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Sleep Disorders in the Pediatric Population: Outcomes Resulting in Physiological, Developmental, and Behavioral Manifestations

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ABSTRACT

Sleep disorders are a growing concern in the pediatric population, especially because of their potentially detrimental effects on a child's development. Sleep is critical for the health of a child. Accordingly, disruptions in sleep can lead to impairments in cognition, behavior, and various other physiological and psychological manifestations. Certain sleep disturbances and disorders are preventable and even treatable, especially when they are properly diagnosed. When a child is diagnosed with a sleep disorder, they must receive the proper medical attention and treatment plans to effectively dissipate their symptoms and mitigate the detrimental consequences of their condition. To understand the appropriate treatment plans for pediatric sleep disorders, researchers must investigate the symptoms and behavioral outcomes of the disorders. Researchers have found that the consequences of sleep disorders include physical ailments, poor school performance, and delayed development of an individual's behavioral and social skills. The primary goal of this study was to determine the detrimental effects of sleep disorders and abnormalities in the pediatric population. To perform this literature review and retrospective analysis, resources such as PubMed, Science Direct, and additional academic journals were utilized. Moreover, primary information was gathered from pediatric sleep disorder cases and further analysis of the detrimental effects of these sleep disorders on pediatric patients. In this review, the repercussions of sleep disorders in a young life are explored, specifically to analyze how sleep disorders impair a child's physiological, developmental, and behavioral growth.

BACKGROUND

Sleep is a crucial element to our health and homeostasis. There are many lenses to look through when talking about sleep, but one significant one is that of when we are children. It is especially important when we are in our prime developmental stages. Receiving the appropriate amount of sleep one needs, as a growing individual, is paramount and a determinant of one's mental and physical capabilities during this period. There are consequences from not receiving enough sleep. As adults, many experience this due to schedules, occupations, and other commitments, which have been the focus of many research studies. Although, there has not been much research of this topic in children, it has become more prevalent and pressing. In fact, there are studies that have noted that there is an under diagnosis of sleep disorders in children (Meltzer et al., 2010). Not only are there consequences to not receiving enough sleep, but also it is important to recognize that there are other causes to these consequences. Some of the most prevalent causes are sleep disorders and other abnormalities regarding sleep. If diagnosed with a sleep disorder or sleep disruptions, children and adolescents may have a challenging growth transition and this can disrupt their physical, emotional, cognitive, and social developmental stages (Calhoun et. al, 2016). In particular there can be major disruptions neurologically, psychologically, and physically. A specific effect from sleep conditions and a potential cause are headaches (Rabner et al. 2018). Some of these primary skills include learning, memory, and motor abilities. With these, the development of relationships with peers, behaviors in differing situations, and school performances are all transforming and strengthening in a child. The result of these changes can too affect the way a child will grow and lead into their adult life. Many bi-directional relationships

exist between known factors of sleep disruptions; headaches being one significant relationship to observe when looking at a correlation between sleep disorders and its resulting changes in a child's demeanor (Rabner et al., 2018).

It is known that for children who are ages six years old and above need about 9 to 12 hours of sleep. This number gradually decreases as a child becomes older, but it is important to note that when a child is youngest, they need ample amounts of sleep ("CDC," 2019). This is because they are at a vulnerable and critical developmental period in their process of growing. Normalcy and gaining adequate amounts of sleep is "an opportunity for the body to conserve energy, restore its normal processes, promote physical growth, and support mental development" (Carter et al., 2014). If there are circumstances in which this sleep is not being received or disruptions to their sleep, there are numerous issues that can result because of this. In addition to the negative effects of lack of sleep in some of these areas, this ultimately leads to changes in a child's every day functioning (Calhoun et al., 2016). Some of the noticeable alterations can be in school performance, such as paying attention, difficulty learning, and decreasing grade results. Another set of changes that can ensue are those both at home and at school with behavior and emotions. Mood irritability is a major result of lack of sleep, along with a child resisting to go to sleep at night. Other changes can also include that of general mood transitions, such as personality changes and behaviors that are generally inconsistent with a child's personality (Calhoun et al., 2016). There are bi-directional relationships that exist with sleep and other factors known to disrupt sleep. Some of these include anxiety, depression, and pain from headaches (Rabner et al., 2018). It is important to understand that the lack of or disruption of sleep can lead to unwanted

manifestations of the body and mind and that existing conditions can be harmful to one's sleep. For a child, this can become a major hindrance in their growth. This growth consists of neurological, physical, and emotional milestones that are to be met from a young age.

In children, up to 50% will experience some type of sleep disturbance (Carter et al., 2014) and between 20% to 30% of children will experience sleep problems (Dimitriou et al., 2017). Sleep disorders and disturbances in the pediatric population can range from snoring to obstructive sleep apnea. With the diagnosis of a sleep condition, it can manifest negatively in a child resulting in disruptive behaviors, emotional instability, and a decrease in school performance (Kohler et al., 2018). This can be a major determinant and even potential deterrent of one's future progression and development. The normal functioning of a child is set through the foundation of how they develop, with sleep being a key factor. With any type of sleep disruption, a child's demeanor can dramatically change. This can be seen through external behaviors, but there are also internal changes occurring at the same time that needs to be taken into consideration. Internally, the brain is still in development, as is the rest of the body. During this time, the brain is making connections and constantly learning about its environment. Memory, language, and reading are just a couple integral developments at the forefront of growth with the brain (de Bruin et al., 2017). A child is in the beginning stages of learning how to use their brain and the infinite connections that are being made each day. Motor skills are being pruned, particularly physical activities or interactions with their peers ("Children's Health," 2019).

There are a few essential tools that can be used when assessing a child's sleep disruption in conjunction with potential underlying conditions and the results of one or both of these afflictions. Properly diagnosing and effectively treating the young patient can be transforming for that child, by properly using corrective measures. As mentioned prior, many relationships exist with sleep, whether it is the cause or effect (Calhoun et al., 2016). For example, evaluating whether an existing condition such as anxiety or depression is the cause or effect from sleep, can change the course of a child's treatment plan and lifestyle (Rabner et. al, 2018). Treatment is imperative in ensuring that the child's growth and development are progressing with the appropriate methods used. Even the methods that a child is advised or uses on their own can affect their ability to sleep. In regards to medication, sleep too can be disrupted because of the type of medication prescribed, its side effects, or at the time it is taken (Rabner et al. 2018). On the other hand, if there is an underlying condition in conjunction with the sleep disturbance or disorder, such as headaches, the coping mechanisms solely with headaches can display a cycle of sleep disruption. For instance, children and adolescents may use naps and rest to try to alleviate their symptoms for their headache pain. Although this could help in the short term, in the long term they are creating a sleep cycle where they do not sleep efficiently at night. This still adversely affects their health because not only are they experiencing an untimely sleep schedule, but also their headache could reappear and become a chronic issue (Rabner et. al, 2018). As a result, other additional conditions and/or symptoms that affect a child's growth and development can simultaneously manifest when a lack of sleep is involved in their everyday life.

Types of Sleep Disorders

In order to delve deeper into the discussion and research regarding sleep disorders and disturbances, identifying the most common types is at the forefront for learning more. When thinking of sleep disorders, many think of those related to adults or specific cohorts, such as those in college. This is because of the well-known nature of sleep disorders and disturbances in these particular groups within the population. Through understanding the effects of the sleep disorder or disturbance itself, can allow for a better idea of subsequent effects of those initial effects. Therefore, recognizing where certain physiological and neurological issues stem from is crucial to treating and preventing further detriments in any individual, especially in the pediatric population. One of the most important aspects of sleep disorders and sleep disturbances is that there is a huge loss of sleep. Even with general sleep deprivation, there is a direct correspondence with more emotional vulnerability: with more sleep deprivation, more negative emotions are experienced (Dagys et al., 2011). There is a loss of balance between emotions when sleep is not met. When a child has a sleep disorder, they become more susceptible to other accessory sleep abnormalities and a repeating, negative imbalance in sleep and everyday functioning (Carter et al., 2014). Everyday functioning includes being able to carry out activities, in school or outside of school, in a manner that is devoid of abnormalities. There are various sleep disorders that are at the root of the negative changes seen in children who are experiencing them. First, one of the most predominant sleep disorders, which generally results in unfavorable effects in children is obstructive sleep apnea (OSA). In OSA a child stops breathing during sleep, usually due to an obstruction in their airway. This obstruction can present in various forms in the child ranging from mild to

severe. Being observant is key to these situations and disorders especially for the child's health and wellbeing, but also for their safety. This particular disorder can be accompanied by snoring, sleep positions that are abnormal, enlarged tonsils and adenoids, daytime sleepiness, and cognitive and behavioral issues (Owens, 2019). Some children who are more at risk for OSA include those who are overweight, have enlarged tonsils and adenoids, or craniofacial syndromes. Next, parasomnias such as somnambulism, also known as sleepwalking, is very common among the pediatric population. During an episode, it is difficult to wake the child or adolescent, followed by confusion and agitation. Some episodes can be more severe than others, including putting oneself or others in dangerous or unusual situations due to their behavior during the episode (Owens, 2019). Sleepwalking can even be a result of others sleep disturbances, such as sleep terrors. With this, sleep terrors constitute 1% to 6.5% prevalence in children and generally present in early childhood (Carter et al., 2014). Characteristics of this disorder can include difficult to awaken, perceived intense fear, such as screaming, walking, or confusion. Accompanying these disorders often are nightmares that are experienced by many children who may already have been diagnosed with sleepwalking or night terrors. Nightmares are more common and can even be associated with additional disorders that are not directly related to sleep (Owens, 2019). During a nightmare one's sympathetic response increases due to troublesome dreams. Continuous cycles are evident, such as those mentioned above are common because of the recurring nature. Ultimately, with most sleep disturbances, sleep deprivation follows in a significant way. It is imperative to recognize these signs and symptoms in children and adolescents to provide necessary intervention when needed.

Additional common sleep disturbances among children and adolescents are insomnia and restless leg syndrome ("Cleveland Clinic," 2020). Restless leg syndrome can occur during sleep in children and adolescents, where there is an uncomfortable sensation in their leg, causing an urge to move their legs. This urge can be uncontrollable and the individual can be unconsciously aware that it is occurring. This urge and feeling that a child may experience is usually exhibited around bedtime or at time where their legs are inactive ("Stanford Health Care," 2019). This can affect sleep due to its prolonged sensitivity to the child and the methods of the child trying to remove the urge or sensation. The outcome is that of sleep disruption because more time is now needed to fall asleep because of the initial urge of moving their legs or repeated discomfort even during sleep. In some cases, children and adolescents may awaken from sleep in order to dismiss the sensation of needing to move their legs ("Cleveland Clinic," 2020). Insomnia has various categories and is commonly seen in children, mainly those between zero and five years old. One predominant subtype is behavioral insomnia whereby children are resistant to parent's or caretaker's requests to go to sleep or if time limits before bed are in place. Other occurrences with behavioral insomnia include frequent night awakenings, coupled with the child or adolescent being unable to fall back asleep in a short time frame. This awakening or arousal occurs usually at the end of a 90-minute sleep cycle and the child is unable to fall back to sleep. The child usually falls back asleep if the same conditions are presented to him or her. Due to the continuous cycle of insomnia in children, this pattern of behavior and sleep becomes learned under these conditions. Therefore, breaking this cycle is required in order for the child to adhere to regular sleep patterns and receive an adequate amount of sleep each night (Owens, 2019). Some other

factors that can be seen in behavioral insomnia in children are inadequate parental limit-setting and psychophysiologic insomnia. In preschool aged children and older, resistance and demands are met when it is time for the child to go to sleep. Hence, a prolonged onset of sleep becomes an ongoing pattern. There can be multiple reasons for this delayed onset such as being afraid to go to sleep, thus behaviors are displayed that visibly delay this onset of sleep, such as crying or consistently leaving the bedroom to go to find comfort from parents. Set bedtime rules are ineffective or absent from the child's routine (Owens, 2019). In contrast to this, psychophysiologic insomnia is due to anxiety regarding falling or staying asleep. This could be due to already present abnormalities with sleep and their sleep environment, which leads to maladaptive cognitions about the results of their sleep issues (Owens, 2019). The culmination of features seen in behavioral sleep insomnia are followed by an insufficient amount of sleep. These characteristics can be seen together in children and adolescents, whereby some are able to grow out of these behaviors, while they persist in others.

Along with sleep disorders, some sleep disturbances can too have measurable negative effects on children and adolescents. Several sleep disturbances were aforementioned in the above sleep disorders, but can present alone, causing undesirable consequences in the physiological, neurological, and psychological aspects of an individual. Sleep disordered breathing (SDB) is an umbrella term for problems with breathing during sleep and commonly seen in children. When a child experiences an issue with breathing during sleep, their body perceives this is as choking and their fight or flight response is activated (Kaihua et al., 2018). As a result, their sleep is disrupted because of the arousal and sudden awakening that they have experienced. This term

comprises sleep patterns of children that turn abnormal due to snoring, restless sleeping, awakening in the night, and additional obstructive events. Some categorize sleep disordered breathing as a disorder or a multitude of disturbances that a child or adolescent may experience in their sleep habits. This depends on the severity of their symptoms and how and if they progress further. For example, OSA can develop due to sleep disordered breathing, but can also be categorized under sleep disordered breathing (Calhoun et. al, 2016). One of the most common causes is enlarged tonsils or adenoids, as discussed prior. The importance to recognizing and diagnosing sleep disordered breathing is ruling out some of the other sleep disorders aforementioned, along with additional underlying medical conditions. Some symptoms and potential causes of SDB include snoring, that is particularly loud for most of the nights, bedwetting, and cardiovascular difficulties (Calhoun et. al, 2016). Snoring has shown to have negative effects on cognitive functioning and behavioral problems when linked with sleep-disordered breathing (Smith et al., 2017). Initially having a diagnosis of an SDB can turn into a more serious sleep condition with more unwanted consequences, if not treated immediately. With all sleep disorders and sleep disturbances in children recognizing the signs and symptoms are paramount to preventing damaging effects to their development in all aspects of their growth.

Understanding sleep disorders and sleep disturbances in the pediatric population is crucial to properly identifying the correct diagnosis, but also to confirm that no underlying conditions or similar symptoms of other conditions are actually present. As previously mentioned, more than one sleep disorder or disturbance can exist with another or because of another. Children and adolescents can experience comorbidities especially

when it comes to disruptions in sleep. Some symptoms of sleep disorders can also look like that of other conditions. For example, muscle pain and tightening can result because of sleep disruption or because of anxiety (Rabner et al., 2018). On the other hand, anxiety can take shape in other forms, such as inattention and agitation, which are similar symptoms to that of sleep disorders (Brown et al., 2018). Emotional issues that result can be due to both anxiety and lack of sleep. Albeit, it is essential to note that this is where comorbidities are a considerable element to tracking sleep disorders in children because they could also be undergoing conditions that have overlapping symptoms (Gregory et al., 2012). The nature of additional conditions coupled with sleep disturbances and disorders sets a precedence for abnormalities in development, specifically cognition and functioning. Hence, it is crucial to remember that with many conditions seen in children they are not only multifactorial, but have multiple relationships with and because of one another. Due to the long-term effects of other conditions, in conjunction with a deficit in sleep, can be extremely harmful at such a young age. Receiving treatment and potentially changing one's lifestyle habits are key to try to secure the proper development of a child. It has been known that a lack of sleep can lead to an underperformance in academics, social situations, and physical activities. An ongoing pattern such as this requires intervention for the child, allowing them to carry out daily functions to their full potential. The comorbidities can stem from the multi-directional relationships that exist with many conditions (Meltzer et al., 2010). These conditions are mainly psychological that can manifest physically.

Children and adolescents are continuously learning and growing. To do so effectively, certain developmental requirements and milestones must be met. In a child's

daily routine, they are constantly utilizing and perfecting skills by developing their cognitive and motor abilities. If they lack an element necessary to perform daily functions, then the continuation of their learning is halted, until it is resolved. In particular, sleep is required for children to have enough energy to perform daily activities and also to stay focused on tasks, thereby allowing for continuous learning to occur ("Children's Health," 2019). It has been shown that sleep disorders and disturbances can have short-term as well as long-term effects. For example, sleep disorders can deleteriously affect a child's next day functioning. However, they can also influence a child's long-term development, especially if there is no intervention at an early stage. A child's brain rapidly develops from in utero and onward throughout their childhood. The brain serves as a fundamental organ, performing a variety of crucial tasks to sustain life and acting as the major control center for our development and function. The brain's development is especially important to consider for a growing individual. During childhood, one's mind is constantly primed through learning. The brain requires rest to maintain this functioning ("Children's Hospital of Philadelphia," 2019). At an early age, language and reading abilities are just a few of the skills that are being primed. To improve these vital skills, the brain needs an appropriate amount of sleep each night. Emotional regulation, cognitive functioning, and motor skills are a few of the other cardinal abilities that children and adolescents are able to master as a result of receiving enough sleep, thus allowing for normal brain functioning. Understanding the brain's functional abilities and the pivotal role that sleep plays in proper development is key to better comprehending how lack of sleep and sleep disturbances can negatively impact a young individual's emotional, mental, and physical states.

Extensive research and data analyses have been conducted to investigate sleep deficits caused by sleep disturbances and disorders in the pediatric population today. The consequences of the lack of sleep have been shown to be the source of multiple physiological and psychological issues. Physiologically, decreased sleep typically results in next day fatigue, inability to concentrate, inhibited motor skills, and impairments in memory, just to name a few. Additional cognitive impairments have also been shown to present in children who have sleep disorders, which can lead to decreased performance in school and in other daily activities (Kohler et al., 2018). Because childhood represents the formative years of learning and growing, children who experience these sleep disorders and disturbances need to be treated appropriately and efficiently in order to resolve the issues. Along with neurocognitive and physiological impairments, there are psychological implications as well. Psychological implications can range from anxiety to anger, covering a wide spectrum of behavioral issues (Dimitriou et al., 2017). These behavioral issues can manifest in many forms, such as acting out both in school and at home, lack of participation in certain activities, and noticeable patterns of unstable moods that were unseen before (Dimitriou et al., 2017). A few of the consequences presented here can carry on throughout a child's growth and become a new norm even into their adulthood. Therefore, the sleep deficits that a child may be experiencing need to be diagnosed and treated as soon as possible, so that the child can resume their normal growth and development. In fact, one of the most transformative regions during development is a child's brain. Their important cognitive processes are being prepped and primed here, to adapt, collect, and carry information that will help them later in life. Whether this information regards their motor skills, language, attention, executive

functioning, problem solving, or their emotions, it is key for this area to be functioning properly at all times (Kaihua et al., 2018). Most conclusions and results were similar in regards to the physiological and psychological changes in children. Although, it is important to remember that certain manifestations of symptoms and noticeable changes could be different depending on the type of sleep disturbance or sleep disorder that is diagnosed.

When looking at the data collected and analyzing the many cases and research involved, a commonality in pediatric sleep disorder and disturbance cases was that they were underdiagnosed or even misdiagnosed (Meltzer et al., 2010). There are several potential reasons as to why these disorders and disturbances are underdiagnosed. For example, parental supervision and attention may be lacking in the child's life, so parents do not realize when to contact a physician regarding their child's sleep habits. Moreover, other conditions might be deemed the cause of many of the symptoms exhibited in sleep disorders and disturbances, so a child could be treated for other disorders rather than a sleep disorder. Alternatively, some disorders can present transiently, therefore symptoms and additional resultants are not chronically present. It is important to note that other conditions that are first present can initiate sleep issues in children (Moturi and Avis, 2010). Still, many sleep disorders and disturbances exist without additional or underlying conditions. Additionally, it is critical to observe day time functioning in children who may experiencing continuous decreased sleep, to ensure that proper measures are taken to adjust their lifestyle in order to receive better sleep. More help may be needed for a child depending on their range of symptoms and where they are in their development process (Owens, 2019). Further evaluation may also be essential to determine the true cause of

the lack of sleep or to confirm that a sleep disorder or disturbance is present. This all begins at the observation and diagnosis processes, in order to ensure that there is not a misdiagnosis in the converse direction, being that there is another condition that is actually causing the sleep disturbances.

Treatment

Treatment plans must be set in place in order to move forward and for the child to regain normalcy in their daytime functioning and nighttime sleep schedule. There are various techniques for intervention to take place and to break the cycle of certain sleep disturbances and sleep disorders. With a diagnosis such as this, the first treatment plan may not always be the most effective for the child, therefore multiple changes and instances may be necessary to see an improvement. Albeit, one intervention or treatment plan may not be the same for each child or the same for the same condition that they are experiencing. Catering the treatment plan to the child and their particular sleep ailment is critical for positive changes to made to their health and wellbeing (Owens, 2019). After diagnosis of the sleep disturbance or disorder, depending on the severity, surgical intervention may be the method to resolve it or prescribed medication could aid in diminishing the majority of or all of the symptoms (Moturi and Avis, 2010). Changes to lifestyle such as using technology and other inventions that could help with the particular sleep disorder present could be of use to the child. Physical changes to their environment can be made as well for treatment, such as particular usage of pillows, blinds, and even technological devices. Conversely, devices such as smartphones, tablets, and laptops can further exacerbate symptoms of the disorder or disturbance (Owens, 2019). Therefore, limitation or removal of these devices might be a treatment option for the child.

Another treatment option that is common to most children who have a sleep disorder, is for parents or caregivers to devise a plan that is conducive to their child's sleep schedule and symptoms. This requires a team effort of the family or caregivers and their child (Fleishman, 2012). Some of the technology particularly used at nighttime for children can be more harmful than helpful, hence recognizing when they are becoming detrimental is important, as well as allowing the child to understand this as well. Even though technology today has become a cornerstone of learning, there is a line that can be crossed when learning is halted. One of these instances is when a child or adolescent uses technology for entertainment purposes, especially before bed (Owens, 2019). Their entire sleep schedule can negatively be changed and result in too great of a lack of sleep. Often times, setting a schedule in place, such as limiting devices and setting a bedtime can be exactly what a child needs to eliminate their sleep issues. Having a night routine can be considerably helpful to a child's wellbeing and mental state (Mindell and Williamson, 2017). With this, allowing for an environment that is most opportune for the child's sleep is significant in preventing and eliminating sleep disorders and disturbances. Suitable changes may need to be made by the parents or caregiver to assure that the modified environment is sufficient for the child.

Depending on the severity of the disorder or disturbance, more intervention may be required in regards to the child's academic learning and additional activities. Involving the child's school teachers and nurses may be a possibility in order to inform them of the present situation and if extra assistance is needed to receive the education that they may be lacking in due to the significant symptoms that are causing decreased school performance. Altering one's lifestyle is one of the most prominent forms of treatment for

sleep disturbances and disturbances. However, some of the changes may be adapting to the sleep disorder itself rather than eliminating it. Nighttime and daytime changes are generally necessary for children who lack sleep not only to resolve the condition, but to achieve a better sense of normalcy and continue proper growth and development (Moturi and Avis, 2010). Various forms of therapy can be used to determine the root of the issue, cope with a chronic condition, or to adjust the body to a new lifestyle. Therapy can be helpful in multiple ways, especially for children, because they can make alterations to their behavior and mentality early in development Later in life, they will have acquired skills to help prevent them from further disturbances or proper ways to manage symptoms.(Owens, 2019). Therapy can be helpful especially when other options such as medications or physical changes to one's environment, such as alterations to their bedroom, are not completely effective. A key to the treatment plan is also effective communication between the child and the physician. In order to better understand the child's daytime schedule and sleep schedule, productive dialogue is needed as well. Several treatment options exist for children with sleep disorders and disturbances, but this relies on the specific sleep disorder that the child is faced with and factors that contribute to their environment.

Along with a trusting relationship between the child and physician, as well as the child's caregivers, ensuring that the current treatment plan is effective is one of the main concerns. Due to the limited research that exists about sleep disorders and disturbances in the pediatric population, there is not always one treatment option that is applicable to each child or adolescent. Thus, depending on the sleep disorder itself and the child's own lifestyle, creating a plan that could prove to be successful may require multiple trials. It is

also important to note the possibilities of underlying conditions or existing comorbid conditions. Factoring in secondary conditions is essential because there is potential that negative overlap could result, with a treatment plan in place for a sleep disorder. Some information about certain sleep disorders are known more than others, which can be useful to physicians and their pediatric patients who also are diagnosed with one of those sleep disorders (Meltzer et al., 2010). Another crucial aspect of the treatment plan is analysis and observation after one is in place. One would want to see positive changes to symptoms that the child may have been experiencing previously. For example, school performance and daytime functioning may be noticeably improved with an initial treatment plan in place. Continuous checkups on children and adolescents experiencing lack of sleep is especially central to the healing and adapting process of sleep disorders, but also in regards to furthering our knowledge about pediatric sleep disorders and disturbances.

Prevention

With the current studies published, one of the key elements that must be implemented as research continues, is awareness (Moturi and Avis, 2010). Due to the underdiagnosis of sleep disorders and disturbances in children, there is a lack in the knowledge and understanding of signs and symptoms that present in the pediatric population. This is mainly due to the overlap of symptoms with other conditions or attributed to the normal growth process in children (Rabner et al. 2018). Not only is this common in sleep disorders and disturbances, but with other conditions as well, which poses challenges to the recognition of sleep disorders process. Due to the already limited nature of sleep disorders and disturbances in children, it becomes difficult for parents and

caregivers to properly monitor symptoms of what their child is experiencing. Recognizing the signs and symptoms are crucial to this process. In order to be better equipped to do so, more education is needed for both children and parents to bring awareness and prevalence of sleep disorders and disturbances, but to also be conscious of nighttime and daytime changes that are attributable to the lack of sleep (Mindell and Williamson, 2017). The importance and goal are to educate children and families abut sleep patterns and how they affect cognitive abilities inside and outside of school. Emphasizing the impotence of sleep, as well as the negative consequences that can come from the lack of it are at the forefront of this education process. First, implementing more educational and awareness strategies in school systems would be a key source for children and parents to learn. Utilizing more lecture speakers, teachers discussing the prevalence of sleep disorders and disturbances, and school faculty having open discussion with their students about both their performance in school and their environment at home are a few methods needed to spread awareness (Owens, 2019). Next, the use of graphics in schools, as well as in other populated areas where children and families congregate could also aid in the educational evolution of the lack of sleep, symptomatology, and consequences to this in pediatrics. Posters, lists, and videos are some potential methods to deliver this information, especially in the school systems. Using details and accurate information that is understandable to children and caregivers is just as important as the distribution of these graphics. Making sure that the graphics will be read by providing direct content, this will allow others to better comprehend what is happening in the pediatric population now, how to recognize signs of sleep disruptions, and to try to take the proper preventative measures. Another vital area to add these graphics of information

would be in doctor's offices, such as in the waiting rooms and examination rooms. Specifically, in pediatric offices where children and parents are more likely to look at and read the information given on posters and other signs. Even videos describing the importance of sleep and its consequences without it could supply valuable facts, that may be otherwise not known to families. These could be played throughout the waiting rooms or posted on a social media platform that could allow for the public to watch and learn from. There are numerous methods to utilize to spread awareness and factual information to others, that could efficiently and quickly distribute information on the prominence of sleep disorders and disturbances in children.

In addition to the graphics that could operate in many different forms and institutions, other preventative measures can be taken as well. Through alternative educational techniques, parents and caregivers understanding the importance of sleep for the proper growth and development of their child is paramount to alleviating the issues seen today (Moturi and Avis, 2010). One main preventative measure that could be put into practice would be cognitive examinations in schools. Even though schools generally test cognitive abilities each day through academic learning and physical activities, a particular cognitive test that school nurses could perform, is an option to regularly check on children to see if they are experiencing any symptoms relative to sleep disorders and disturbances. These tests could be used as a marker tool as well to better examine a child's overall wellbeing. It can be difficult for school faculty to fully know a child's environment outside of the school; therefore these examinations can provide a little more insight into their home life and particularly their sleep schedule (Reidy et a., 2016). This can be especially helpful when there are noticeable behavioral or academic changes to a

child that a teacher or another faculty member may notice. This could also be advantageous for parents and caregivers who may not be able to see a physician immediately if they first notice possible negative changes to their child, such as behavioral outbursts, a decline in school performance, or difficulty functioning during their daily life (Reidy et al., 2016). This would be a key preventative measure that would help parents and caregivers not only better understand what their child may be experiencing, but also knowing what steps to take early on. Aforementioned, difficulty also lies within the diagnosis process because of the overlap of symptoms and changes that a child can experience (Moturi and Avis, 2010). Hence, additional cognitive exams could help with the process of narrowing down what the child may be facing. Another preventative measure that would pose to be helpful would be ensuring that children and adolescents are attending their necessary well-checkups with their pediatrician and any other specialist they may be seeing. The careful examination performed at these visits could also help detect patterns of sleep disorders and disturbances. Treatment plans can be implemented sooner once a concrete diagnosis has been determined. Ruling out other conditions can be effective in determining the root of the symptoms and changes. Additional, visits may be needed if there is a diagnosis of a sleep disorder or disturbance, in order to create an effective treatment plan.

Stressing the importance of sleep and routine schedules for children and adolescents is key to better preventing a major lack of sleep, and therefore cognitive functioning (Mindell and Williamson, 2017). More knowledge and awareness regarding a child or adolescents' growth and development in relation to sleep can allow for families and others prepare and try and prevent negative outcomes for their child. Even if one's

child is on a normal trajectory of growth and development, sleep patterns are everchanging. Knowing pertinent information about sleep and its deleterious nature if one does not receive enough, can help that child or adolescent in the future. Signs and symptoms can appear abruptly and being prepared for changes as seen in sleep disorders and disturbances can greatly help that child and their family. Creating a foundation of a routine and sleep schedule early on in a child's life is incredibly beneficial, along with tackling any other conditions that are affecting cognitive abilities and sleep (Owens, 2019). Prevention can begin from birth onward when it comes to sleep. Bringing light to these ever-present conditions can help a child and their family better understand the consequences of lacking sleep and signs for sleep disorders and disturbances. Any form of prevention and awareness can provide information and a dialogue about this issue.

FUTURE STUDIES

Although there have been great advances in the intervention and treatment options available for pediatric sleep disorders and disturbances, more research needs to be performed in order to inform physicians how to provide appropriate care to their patients and families. Through careful analysis of research studies available and data found, the majority have noted that there is still not enough known in regards to this healthcare issue. Due to its increasing prevalence, more studies are being performed on understanding pediatric sleep disorders and disturbances, but concrete data has not been found to suggest ways to definitively heal children who experience negative sleep conditions. In particular, there have been a few studies that have taken into consideration the environment that the child is in in regards to their sleep (Owens, 2019). This ties into their socioeconomic status, specifically their caregivers' occupations, where they live

geographically, and educational status of their caregivers as well. These are just a few factors that need to be considered in order to receive more information about the incidence of sleep disorders and disturbances. This would give insight into what may be lacking in a child's daily and night time functioning, as well as what resources the child and caregivers have access to. Not only is awareness important, but allowing for children to receive the care and treatment that they need, especially to strengthen their cognitive skills is critical. Depending on the nearest pediatrician's office, transportation options, and additional healthcare needs of the child, receiving a proper evaluation and treatment could pose difficulties. Socioeconomic status is a major proponent in each child's life and is a determinant in how to move forward in a positive direction for that child's growth and development (Mindell and Williamson, 2017). Also, due to the increase of underdiagnoses and misdiagnoses, better diagnostic tools need to be designed to create a more definitive diagnosis for the child or adolescent. A multitude of factors need to be taken into consideration for future research, especially to in identify more accurate information regarding sleep disorder and disturbances diagnoses, treatment, and prevention. This healthcare issue highlights the importance of education and awareness along all communities and in particular, the bond between the pediatrician and their patients and families.

CONCLUSIONS

Sleep is paramount in a child's life because of its vital role in the growth and development of a child. Cognitive abilities are being learned each day, through consistent usage of their primary skills and active functioning. When there is a hindrance in this functioning, there is a direct negative relationship to the strength of one's cognitive

abilities. A key player in this hindrance is when there is a lack of sleep, that becomes persistent. With this, a child is unable to perform or learn at their best, which can result in numerous physiological and psychological changes, all leading back to their neurocognitive abilities. If sleep disorders or disturbances are not diagnosed and treated in an adequate amount of time, permanent cognitive changes to that child or adolescent can result. This would be detrimental to that individual because of the many consequences that exist when it comes to not receiving treatment when needed with major changes in sleep. Currently, several resources can be made available to all children and their families to better understand just how severe negative alterations in sleep can be to their child. The development of more preventative approaches would be beneficial for caregivers to know when to recognize that their child or adolescent could be undergoing changes related to sleep disturbances. With more research, knowledge, and awareness, this predominating healthcare issue in the pediatric population can be met with better methods of diagnosing, treating, and preventing more children and adolescents from deteriorating physiologically, behaviorally, and cognitively.

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