">• Are there times when you may sacrifice sleep or have to change your sleep routine because of your involvement in these activities?• If so, do you feel reluctant to make these changes?	
Multiple activities vs few/none	<ul style="list-style-type: none">• General assessment of the various activities they are engaged in.	<ul style="list-style-type: none">• Ask about TC

EFI-S VIGNETTES ABOUT SLEEP

****Note regarding questions about what their friends would do.**

- Need to assess what kind of friends they have (e.g., high achieving, partyers, friends that stay up late/sleep early)
- Which friends would do what?

#1. It's a school night and you are up chatting and texting back and forth with your friends. You're having a really good time, but you realize that it's getting late and you are usually in bed at this time. You feel sleepy, but your friends are still sending you messages. What would you do? Continue to chat with your friends? How much longer? Tell your friends that you're going to bed? Are you afraid that you'll miss out on something? What do you think your friends would think about your decision?

#2. You have an exam the next day. You've spent some time studying already, but you do not feel completely prepared for the exam. You're usually in bed by now and you feel tired. What would you do in this situation? Stay up and continue to study? How much longer? Go to bed because you've studied enough and any more studying you do actually won't help that much more. Or maybe you don't care THAT much about the exam. How do you think staying up will affect how well you do on your exam? What do you think your classmates would do in this situation? Has this happened before? Tell me about it.

#3. Imagine a day when you've completed all of your homework assignments early. You have the opportunity to go to bed earlier than you normally do. Would you? If not, what would you do instead? What is stopping you from going to sleep? Has this happened to you before? Tell me about it.

#4. It's a Friday night. Tomorrow, you are going on a day trip with your friends and you need to be ready by 6am. It's been a long and busy week for you. You didn't have as much leisure time to watch your favorite TV shows, chat with your friends, or relax as much as you would have liked this past week. Alas, it is Friday and you finally have the time to spend catching up on some of the things you missed out on. But remember, you have to meet your friends at 6am tomorrow morning. How are you going to spend your Friday night? What do you think your friends would be doing? What would the trip be like if you slept early/late?

#5. Sometimes you wake up feeling great – very refreshed and ready for the day. Tell me about that type of experience. What happened? Did something happen the prior day/night? What do you think contributed to your "good sleep?" How did the rest of your day go? If you could tell other teens what they need or need to do in order to get good rest, what would you tell them?

#6. Sometimes you wake up feeling as if you didn't sleep at all and it's hard for you to get out of bed. Tell me about those types of experiences. What happened? Did something happen the prior day/night? What do you think contributed to your "bad sleep?" How did the rest of your day go?

New Quantitative Measures

Description

After reviewing data from the EFI-S, we developed several quantitative measures to assess values and beliefs about sleep that were salient in our conversations with the families. In adolescents' descriptions about their daily routines that shape their sleep patterns, it was evident that one of the challenges that adolescents face is balancing sleep among other important activities and daily demands (e.g., school work, family). Therefore, we developed a paired-comparison sorting task to assess the importance of and preference for sleep relative to other activities. Additionally, our EFI-S touched upon adolescents' implicit beliefs about sleep. Drawing from entity and incremental theories on personality (Yeager & Dweck, 2012), we were interested to learn about the extent to which adolescents believed that sleep was a fixed or malleable characteristic of individuals. One of our new survey measures focused on adolescents' beliefs regarding morningness and eveningness attributes of individuals and a second survey measure assessed adolescents' beliefs about the extent to which sleep is an innate and effortful skill. Moreover, the EFI-S focused on consequential factors in adolescents' lives that influence their sleep routines. Therefore, we developed a comprehensive measure on contributors of sleep, which included various items related to their sleeping environment, daily activities and their mood. Lastly, we developed a measure to capture adolescents' beliefs regarding the impact of sleep on different aspects of their well-being and daily functioning.

Overall, these measures demonstrate different ways to assess beliefs and values about sleep that reflect key aspects of our conceptual model. The survey measures compliment the topics from our EFI-S protocol and can be used in conjunction with the EFI-S or independently in a questionnaire.

Paired-comparison Sorting Task

The purpose of the paired-comparison sorting task is to systematically assess adolescents' beliefs about the importance of sleep relative to other key activities and demands in their daily lives. This procedure is a well-validated technique to assess the relative importance of different, potentially competing, domains (Weller & Romney, 1988). Participant responses from the EFI-S indicated that adolescents' sleep routines often conflicted with other activities related to family, school, friends and media. These responses informed the development of a sorting task, in which each of the five activities was paired with one another, resulting in ten unique paired comparisons. Two separate sorting tasks were developed to assess the (1) [relative importance](#) and (2) [relative preference](#) of the five activities. Each paired comparison was presented individually and adolescents were asked to choose one of the two presented activities. Results from this sorting task allow us to assess adolescents' ranking of these key activities based on their importance and preference.

Constructing the sorting task materials:

- For each sorting task, print each pair of words on cardstock paper. The letters should be printed in a font that is large enough for participants to read from a comfortable distance.
- Laminate and hole punch each card on the top left corner and secure together with a metal ring.
- The order of the paired comparisons should correspond with the order shown in the sorting task scoring sheet (see scoring sheet for [Relative Importance](#) sorting task; scoring sheet for [Relative Preference](#) sorting task). Write the number corresponding to each paired comparison on the back of the card so that the numbers are only visible to the research staff, but not to the participant.
- Print the sorting task scoring sheet to document the participants' responses during the activity.

Administering the sorting task:

- Start with the **Relative Importance** sorting task. Inform participants, "On these cards, you will see two types of activities. I'll be asking you to choose between the two activities. There are no right or wrong answers. Please respond with the activity that comes to your mind first. For this first activity, I will ask you to tell me which activity is more important to you."
- Flip through each card in numerical order. Display the printed words to the participant and read aloud each paired comparison using the preface, "Which activity is more important to you?" For example, "Which activity is more important to you? To get a good nights' rest or to do well in school?"
- Listen to the participants' verbal response for each card and circle their response on the scoring sheet.
- Next, administer the **Relative Preference** sorting task. Inform participants, "The next activity is very similar. I will ask you to tell me which activity you would prefer to do at night if you could choose."
- Flip through each card in numerical order. Display the printed words to the participant and read aloud each paired comparison using the preface "Which activity would you prefer to do at night if you could choose?" For example, "Which activity would you prefer to do at night if you could choose? Sleep or study or complete schoolwork?"
- Listen to the participants' verbal response for each card and circle their response on the scoring sheet.

Scoring the sorting task: Our scoring methods were based on procedures outlined by Weller & Romney (1988).

- For each sorting task, there are 5 categories: Sleep, School, Family, Friends, TV/Media. Sum the number of times that each activity was chosen for each paired comparison within each sorting task. For example, in the first pairing of the Relative Importance sorting task, if the participant chose "Do well in school," then School would receive a score of 1.

- After this tabulation, rank-order the activities from greatest to least amount of times that the activity was chosen. As such, this procedure provides an assessment of the relative importance and preference of each activity, such that higher scores for any given activity indicate a stronger importance or preference of this activity relative to others.

Understanding the scoring of the sorting task:

- Sometimes, the rank ordering of these activities will reveal a clear pattern of importance or preference of activities. For example, a participant may have chosen sleep four times, school three times, family two times, and friends once. This could indicate that the participant has a well-developed sense of the relative importance or preference of the activities.
- However, it is also possible that the participant may have chosen both school and sleep the same number of times. This could indicate that the participant placed equal importance or preference on both school and sleep. It may also suggest that the participant does not have a well-developed idea of the relative importance or preference of these activities.

Results from the paired-comparison sorting tasks:

Table 1. Relative Importance Sorting Task

Ranking of activity	Mean	SD	Paired comparisons
School	3.19	0.90	***School>Sleep; [†] School>Family; ***School>Friends; ***School>Media
Family	2.66	1.15	**Family>Sleep; *Family>Friends; ***Family>Media
Friends	1.91	1.09	***Friends>Media
Sleep	1.56	0.95	*Sleep>Media
TV/Media	0.72	1.09	

Note. Preliminary findings are based upon sample size $N=32$.

*** $p < .001$, ** $p < .01$, * $p < .05$, [†] $p < .10$

Table 2. Relative Preference Sorting Task

Ranking of activity	Mean	SD	Paired comparisons
Friends	2.59	1.21	***Friends>School; **Friends>Media
Family	2.50	1.32	***Family>School; *Family>Media
Sleep	2.47	1.16	*Sleep>Media; ***Sleep>School
TV/Media	1.66	1.15	**Media>School
School	0.81	1.03	

Note. Preliminary findings are based upon sample size $N=32$.

*** $p < .001$, ** $p < .01$, * $p < .05$

Results from the sorting task revealed that although adolescents, on average, did not place great importance on sleep relative to other activities, they showed a strong preference for sleep. Specifically, findings from the Relative Importance sorting task indicated that sleep was ranked 4th out of the five activities; however in the Relative Preference sorting task, preference to sleep, spend time with family and friends were ranked equally as the most preferred activity. These findings suggest that decisions to sleep, spend time with friends, family and on sleep may be the most salient, yet conflicting, activities for adolescents.

Implicit Beliefs About Sleep

In our pilot study, we were motivated to understand whether adolescents have developed their own implicit theories, values and morals related to sleep. Drawing from implicit theories of personality, which describe the tendency for individuals to believe that personal characteristics are either fixed or malleable (Yeager et al., 2014; Yeager & Dweck, 2012), we were curious to learn about the extent to which adolescents held an entity or incremental perspective on sleep. An individual who subscribes to an entity theory of personality would endorse the belief that sleep is a static trait whereas a person with an incremental perspective would describe sleep as a malleable characteristic of a person. To assess for these types of implicit beliefs in our EFI-S, we asked questions such as “Is sleep malleable or is it an attribute of the individual?” “Can people change their sleep habits? How difficult would that be?” and “Would you categorize yourself as an early bird or a night owl?” ([see EFI-S conversational probes](#)).

Based on participant responses from the EFI-S, we developed two separate measures to assess adolescents’ implicit theories on sleep. First, we developed a measure to evaluate the extent to which adolescents held an entity perspective on sleep by assessing their beliefs related to morningness versus eveningness ([see survey measure](#)). In the EFI-S, some adolescents believed that they were “night owls,” describing the evening as a time when they felt most energized, whereas others

described themselves as “early birds,” who were most productive in the mornings and afternoons and spent the evenings winding down from their day. Therefore, we contrasted “morning” versus “night” people in our measure. Our measure was adapted from a measure on the entity theory on personality (Yeager, Trzesniewski, Tirri & Nokelainen & Dweck, 2011). Although the original measure focused on beliefs about bullies versus victims and winners versus losers, we revised the survey items to contrast two types of individuals -- “morning” versus “night” people – in order to capture beliefs regarding morningness versus eveningness. This measure included 6 items and we obtained a good reliability ($\alpha = .76$) within our pilot sample. On average, adolescents in our pilot study did not show a particularly strong entity perspective on sleep, however there was a fair amount variability ($M = 2.92$, $SD = 0.86$).

We also developed six additional questions to assess the extent to which adolescents believed sleep was an innate ability ([see survey measure](#)). Past research on growth mindset and incremental theories of personality propose that individuals who view personality as innate also subscribe to the idea that minimal effort is required to achieve a type of trait, behavior or skill (Dweck & Leggett, 1988; Yeager & Dweck, 2012). In our EFI-S, some adolescents described sleep as a behavior that is difficult to change, whereas others believed that with practice, sleep behaviors could be modified. Factor analyses indicated that three of the survey items (#1, 3 & 6) assessed the extent to which participants believed that sleep is an innate skill and the remaining three survey items (#2, 4 & 5) assessed beliefs regarding how effortful sleep is. Overall, this measure had good internal reliability ($\alpha = .73$). Averaging across the six items, adolescents in our pilot study showed a neutral perspective on sleep as an innate ability, however there was variability in participants’ responses ($M = 3.39$, $SD = 0.79$).

SORTING TASK: RELATIVE IMPORTANCE OF SLEEP**Which activity is more important to you?**

Scoring Sheet - Please CIRCLE ONE from each pair

1	Get a good night's rest	OR	Do well in school
2	Spend time with friends and/or boyfriend/girlfriend	OR	Spend time in front of a screen (watch TV/movies, play games, use internet)
3	Do well in school	OR	Spend time with family members
4	Spend time with family members	OR	Get a good night's rest
5	Get a good night's rest	OR	Spend time with friends and/or boyfriend/girlfriend
6	Spend time with family members	OR	Spend time in front of a screen (watch TV/movies, play games, use internet)
7	Spend time with friends and/or boyfriend/girlfriend	OR	Spend time with family members
8	Spend time in front of a screen (watch TV/movies, play games, use internet)	OR	Get a good night's rest
9	Do well in school	OR	Spend time with friends and/or boyfriend/girlfriend
10	Spend time in front of a screen (watch TV/movies, play games, use internet)	OR	Do well in school

	Score
Sleep	
School	
Family	
Friends	
TV/Media	

SORTING TASK: RELATIVE PREFERENCE FOR SLEEP**Which would you prefer to do at night if you could choose:**

Scoring Sheet - Please CIRCLE ONE from each pair

1	Spend time in front of screen (e.g., watch TV/movies, play games, use internet)	OR	Study or complete schoolwork
2	Spend time with family	OR	Spend time in front of screen (e.g., watch TV/movies, play games, use internet)
3	Study or complete schoolwork	OR	Spend time with friends and/or boyfriend/girlfriend
4	Sleep	OR	Study or complete schoolwork
5	Spend time with friends and/or boyfriend/girlfriend	OR	Spend time in front of screen (e.g., watch TV/movies, play games, use internet)
6	Spend time with family	OR	Sleep
7	Study or complete schoolwork	OR	Spend time with family
8	Spend time in front of screen (e.g., watch TV/movies, play games, use internet)	OR	Sleep
9	Spend time with friends and/or boyfriend/girlfriend	OR	Spend time with family
10	Sleep	OR	Spend time with friends and/or boyfriend/girlfriend

	Score
Sleep	
School	
Family	
Friends	
TV/Media	

SURVEY MEASURE: IMPLICIT BELIEFS ABOUT SLEEP

Using the scale below, please circle the number that best describes your thoughts about the following statements:

		1 Strongly disagree	2	3 Neither disagree or agree	4	5 Strongly agree
1.	Some people are born morning people and others are born evening people.	1	2	3	4	5
2.	Morning people and night people are types of people that can't really be changed.	1	2	3	4	5
3.	Everyone is either a morning or night person in life.	1	2	3	4	5
4.	You can't change people's sleep habits.	1	2	3	4	5
5.	People who prefer to stay up and sleep late can try sleeping earlier, but deep down, they are still night people.	1	2	3	4	5
6.	There are two types of people: people who sleep early and people who sleep late.	1	2	3	4	5

SURVEY MEASURE: IMPLICIT BELIEFS ABOUT SLEEP

Using the scale below, please circle the number that best describes your thoughts about the following statements:

		1 Strongly disagree	2	3 Neither disagree or agree	4	5 Strongly agree
1.	Some people are naturally better sleepers than others.	1	2	3	4	5
2.	It is very difficult for people to change their sleeping habits.	1	2	3	4	5
3.	People who are good sleepers as children will become good sleepers as adults.	1	2	3	4	5
4.	Getting good sleep takes a lot of effort.	1	2	3	4	5
5.	People can practice being better sleepers.	1	2	3	4	5
6.	Some people can control their sleep better than others.	1	2	3	4	5

DAILY DIARY AND ACTIGRAPHY PROTOCOLS

Our sleep tool box includes two methods to assess adolescents' naturalistic sleep patterns: (1) self-report daily diaries and (2) actigraph watches. Both daily diaries and actigraph watches were administered in conjunction with each other across the same seven-day period.

Daily Diary

In our study, adolescents were provided with a seven-day supply of daily diaries (also known as the [AM Sleep Report](#)). (It is also possible to administer the daily diaries online using services such as Survey Monkey or Qualtrics) Every morning for 7 consecutive days, participants completed the AM Sleep Report upon waking. The AM Sleep Report included six questions regarding their sleep, which provided information on the duration of their sleep, amount of time it takes to fall sleep, number and duration of awakenings and subjective sleep quality.

DATE: _____
 DAY: _____
 ID: _____

Day 1

AM SLEEP REPORT

- 1) What time did you turn off the lights to go to sleep last night? _____ AM PM
- 2) How long did it take you to fall sleep after turning the lights off? _____ Minutes
- 3) How many times did you wake up during the night? _____
 And for how long (in total)? _____ Minutes
- 4) What time did you wake up and no longer sleep this morning? _____ AM PM
- 5) What time did you get out of bed this morning? _____ AM PM
- 6) How would you rate the quality of your sleep?

1	2	3	4	5
Very poor	Poor	Fair	Good	Very good

Sleep Actigraphy

Sleep actigraphs are watch-like devices that detect body movements from which time-based sleep estimates on an individual's sleep patterns can be derived (Sadeh, Sharkey & Carskadon, 1994). Compared to subjective, self-report sleep diaries which may be susceptible to recall bias, actigraphs provide objective data on multiple sleep parameters, including sleep duration, sleep efficiency (i.e., proportion of the night spent asleep), sleep latency (i.e., length of time it takes to fall asleep), number of awakenings during the night and the duration of each awakening. There are several models of actigraph watches; for our study, we used the Micro Motionlogger Sleep Watch (Ambulatory Monitoring Inc.).

Although actigraphs can be worn throughout the day (some researchers may want to collect data on daytime naps), we were particularly interested in nighttime sleep; thus adolescents in our study wore the watches only during the night. Our participants were instructed to place their actigraph watch on their non-dominant hand before going to bed and to keep it on until the following morning when they woke up (see [Actigraph Instructions](#) for participants). Adolescents wore the actigraph for the seven consecutive nights (coinciding with the self-report diaries), which is a recommended number of days to obtain reliable sleep measurements (Acebo et al., 1999).

After collecting the actigraph watches from our participants, we downloaded data from the device and utilized the software package Action4 (Ambulatory Monitoring, Inc.) to code and score the actigraphy data. To calculate adolescents' sleep patterns, we scored one-minute epochs using the Sadeh actigraphy scoring algorithm, which has been validated and used in studies with children and adolescents (El-Sheikh, Buckhalt, Mize & Acebo, 2006; Sadeh et al., 1994). Sleep onset time was the first of at least three consecutive minutes of sleep and sleep offset time was the time of the last five or more consecutive minutes of sleep (Acebo, Sadeh, Seifer, Tzischinsky, Hafer & Carskadon, 2005).

Sleep Watch Instructions Card

Print these instructions (double sided) on a laminated card and include with the actigraph watch.

Front side of card:**Actigraph Watch**

- The special “watch” that we have asked you to wear is called an Actigraph.
- It collects information about your movement so we can understand sleep and daily activity.
- Actigraphs are pretty tough, so don't worry about breaking them by doing everyday stuff.
- You only need to wear your Actigraph at night when going to bed.

Do NOT wear your Actigraph:

1. In the shower, bath, or while swimming (washing your hands is OK)
2. While playing contact sports like soccer, football, baseball, basketball, etc.



Back side of card:

How to Use Your Actigraph Watch

- Put the Actigraph on your non-dominant hand (if you are right-handed, put it on your left hand).
- There are two buttons on the watch: when the EVT button is pushed, the time will flash, recording when you pushed it. The other button is locked, and pushing it does nothing.
- While wearing your Actigraph watch at night for the first 7 days, push the EVT button when you:
 1. Turn off the lights to go to bed at night.
 2. Get up and out of bed in the middle of the night (to go to the bathroom, etc.).
 3. When you are fully awake and out of bed in the morning.



EVT button

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