



Sleeping Disorders as a Symptom of Depression

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ABSTRACT: Recently, people pay less attention to their sleep since there are a lot of stimulants to keep them awake more than sleeping. According to many reports, the results have shown that many are facing a serious condition, which is sleeping disorder. This condition is related to sleep and affects the ability to sleep well on a regular basis. It is a serious problem that if left untreated, the condition can lead to many more severe problems. There is a significant correlation between sleeping disorder and depression which is called “bidirectional relationship”. The studies show that sleeping disorders are a “symptom” of almost all types of depression such as Major Depressive Disorder, Bipolar Disorder, Seasonal Affective Disorder and so forth. On the other hand, depression itself can also be a cause of sleeping disorders. In addition, the studies show chronic sleep deprivation can cause the changes in Serotonin, which is the brain’s neurotransmitter, and will have a chance to lead to depression greater than acute sleep deprivation. As a result, people should raise awareness in sleeping and usually examine their sleep. To have less chance of depression, a person requires a healthy sleep period and effective care.

KEYWORDS: Anxiety, Depression, Psychology, Sleeping disorders, Symptoms

I. INTRODUCTION

Nowadays, more than one-third of adults in the United States report getting fewer than 7 hours of sleep in 24 hours, and more than 70 percent of high school students report getting fewer than 8 hours of sleep, which is substandard, on weeknights. Furthermore, there are approximately 70 million people in the United States who suffer from sleeping disorders. From the figure, many people, who are facing this problem, think it’s a common problem that has nothing to do with it. In contrast, it is an early issue to be concerned about and also alleviated. Since sleepiness interferes with cognitive function, which can lead to learning disabilities in children, memory impairment in people of all ages, personality changes, and depression. To give some more information, people with sleeping disorders have a higher risk of developing depression than people who get a good night’s sleep. Therefore there is a significant correlation between sleeping disorders and depression. It can also be said that sleeping disorder is a symptom of depression.

II. DEFINITION

A. Definition of sleeping disorder

1) Concept of sleep and sleeping disorder

Sleep is when conditions of body and mind typically recurs for several hours at night, every night. In other word, sleep is a state where awareness of environmental stimuli is reduced. At night, when people sleep, they pass through the processes of sleeping which are called “Phases of sleep”, “Stages of sleep” or “Sleep cycle”. Normal cycle is divided into 2 sleep states, during the night, there was a switching between these states several times (spend 90-100 minutes per cycle). These 2 states are Rapid eye movement (REM) and Non-rapid eye movement (NREM). REM has no sleep state division while NREM is subdivided into 3 states, which are N1, N2 and N3. Non-REM sleep occupies about 75% of normal sleeping while REM occupies only 25%.

- NREM sleep stage1 (N1)

It is a transitional phase, from wakefulness to sleep. During this state people will be in the shallow stage of sleep. This stage lasts for 5-10 minutes. Processes of this stage are reducing respiration rate, reducing heartbeat rate and having a change in brain’s wave activities. The waves involved are Alpha and Theta waves. Both are low frequency waves, Alpha waves-(8-13 HZ), Theta waves-(4-7 HZ)

- NREM sleep stage2 (N2)

In this stage the body goes into a deep relaxation state, people are less aware of their surroundings. This stage lasts around 20 minutes. Processes are dropping in body temperature, producing sleep spindles by the brain, reducing heartbeat rate and changing



in brain's wave activities. Theta waves will be interrupted by sleep spindles. Also, this time the brain wave activities involve K-complexes. K-complexes are high amplitude patterns of brain activity that are used in response to environmental stimuli.

- NREM sleep stage3 (N3)

Deepest sleep stage, people are less responsive to the surroundings. Transitional period between light sleep states to very deep sleep states. This stage lasts about 20-40 minutes. Processes are dropping in blood pressure, dropping in breathing rate.

- REM sleep

REM or Rapid eye movement, as its name, in this stage our eyes move rapidly under the closed eyelids. This stage can be referred to as a paradoxical sleep since the muscles work the opposite way as the body muscles become very relaxed and immobilized, muscle paralysis occurs while the brain and other body systems become more active. Dream occurred at this stage.

Normally, the sleeping time needed for individuals is different, depending on age. Time needed varies between young and old.

Sleeping disorders disrupt these sleep cycles and as a result of that people do not have a proper or enough time to sleep. This will have an effect on people's daily life, lead to difficulties functioning during the daytime, and have unpleasant working efficiency.

2) *What is a sleeping disorder?*

Sleeping disorder is talking about problems related to sleep and affect the ability to sleep well on a regular basis. The problems usually involve quality of sleep, timing of sleep and amount of sleep. The problems that the patient is facing are depending on the type of the disorders, but the common issue is they may have a difficult time falling asleep.

3) *Sleeping disorder or just mental illness?*

How to distinguish between sleeping disorders and mental illnesses? There are differences between mental illness and mental disorders. Mental illness is a problem that affects the way people think, behave and interact. "Mental illness" is just a group of illnesses but "Mental disorder" is a mental illness that meets the criteria of being "disorder". Therefore, not everyone with mental illness has a mental disorder.

4) *Theories around sleeping disorders*

Scientists have studied and investigated why humans have to sleep for a long time, despite the fact that many questions about importance of sleeping remain difficult to answer. There is some theory that talks about "sleeping".

1. Energy conservation theory

This theory explains why sleeping gives people energy. According to this theory, sleeping allows us to reduce the caloric that the body needs by lowering the metabolism process; this is the reason why the metabolic rate drops up to 10% when we sleep.

2. Restorative theory

Restorative theory was first proposed in 2006. This theory suggests that the purpose of sleep is to restore our body, especially the brain. During sleep a lot of restorations happen, such as clearing out and replenishing brain chemicals, clearing waste toxins from brain, repairing tissues throughout the body, rest for the brain and organizing-storing memories.

There is a word "Sleep can be understood as fulfilling many different functions but intuition suggests there is one essential function. The discovery of this function will open an important door to the understanding of biological processes" – Allen Rechtschaffen

3. Brain Plasticity

Brain Plasticity, also called neuroplasticity, is a brain's ability to change and adapt in response to experience. This theory says that, during sleep, the brain has structural changes. The concept of this theory deals with information processing and memory formation. There are many examples that support this theory, one of which is the different time of sleep that is needed by different age groups. Example: why babies and young children need more time to sleep than adults; the reason is the younger are learning much more than adults so their brains need more time to process it.

B. Definition of depression

1) *What is depression?*

Depression or Major depressive disorder is the most common psychiatric complaint. In psychological terms it is referred to as a common mental illness that negatively affects the way people think, behave and express. Depression will make they feel sad, hopeless and pessimistic, they will experience moody emotion; that their mood will swing very fast and also not be able to fully



control your emotion. Nowadays, our society, the environment that people are in and the way of lifestyle are getting more and more stressful and as a result of that, people regularly experience depression as a part of life. Also it not only affects the adults but it also has effects on the younger or the teenagers. However, depression in teenagers looks quite different from depression in adults, whether because of the symptoms or especially, the cause of depression.

2) *Difference between depression and sadness, grief*

Being sad is not the same with depression, although both sadness and depression have something in common, such as both are involved with the negative feeling, but they also have the difference. The examples are -in sadness, self-esteem is usually maintained but in depression, the feeling of worthlessness and self-esteem are lost.

3) *Psychological theories and models around depression*

1. Behaviorist theory

Behaviorist theory of behaviorism is a theory that talks about “learning”. It is said that people are learning through the conditions. The conditions will make us respond to the environment, the stimuli. The behaviorists believed that people can learn anything within their capacity if they have the right condition.

2. Operant conditioning

The disappearance of positive reinforcement from the surrounding environment or the increasing of negative reinforcement in the environment is considered the cause of depression in Operant conditioning. Positive reinforcement occurs when people have self-esteem, which can occur when people are rewarded or reassured. According to the theory, it is said that people tend to repeat the actions, behaviors that lead them to reinforcement.

3. Psychodynamic theories

Invented by Dr. Sigmund Freud, a famous Austrian neurologist, Psychodynamic theories is one of his famous, well known theories. Because of this theory, depression was understood in many terms such as inwardly directed anger, severe super-ego demands, excessive narcissistic and oral-anal personality need. This theory focuses on the relationship between mind, mental, emotional and motivation.

4. Cognitive approach

This approach focuses on “beliefs” more than “behavior”. This theory is talking about an individual's negative mind, unreasonable beliefs, misinterpretation of events as the cause of depression. Research over the last 50 years supports the beliefs that depression can be caused by the operation of “negative biases” (or in other word, lack of positive, cognitive biases) and cognitive emotion regulation. Cognitive biases are such as self-referential processing, attention, interpretation, memory. This is the example of relationship between cognitive biases and cognitive emotion regulation, increases of maladaptive emotion regulation e.g. Rumination causes the decrease in the use of adaptive emotion regulation e.g. Distraction.

III. TYPE

A. *Type of sleeping disorder*

Recently, there are approximately 80 different types of sleep disorders. Examples of the top ones are below:

1) *Insomnia*

The inability to fall asleep or to remain asleep is called “Insomnia” which is one of the most common sleeping disorders. It can be caused by jet lag, stress and anxiety, hormones, or digestive problems. And it may also be a symptom of another condition.

Insomnia can be problematic for overall health and quality of life, potentially be the causes of depression, difficulty concentrating, irritability, weight gain, impaired work or school performance

Insomnia is normally classified as one of three types. First, chronic, when insomnia occurs thrice a week and continues for at least 1 month. Second, intermittent, when insomnia occurs periodically. Finally, transient, when insomnia lasts for just a few nights at a time.

2) *Sleep Apnea*

Sleep apnea is characterized by intermittent cessation of breathing during sleep. This is a serious medical condition that leads to reduced oxygen level in blood, causing a person's body to be jerked awake.



There are two types of Sleep Apnea. First, Obstructive Sleep Apnea (OSA), where the flow of air stops because airway space is obstructed or too narrow. Second, Central Sleep Apnea (CSA), where there is a problem in the connection or correlation between the brain and the muscles that control your breath. In the worst cases, it can lead to heart attack, stroke, or sudden death.

3) *Parasomnia*

Parasomnias are a class of sleep disorders that cause abnormal movements and behaviors during sleep, for example, sleepwalking, sleep talking, bedwetting, groaning, teeth grinding or jaw clenching, and so forth.

4) *Restless leg syndrome*

Restless leg syndrome (RLS) is an overwhelming need to move the legs. The condition is marked by uncontrollable sensations in legs such as pins and needles, or bugs crawling up the leg. This urge is sometimes accompanied by a tingling sensation in the legs. Although these symptoms normally occur during the night, they also can happen during day time. RLS is often correlated with certain health conditions, including attention deficit hyperactivity disorder (ADHD) and Parkinson's disease, but the exact cause isn't always known.

5) *Narcolepsy*

Narcolepsy is also known as "sleep attacks" that occur while awake. This means that it causes people to suddenly feel extremely tired and fall asleep without warning. People suffering from narcolepsy are at risk of falling asleep at inappropriate times such as while driving, which can prove fatal. The disorder can also cause sleep paralysis, which may make you physically unable to move right after waking up. Although narcolepsy may occur on its own, it is also associated with certain neurological disorders, such as multiple sclerosis

B. Type of depression

1) *Major Depressive Disorder (MDD)*

The term clinical depression is generally referring to Major Depressive Disorder (MDD). Major depressive disorder is a mood disorder characterized by a number of key features such as depressed mood, changes in weight, fatigue, lack of interest in activities normally enjoyed, difficulty concentrating, feelings of worthlessness and guilt, thoughts of death and suicide.

If a person experiences the majority of these symptoms for longer than a two-week period, they will often be diagnosed with MDD.

Depression can be described as mild, moderate or severe; melancholic or psychotic.

2) *Persistent Depressive Disorder (PDD)*

Dysthymia, recently known as persistent depressive disorder, refers to a type of chronic depression present for at least two years. It can be mild, moderate, or severe.

People might experience brief periods of not feeling depressed, but this relief of symptoms lasts for two months or less. While the symptoms are not as severe as major depressive disorder, they are pervasive and long-lasting.

PDD symptoms include feelings of sadness, loss of interest and pleasure, anger and irritability, feelings of guilt, low self-esteem and difficulty falling or staying asleep.

3) *Bipolar Disorder*

Bipolar disorder, used to be known as 'manic depression', is a mood disorder characterized by periods of abnormally elevated mood known as mania. These periods can be mild (hypomania) or they can be so extreme as to cause a person's life, require hospitalization, or affect a person's sense of reality. The vast majority of those with bipolar disorder also have episodes of major depression.

In addition to depressed mood and markedly diminished interest in activities, people with depression often have a range of physical and emotional symptoms.

Depressive episodes have the same symptoms as major depression, including fatigue, insomnia, and lethargy, unexplained aches, pains, and psychomotor agitation, hopelessness and loss of self-esteem, irritability and anxiety, indecision and disorganization.

Signs of a manic phase include high energy, reduced sleep, racing thoughts and speech, grandiose thinking



Bipolar disorder affects approximately 2 percent of the population. The risk of suicide in bipolar illness is about 15 times greater than in the general population. Psychosis (including hallucinations and delusions) can also occur in more extreme cases.

4) *Postpartum Depression*

Pregnancy can bring about significant hormonal shifts that often connect with a woman's moods. Depression can have its onset during pregnancy or following the birth of a child.

Currently classified as depression with peripartum onset, postpartum depression (PPD) is more than just the "baby blues."

Mood changes, anxiety, irritability, and other symptoms are not uncommon after giving birth and often last up to two weeks. PPD symptoms are more severe and longer-lasting.

PPD can range from a persistent lethargy and sadness that requires medical treatment all the way up to postpartum psychosis, a condition in which the mood episode is accompanied by confusion, hallucinations, or delusions.

Almost 10 percent of women will experience depression during pregnancy. This increases to 16 percent in the first three months after having a baby.

If left untreated, the condition can last up to a year. Fortunately, research has found that treatments such as antidepressants, counseling, and hormone therapy can be effective.

5) *Premenstrual Dysphoric Disorder (PMDD)*

Premenstrual dysphoric disorder (PMDD) produces similar symptoms, but those tend to be mostly psychological.

Among the most common symptoms of premenstrual syndrome (PMS) are irritability, fatigue, anxiety, moodiness, bloating, increased appetite, food cravings, aches, and breast tenderness.

PMDD symptoms may include extreme fatigue, severe feelings of stress and anxiety, food cravings or bingeing

Similarly to perinatal depression, PMDD is believed to be associated with hormonal changes. Its symptoms often begin just after ovulation and start to ease up once during period.

6) *Seasonal Affective Disorder (SAD)*

A condition known as seasonal affective disorder (SAD), currently called major depressive disorder with seasonal pattern. It may cause feelings of depression, sleepiness, and weight gain during the winter months but perfectly feeling fine in spring. SAD is believed to be triggered by a disturbance in the normal circadian rhythm of the body and the variation in light exposure in different seasons. Light entering through the eyes influences this rhythm, and any seasonal variation in night/day pattern can cause a disruption leading to depression.

The condition often goes undiagnosed and unreported so prevalence rates for SAD can be difficult to pinpoint. It is more common in areas further from the equator.

7) *Atypical Depression*

Atypical depression refers to depression that temporarily goes away in response to positive events. This depressive disorder with atypical features, a type of depression that doesn't follow typical presentation of the disorder. Atypical depression is characterized by a specific set of symptoms related to excessive eating or weight gain, excessive sleep, fatigue, weakness, and feeling "weighed down", intense sensitivity to rejection, strongly reactive moods

Atypical depression is actually more common than the name might imply. Unlike other forms of depression, people with atypical depression may respond better to a type of antidepressant known as a monoamine oxidase inhibitor (MAOI).

8) *Situational depression*

Situational depression, clinically known as adjustment disorder with depressed mood, is a short-term, stress-related type of depression. This condition looks like major depression in many respects.

It is also brought on by traumatic events or a series of changes to their everyday life, such as the death of a loved one, a serious illness or other life-threatening, event going through divorce or child custody issues, being unemployed or facing serious financial difficulties

It is normal to feel sad and anxious during events like these but situational depression happens when these feelings start to feel out of proportion with the triggering event and interfere with daily life.



Situational depression symptoms tend to start within 90 days following the triggering event and can include frequent crying, sadness and hopelessness, anxiety, social withdrawal and inability to concentrate.

9) *Depressive Psychosis*

Some people with major depression also go through periods of losing touch with reality. This is known as psychosis, which is a mental state characterized by disorganized thinking or behavior; false beliefs, known as delusions, or false sights or sounds, known as hallucinations. Experiencing both of these together is known clinically as major depressive disorder with psychotic features. However, some providers still refer to this phenomenon as “depressive psychosis” or “psychotic depression”.

Hallucinations are the condition of seeing, hearing, smelling, tasting, or feeling things that aren't really there. An example of this would be hearing voices or seeing people who aren't present. A delusion is a closely held belief that's clearly false or doesn't make sense. On the other hand, to someone experiencing psychosis, all of these things are very real and true.

Depression with psychosis can cause physical symptoms as well, including problems sitting still or slowed physical movements.

IV. SYMPTOMS

A. *Symptoms of sleeping disorder*

Symptoms of sleeping disorders are shown differently depending on their type and severity. First of all, focusing on the signs of Insomnia and Sleep Apnea. People who suffer from them have difficulty breathing and falling asleep at night and also have irregular sleep-and-wake cycles. But during the day, they are so sleepy that some people have a very strong urge to fall asleep at inappropriate times. They also experience daytime fatigue, weight gain, anxiety, irritability, and depression. In addition, having irregular sleep-and-wake cycles and lacking in concentration are signs of Narcolepsy and Circadian Rhythm Disorder as well. Next, focusing on the signs of Restless Leg Syndrome (RLS) and Parasomnias. They include having abnormal movements such as sleepwalking or sleep talking and unusual experiences such as sleep paralysis or night terrors. Finally, the symptom that all of them show in common is a lack of concentration which causes people to perform tasks at work or school inefficiently.

B. *Symptoms of depression*

Depression show various signs but there are differences in them based on sex and age. Some signs can affect people's mentality, mood and thoughts, while others can affect their physicality. In women, which depression is more common in, symptoms that relate to depression are feeling anxious, talking or thinking more slowly, having changes in their appetite or even withdrawing from social engagement. Some women also experience weight changes and greater fatigue. In men, symptoms are quite different. They become more aggressive, angry, and restless. Feeling tired easily and losing interest in their favorite activities are also included. Some have difficulty concentrating on performing tasks and also experience Insomnia. Others may develop risky behavior such as drinking alcohol or using drugs. Furthermore, as was said before that symptoms of depression show differently based on sex and age, meaning that children also have different symptoms from adults. Some children experience mood swing, feeling of incompetence or even decline in school performance. Others may get into trouble at school or avoid meeting friends or siblings. Despite all differences, there are some symptoms that they all have the same which are feeling of desperation and sadness, headaches, restless sleep, and thoughts of suicide.

V. RELATIONSHIP BETWEEN DEPRESSION AND SLEEPING DISORDER

Sleeping disorders and depression are closely linked to each other. Many researchers defined the relationship between these two as a “bidirectional relationship”. Which one is the starting point? “Either one can be the starting point” says Johns Hopkins, the sleep researcher. The problem in sleeping or the absence of proper sleep can cause depression otherwise; depression can also be a cause of sleeping disorders, especially insomnia. For example, people with insomnia have a higher risk of developing into depression than the people who have good, proper sleep at night. But actually, it is not only depression that may cause problems in falling asleep but also, daily depression such as financial worries or some argument can be causes of sleeping disorders too.

In addition, there are studies that compare which sleep deprivation between chronic sleep deprivation and acute sleep deprivation is the greater cause of depression. The studies show that chronic sleep deprivation is a greater cause of depression than acute sleep deprivation. Chronic sleep deprivation can cause the changes in Serotonin, which is the brain's neurotransmitter, and



will lead to depression in the end. On the other hand, acute sleep deprivation (such as not sleeping for 24 hours) may help to combat depression.

According to a study in females that was a 10-year follow-up from baseline research, depression has a considerable ratio among other risk factors of developing EDS (excessive daytime sleepiness) along with anxiety and smoking. Also a clinical and epidemiological study in a UK population sample indicated that, of all depressed patients, about three quarters have difficulty in initiating or maintaining sleep. 77% of depressed patients aged between 16 to 24 had at least one insomnia symptom, as well as 90% of those between 55 to 64, while only 36% of people who did not have depression had them. Furthermore, about 40% of patients under 30 and 10% of those between 50 and 59 are experiencing Hypersomnia.

One general population survey of 18,980 adults reported that, of the sample, 0.8% had both sleep disordered breathing and major depressive disorder (MDD).¹³ As many as 17.6% of individuals with sleep disordered breathing were diagnosed with MDD, and 18% of individuals diagnosed with MDD also had sleep disordered breathing. Likewise in patients with narcolepsy, approximately 28% to 57% of them have elevated depression symptoms,^{14,15} and in one sample, 20% met current or past criteria for depression.¹⁶ As many as three quarters of individuals with delayed sleep phase syndrome have similarly a past or current history of depression,¹⁷ and such individuals report that they have poorer sleep quality and more depression.¹⁸ Restless legs syndrome also has an increased relation with depression¹⁹; as many as 53% of clinic patients with restless legs syndrome or periodic limb movements have elevated rates of depression.

A. *3 potential mechanisms between sleeping disorder (sleep disturbance) and depression*

1) *Inflammation hypothesis*

The inflammation mechanism between sleep disturbance and depression starts with the activation of the sympathetic nervous system and β -adrenergic signal to release neuromediators and activate NF- κ B. NF- κ B will increase the inflammatory cytokines. These cytokines are corresponded with a rise in depression; meanwhile the inflammatory activity is turning into influence sleep.

2) *Biochemical pathways*

Depression is associated with the disruption of REMS sleep. REM sleep is dealt with a rapid decrease in “monoamines” (such as serotonin, norepinephrine, dopamine) and concomitant increase in “cholinergic tone”. In pathophysiology of depression, the monoamine hypothesis is the most well-known hypothesis which says that the variations of monoamines level are the cause of depression. It is said that the cause of depression can be the excessive decreasing in levels of serotonin metabolites and norepinephrine or having some abnormal genetic regulation of serotonergic transmission which are responsible for REM sleep abnormalities.

3) *Genetic correlations*

Sleeping disorder such as insomnia is believed to be influenced by environmental factors, but recent research has shown that genetic factors are involved too. A subsequent well-designed study concluded the genetic influences in insomnia, 56% for females and 74% for males with MDD (Major depressive disorder).

VI. TREATMENTS FOR DEPRESSION AND SLEEPING DISORDER

A. Medications

Antidepressant medications are typically the first-line treatment for depression. In this method, depressed patients are generally prescribed with antidepressant drugs which help ameliorate sleep efficiency, decrease sleep latency and increase slow wave sleep (SWS), with little effect on rapid eye movement sleep (REMS). In this regard, antidepressants are more favourable in patients with comorbid depression and sleep disturbance (but not in patients experiencing obstructive sleep apnea (OSA), as they might make it worse). In patients with major depressive disorder, antidepressant treatment can significantly reduce the use of BZDs, thereby greatly reducing the addiction to hypnotics. In addition, these prescription medications usually take time before they begin to improve symptoms and patients may need to try several antidepressants before finding the right fit.

B. CBT Therapy

Cognitive behavioral therapy (CBT) is a form of psychotherapy that focuses on how a person's thoughts, beliefs, and attitudes affect their feelings and behaviors. It's based on the idea that current distorted thoughts or beliefs are the cause of negative actions and feelings. Patients and a therapist will work on identifying exact negative thought patterns and developing more balance



and practical ways to respond to challenging or stressful situations. CBT is a short-term approach with only 10 to 20 sessions, compared with other types of therapies which require several years for treatment. A recent meta-analysis indicated that internet-delivered CBT (CBT-i) or Digital CBT (DCBT) can improve sleep efficiency and achieve remission from insomnia when insomnia is comorbid with depressed disorders.⁹⁸ Another randomized controlled trial (RCT) focusing the effectiveness of CBT-i in older adults with comorbid insomnia and depression also illustrated that CBT was effective at reducing both insomnia and depression severity in a 20-week follow-up, therefore, CBT therapy is a notable treatment for patients suffering insomnia comorbid with depression.

C. Deep Brain Stimulation

In deep brain stimulation, a doctor will implant tiny electronodes in the nucleus accumbens, the part of the brain which is responsible for mood and motivation. This is an optional method for treating patients whose previous depression treatments have been unsuccessful, since the samples in these studies were quite small and not any long-term success has yet been provided.

D. Sleep Deprivation

Sleep deprivation is another form of psychotherapy that deprives depressed patients from sleeping for 36 consecutive hours, a total sleep deprivation (TSD), so that patients can reach a rapid improvement in an episode of depression. Sleep deprivation obviously has opposite effects in healthy people and depressed patients. If healthy people don't sleep, they will lack energy and feel in a bad mood. But if they are depressed, sleep deprivation can provoke an immediate improvement in mood and cognitive abilities. However, the efficiency of sleep deprivation will diminish after patients catch up on those missed hours of sleep. In addition, subsequent studies found that depressive symptoms were lessened and the effect lasted longer when combined TSD, pharmacology, sleep phase advance (SPA) and bright light therapy (BLT) together, compared to using only medication.

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