

Sleep is critical for human flourishing yet is not valued in much of our achievement driven, twenty-first century society. While it seems counterintuitive that rest would be productive, the more sleep has been studied, the more it has been found to be vital to physical, emotional and mental wellbeing. Sleep is an active and restorative process. During sleep, the body organizes stimuli the brain receives throughout the day, metabolizes toxins, and stores energy among many other functions. It is especially important for adolescents as their bodies and brains are still developing.¹

Sleep deprivation is becoming more prevalent in adolescents. The U.S. Department of Health and Human Services Office of Disease Prevention and Health Promotion introduced into the Healthy People 2030 campaign a goal of increasing the number of students in grades 9-12 who average 8 or more hours of sleep on a weekday night from about 1 in 4 (25.4%) in 2017 to 27.4%.² Though it would impact many students, it is a modest objective, aiming for just a 2% increase². Yet the percentage of high school students who are getting at least 8 hours of sleep per night instead decreased to 22.1% in 2019². Teenagers who get insufficient sleep are more likely to be injured during physical activities³, have greater and more persistent physical ailments^{2,4}, have worse mental health^{1,2,5,6}, poor academic performance⁷, struggle with substance use and other risky behaviors^{2,3} and to be in a motor vehicle crash⁸.

Evidence based recommendations to help adolescents get more sleep abound, with everything from use of a high-density mattress toppers to improve athletic performance² to arguing for a later school start time to accommodate for the hormone driven shift in circadian rhythm adolescents have^{1,6}. These institutional perspectives are admittedly needed, because systemic change drives permanent solutions. In California, a law was passed that the earliest a school could start would be after 8:00am⁶, which effectively adjusted school start times to later in the morning to benefit the sleep of adolescents. However, the pace of bureaucracy is agonizingly slow; later start times have not yet been mandated for middle school students in California or at high school in other states. Furthermore, interventions at an individual level for adolescents experiencing sleep issues seem to be limited. Pharmacologic treatment is not the solution because over-the-counter sleep supplements, such as melatonin, are not recommended in children or adolescents². Additionally, mattress toppers and other sleep interventions such as noise cancelling headphones and sleep masks² can be expensive. Frequently these studies look at

tools for the average high schooler without taking into consideration adolescents with lower socioeconomic status (SES), whose families may not be able to feasibly provide such interventions. Teenagers from a lower SES also have a higher risk of poor sleep impacting the development of internalizing behaviors.⁵ The odds are stacked against adolescents coming from poorer families, especially children of immigrant parents; they are likely to have less resources, fewer connections to the community, and a language barrier. It is an even more complex situation for adolescents who had to immigrate to a new country to escape violence, becoming refugees.

In *Sleep Health*, the journal of the National Sleep Foundation, a systematic review notes that at the close of 2021, nearly 90 million people globally became displaced from their homes to survive⁹. Since then, the first four months after the Russian invasion of Ukraine added another nearly 7 million to the number of internationally displaced persons worldwide⁹. These populations are exposed to horrible violence, fear for their lives, being forced out of their communities, discrimination, and the stress of acclimating to a new country⁹. It is no wonder that adult populations of internationally displaced persons are ten times more likely to be clinically diagnosed with post-traumatic stress disorder (PTSD) than the average American⁹. A large component of PTSD is sleep disturbance.⁹ Even for those without current clinically significant symptoms of PTSD, sleep disturbance predicts the later development of the disorder in adult refugees later on⁹. One study looked at the prevalence of sleep disturbances in Syrian and Iraqi refugees in Australia and revealed that the majority had evidence of clinically significant insomnia symptoms.¹⁰

The prevalence of PTSD or sleep disturbance in displaced adolescents has not been well researched; however, it can be extrapolated that they would also have varying degrees of sleep problems for similar reasons to their adult counterparts. There is research showing how important getting sufficient sleep is for adolescents, as is there research highlighting the psychological trauma of internationally displaced adults and how it detrimentally affects their sleep. Little to no research has been focused on sleep in adolescent refugees. Internationally displaced adolescents are a population in dire need of adequate sleep; they have high rates of sleep dysfunction that is associated with trauma, similar to adult refugee populations⁹. Displaced adolescents could stand to benefit greatly from the basic principles of sleep hygiene. While refugee families may not have access to the same resources to implement sleep hygiene as other

families, there are practical ways to improve sleep quantity and quality in displaced adolescents by limiting screen use before bedtime¹, balancing catch up sleep on the weekends¹¹, attending cognitive behavioral therapy⁹, and having a consistent scheduled sleep routine¹³.

With the relative affordability of smart phones and the genesis of social media came about a new era for adolescents: one of widespread, incessant digital screen use. Much research has been devoted to the potential negative impacts of such large quantities of digital media consumption, including how screen use impacts sleep. Hypotheses for the digital disruption of sleep mechanisms are varied. One theory is that the blue light from screens interferes with the intrinsic production of melatonin, causing the brain to be aroused and delaying sleep. This is due to the fact that the amount of melatonin produced by the pineal gland in the brain varies in response to light exposure. Another proposed reason with evidence from a study in Hong Kong is that the screen use interrupts sleep with notifications and keeps individuals up later than they would normally be, cutting short amount of time in bed.¹²

A recent international systematic review also looked at the association of digital screen use and sleep in adolescents, evaluating over 2,000 articles, ultimately culminating in high quality evidence from 23 studies¹. It found that spending time in the evening viewing digital screens was associated with poorer sleep quality, daytime sleepiness and less hours asleep.¹ Furthermore, the Hong Kong study discussed earlier did see less efficient sleep in those children and teens who woke up to a notification from their phones.¹² Both of these findings are consistent with the literature showing similar associations.^{1,3,6,13,14} It is reasonable to conclude that digital screen use is a contributing factor to adolescents' lack of sufficient sleep and therefore that limiting bedtime digital device use would improve their sleep. However, some would argue that this principle of sleep hygiene would not benefit displaced adolescents, whose families, once displaced, do not have surplus wealth to provide a cell phone to their teen. Yet, digital screens are frequently encountered in adolescents' lives whether they are a personal device used for recreation or not. Even for those without a cell phone, teens from refugee families have extenuating circumstances that are not always obvious but that can push other digital screen use later into the evening. Displaced populations often have fewer resources or more barriers to navigating those resources than other groups, and families must rely more heavily on their children. For instance, it is very likely that many displaced adolescents work part time jobs to

supplement their family's income, or their parents may work longer hours, and they are tasked with more household chores or childcare for younger siblings. These circumstances may delay the student's own homework later into the night. It is also possible that if several family members are sharing one device, that a teenager may be automatically forced to use it later, due to younger sibling's bedtime. If they are using the shared device for recreation, the same idea applies. Another possible scenario is that an adolescent refugee uses a smart phone at night when they cannot fall asleep. If they are already having trouble sleeping, excessive screen use can exacerbate the problem. As discussed earlier, there is an increased prevalence of PTSD related insomnia in displaced persons, and that sleep disturbance is marked by hyperarousal symptoms – nightmares reliving trauma, as well as hypervigilance making it difficult to fall asleep and to stay asleep^{9,10}. Other sleep problems associated with PTSD now under the label “trauma associated sleep disorder” are a REM sleep issue, obstructive sleep apnea and sleep induced extremity movement problems.⁹ With all of the potential challenges adolescent displaced persons encounter in trying to get a good night's rest, they may utilize screens at night to either put off sleep for fear of nightmares, use it as an escape from their problems, or simply to stave off their boredom when they are unable to fall asleep. Whatever the reason may be, use of late-night digital devices will only deteriorate the already precarious sleep quality of these particular adolescents. It is therefore vital for displaced adolescents to limit their screen use in the evenings.

Given all the demands that adolescents from this population face in addition to school, it is not surprising that they have a decreased quantity of sleep on weeknights compared to weekends.¹¹ The deficit between the amount of sleep on weeknights versus weekends is termed “the catch-up sleep ratio” (CUS ratio) by a group of researchers in Korea and is common in adolescents¹¹. They looked at sleep, catch-up sleep and both factors' relationships to depression and suicidal ideation¹¹. They found that adolescents with better sleep quality had fewer symptoms of depression, including less suicidal ideation, and that <5 hours of sleep or a weekend CUS ratio <1.0 was associated with severe depressive symptoms, including an increase in suicidal ideation¹¹. These findings were consistent with other CUS sleep studies in Korea that exhibited the benefits of lowering sleep debt by sleeping longer on the weekends – benefits such as decreased risk of hypertension, obesity, anxiety and depression¹¹. Those studies also found that a >2-hour CUS ratio was associated with reducing risk of depression, however, it is not a linear correlation¹¹. More total sleep did not equate to less depressive symptoms overall¹¹. Too

much sleep on the weekends, specifically a CUS ratio of >1.5 had an association with increased depressive symptoms¹¹. Therefore, up to 1.5x weekday sleep amount on a weekend night benefits a sleep deprived adolescent's mental health¹¹.

However, there are potential issues that could arise with the concept of extended sleep on the weekends. One such debate may be that parents, especially those from different cultures, may see sleeping in on weekend mornings as laziness and therefore an invalid solution to their child's sleep deprivation. While a few parents and adolescents may agree to have an adolescents' bedtime on weekend nights be earlier instead, more likely the adolescent will not adhere to it. This is because physiologically, during adolescence, their circadian rhythm shifts to a later onset of sleep and later awakening from sleep^{1,6}. Perhaps if parents knew about the changes to a teen's sleep cycle and it were explained in the context of puberty and hormones, they would be more receptive. Another argument could be made that this study does not clarify how it could be that the increased risk of depression is associated with both too little sleep and sleeping in extreme excess on the weekends. This line of reasoning assumes that the association is unidirectional: if sleeping too little increases depressive symptoms, then sleeping excess should not increase depressive symptoms. The flaw in this logic is exposed in further research between mental health and sleep – where the relationship between sleep and depression is found to be bidirectional⁵. Poor sleep can contribute to depression⁵, but similarly to sleep disturbance in those with PTSD, those with depression may also have poor sleep.⁵ That poor sleep can come either in the form of shorter duration of hours slept, or as inefficient sleep – resulting in longer hours slept when given the chance, such as on the weekend for adolescents. Furthermore, while adolescents may gain sleep with high CUS ratios, they sacrifice other activities while sleeping. Activities like exercise, socializing and community involvement may be protective factors for depressive symptoms. Based on the recommendation for average nightly hours of sleep from the Healthy People 2030 objective and the Korean study, for their mental health adolescents should get an average of at least 8 hours of sleep per night and not get <5 hours of sleep on any one night^{2,10}. If they are consistently lacking sleep, they should sleep up to but not over 1.5x their weeknight average on the weekends to make up for their overall sleep deficit. If well balanced, weekend catch-up sleep can be an intervention for sleep deprivation that also minimizes depressive symptoms. In the refugee population the prevalence of PTSD is high, therefore, a realistic strategy that promotes sufficient sleep and improves mental health is invaluable.

Fortunately, there are well researched treatments for PTSD due to the Veteran's Affairs programs, and while that population shares some characteristics with the refugees, there are also many distinctions in the two groups. Several therapies including but not limited to prolonged exposure therapy and cognitive processing therapy have been studied extensively in war veterans but have not been researched enough to be validated in displaced persons⁹. In addition, treatments for PTSD frequently leave insomnia lingering despite improving other symptoms⁹. Narrative exposure therapy (NET) has proven to be effective at treating PTSD in displaced persons despite cultural differences and limited access to healthcare⁹. However, there is no research on whether NET improves PTSD sleep disturbances⁹. While not specific to adolescent displaced persons, the best-known treatment for PTSD induced insomnia is cognitive behavioral therapy specific to insomnia (CBT-I)⁹. In populations with PTSD, it is shown to improve sleep disturbance, lessen fear associated with sleep, and some evidence suggests it may effectively treat the other PTSD symptoms as well.⁹ At first glance, this may not seem a practical approach to improving sleep in displaced adolescents due to the hurdles standing in the way of simply getting an adolescent refugee to a CBT-I session. Language barriers, lack of health insurance, knowledge gaps of resources available, inability to navigate those resources, isolation, differences in cultural mindsets, transportation, lack of a primary care provider for referral, are all very real obstacles to care. However, the systematic review from Sleep Health mentioned earlier found that CBT-I is

“...highly amendable to different modalities and has even been shown to be effective in reducing insomnia in a day-long community workshop context. This day-long 5-hour CBT-I workshop consisted of 7 short sections: basic sleep education; explanation of the CBT-I model; sleep habits and hygiene education; education on sleep restriction and stimulus control; adjusting sleep-opposing cognitions; sleep preparation and relaxation techniques; and action planning for improving sleep.”⁹

This same one-day format could be adapted to displaced adolescents and their families. Cognitive behavioral therapy for PTSD insomnia has also been found effective in shorter, online and phone formats as well⁹. Additionally, some of the barriers mentioned may lessen with time spent in the new place of residence, as refugees learn to navigate the systems in place, become involved in communities, and gain confidence in their new environments. Adolescents are

particularly able to adapt and learn quickly. Several of the other barriers can be overcome with excellent care by healthcare professionals including public health officials, front office staff, therapists, providers and nurses. The potential improvement in quality of life with treatment of sleep disturbances and PTSD would be monumental and potentially impact their trajectory in certain areas as adults.

Finally, one of the most important pieces of sleep hygiene is having a consistently scheduled sleep routine. The Center for Disease Control and Prevention (CDC) discusses the importance of a consistent bedtime and time to wake up in the morning, as it helps adolescents increase the quantity of their sleep¹³. They recommend setting a screen time curfew, limiting digital device use to rooms outside of where they sleep, and limiting light exposure right before bed, especially avoiding white, blue or intense lights¹³. These boundaries create an anticipated routine, which helps the mind and body prepare for sleep. For the same reason, adolescents need routine activities that are calming to do before bed¹⁴. They should avoid stressful, exciting or stimulating activities late in the evening, as well as caffeine consumption.¹⁴ It is extraordinarily important for refugees who may be in a survival mode all day to have predetermined relaxing activities to fight the default hypervigilant state common in those with PTSD. If a few relaxing and restful activities can be identified, they can also be used when unable to sleep or waking up in the middle of the night¹⁴. Some may argue that the simple sleep hygiene practices of having a schedule routine and sleep boundaries are not enough to help displaced adolescents with PTSD, severe insomnia and sleep-related fear. Sleep hygiene may not be a solitary treatment, but it is the foundation for improving sleep and has been well studied in adolescents. Furthermore, if an adolescent is already practicing basic sleep hygiene and still struggling with sleep, their PCP is more likely to look deeper for the cause of their insomnia. In doing so, the chances are higher that they will recognize their PTSD and suggest CBT-I.

Public health outreach is vital to reaching adolescent refugee populations for sleep interventions. Because CBT-I is the most definitive therapy for sleep disturbances associated with PTSD, several hour community events are already proven⁹, as discussed above, to be viable options. They can be held at schools, churches, libraries, clinics and other community centers in specific neighborhoods that have higher displaced persons population density. Cultural differences may hinder these adolescents or their parents from seeking care for mental health

issues due to stigma. However, teens and families may be more open to discussing sleep problems than other PTSD symptoms¹⁰. It is important to connect these adolescents and their families with resources, and an effective way to do so is to have an advocate in the community that knows how to navigate the healthcare system. Ideally this person would be their primary care provider, supported by a primary care team, including nurses, social workers, medical assistants, and behavioral health specialists – a whole clinic. The reality is that only a fraction of adolescents with sleep disturbance have an opportunity to be seen in clinic. Therefore, every effort must be made to correctly screen, diagnose and treat these adolescents when they do walk through clinic doors. Best practices for education would be to have CME or mandatory annual courses for PCPs on both sleep in adolescents and PTSD in displaced persons. This training could include workflow for provider and medical assistant to screen for both sleep issues and PTSD in adolescents and adults. This could be achieved either by the provider using simple history taking questions or using already existing, validated screening tools. Besides referral for CBT-I, providers should discuss sleep hygiene, doing patient education and providing resources for after the appointment.

For the adolescents who never make it into clinics, clinicians and nurses can do basic, brief teachings on sleep hygiene tailored to refugee populations. Practical interventions, such as those outlined earlier in this paper, can be given in short sessions focused on application of sleep hygiene in similar settings as the CBT-I-day events⁹: after service at synagogues or temples, in libraries, partnering with local businesses such as restaurant owners, or philanthropies. Pamphlets could be distributed at these events that summarize the pillars of sleep hygiene, introduce CBT-I and have resource contact information. Even if audiences are all adults, targeting community gathering places increases the likelihood that displaced persons will share information and resources with other displaced families from their own culture. This is important because for sleep hygiene to be effective in adolescent refugees, their parents must be invested as well. Parents need to understand the importance of catch-up sleep, letting their child sleep in on weekends in moderation. They are likely going to be the party driving accountability on digital screen use limits. They also must be willing to let adolescents work on homework that requires a computer sooner or schedule their teen's screen use on a shared device earlier. If homework must be done later in the evening because an adolescent's job supplements the family income, printing homework at school or a library is a viable solution.

These teenagers are exposed to horrendous trauma and uprooted from their previous lives; they are exactly the population that requires evidenced-based, feasible solutions for their sleep problems. Interventions including bedtime routines¹³, cognitive behavioral therapy⁹, weekend catch up sleep¹¹, and boundaries around digital screen time¹ are realistic tools to improve inadequate sleep for displaced adolescents, despite their limited resources. Most adolescents in the US are already functioning at a sleep deficit constantly¹. Inadequate sleep is linked with more sports and motor vehicle injuries, poorer academic performance, depression, behavioral issues, and chronic pain.¹⁻⁸ In addition, adolescent refugees must deal with fear of reliving their trauma in nightmares, inability to fall asleep and a consistent state of hyperarousal^{9,10} that makes adequate sleep particularly difficult to obtain. Yet, there is so little research on sleep difficulties or even PTSD in displaced adolescents. Sleep is a complex process that is mediated by many compounding factors; more research is vital to adapt sleep hygiene practices and insomnia therapies for their age, as well as their unique situation of PTSD and cultural differences, especially given the increasing incidence of displaced peoples in the world.

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