

Shedding Light onto Seasonal Affective Disorder

Project Proposal: Third Eye Therapy

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Honors Capstone

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Shedding Light onto Seasonal Affective Disorder: Third Eye Therapy

Winter Blues:

Seasonal affective disorder (SAD), also known as seasonal depression, is a psychophysiological disorder that demonstrates symptoms of depression in response to the lack of natural sunlight¹. Additional symptoms may include a drop in energy level, fatigue, a tendency to oversleep, weight gain and difficulty concentrating¹. Approximately ten million Americans suffer from seasonal affective disorder and these statistics just include patients that have been diagnosed¹. With a significant amount of the population struggling with seasonal depression, it is crucial to propose reliable methods of treatment. This disorder is linked heavily to the amount of sunlight one is exposed to on a daily basis¹. Because of this, SAD patients are most often affected by this disorder starting in the fall months and ending in the spring months. While the heart of winter is typically when patients experience SAD, geographical factors may also play a role in the demographic of individuals experiencing this disorder.

In California, the average hours of daylight during the winter months (December-February) are approximated to be 698 hours while during the summer (June-August) is approximately 842 hours². These statistics rank California as the 5th sunniest state³. This fairly consistent sunshine percentage from the winter months to the summer months may be associated with the fact that California is the 48th least depressed state in the country⁴. In comparison, other states in the USA have larger gaps in sunlight hours from summer to winter. For instance, the average number of daylight hours in the summer in Oregon is about 920 hours compared to 266 hours during the winter². This drastic decrease in sunlight lost during the winter months can be seen as a dominating factor that contributes to the development of seasonal affective disorder in Oregon. With Oregon ranked 1st as the most depressed state and ranked as the 46th sunniest state, it is clear that an inverse relationship between sunlight and seasonal affective disorder is present^{3,4}. Overall, through analyzing the statistics of both annual percentage of sunlight as well as the ranking of depression within the United States, it is clear that the two factors are linked and treatment methods need to be addressed in order to reduce the population that struggles with seasonal depression.

Why So SAD?:

The secretion of melatonin can explain the inverse relationship between light exposure and depression⁵. As light or darkness enters the eyeball, it is detected by the retina and stimulates action potentials down the axon of neurons that connect the eye to the brain. These neurons then release glutamate onto the suprachiasmatic nucleus (SCN), a small nucleus located in the hypothalamus of the brain, which is also known as the biological clock. After the SCN is stimulated by this release of glutamate, neurons in the SCN go on to release numerous neurochemicals onto the neurons of another hypothalamic nucleus, the paraventricular nuclei (PVN), which, in turn,

stimulates the superior cervical ganglion^{6,7}. The superior cervical ganglion has direct connections to the pineal gland such that when the ganglion secretes norepinephrine, that norepinephrine binds to receptors located on the pinealocytes in the pineal gland. Once this occurs, it triggers mechanisms that ultimately convert tryptophan to 5-hydroxytryptamine which is then converted to serotonin that can be used to synthesize melatonin^{6,7}.

When light is present, the amount of norepinephrine on the pineal gland is actually very low and the production and secretion of melatonin is suppressed^{6,7}. In darkness, however, a significantly higher amount of norepinephrine is secreted by the superior cervical ganglion, which in turn causes a higher amount of melatonin to be secreted. Therefore, during the day when light levels are high, there is less melatonin made and secreted in the body, however, when light levels are low at night, more melatonin is synthesized and secreted. In these, lower light situations, such as the winter months, melatonin levels are high, which can lead to lower energy levels contributing greatly to symptoms of depression. While the research on the relationship between melatonin and depression remains controversial, an article by the *Bipolar Disorder* journal states “Higher serum melatonin levels were found in patients suffering from major depressive disorder...”⁸. Overall, the higher secretion of melatonin during the dark cycle as opposed to the light cycle can be hypothesized to contribute to seasonal affective disorder.

Current Treatments:

According to the World Health Organization, less than fifty percent of depression patients seek help or treatment from healthcare professionals⁹. Therefore, the amount of the population that struggles with SAD is expected to be much higher than the reported statistics⁴. With a significant amount of the population fighting this disorder, it is essential to have effective treatment plans in order.

The current and most utilized treatment for all variations of depression is anti-depressants¹⁰. The consideration of over-prescription of antidepressants has been a topic of controversy for quite some time. In the United States, 20.5 million antidepressant drugs were prescribed between October and December of 2020¹⁰. As this number continues to increase, the most relevant question becomes whether or not these drugs are effective for a wide variety of patients, each with individualized symptoms. The main concern surrounding the effectiveness of antidepressants is the potential, and more problematic, side effects to develop as a result of treatment. In 2004, the FDA established a requirement for all antidepressant boxes to include a warning label regarding the risk of increased suicidal thoughts or behaviors¹¹. With significantly intense and detrimental side effects, why is the prescription of antidepressants the primary form of treatment for mental illness cases? An article written in the *Journal of Medical Ethics* states “... these drugs are used to supplant, not supplement, interpersonal therapy”, showing the unnecessary use of prescription antidepressants as opposed to the use of therapeutic methods¹². These drugs are not only prescribed to treat severe cases of

psychological disorders but are also prescribed to treat cases involving all types of emotional imbalances. While antidepressants certainly are effective for some patients, the risk of such severe symptoms from these medications increases the need for the consideration of safer alternative treatments.

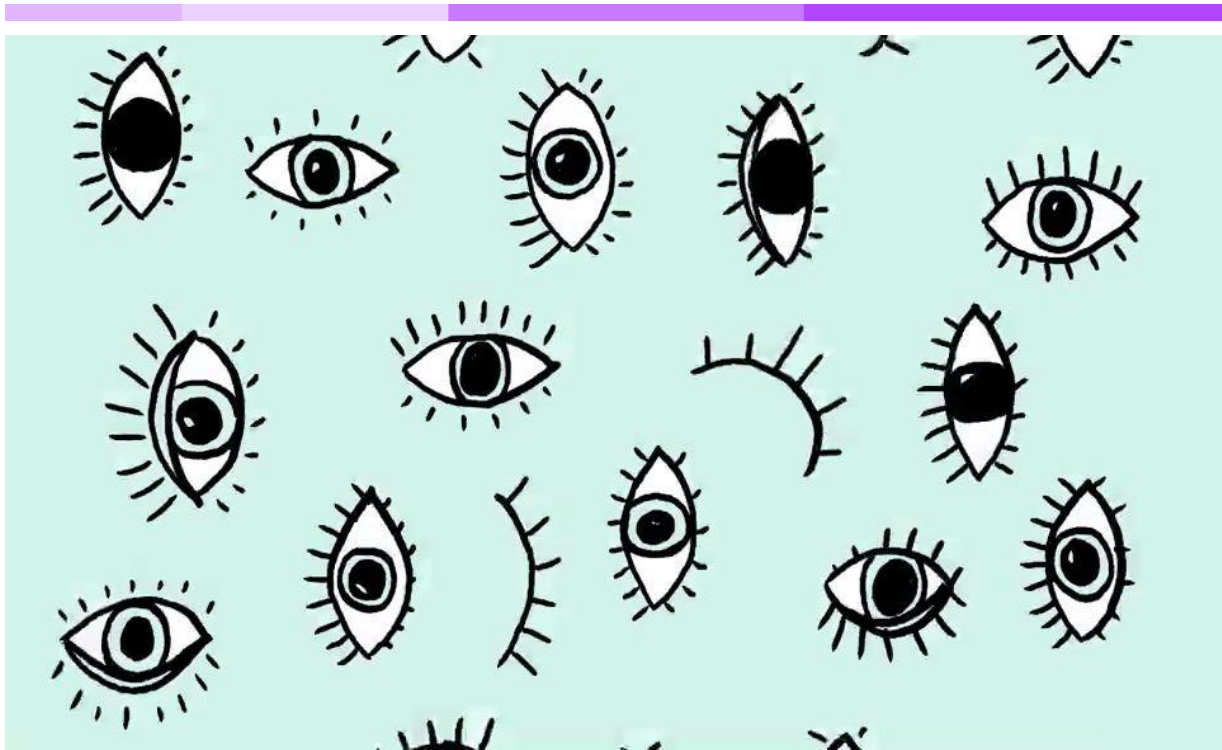
An Alternative:

While therapeutic and natural remedies may not be initially considered as a treatment for psychophysiological disorders, such as SAD, their potential for treating disorders by avoiding the unnecessary ingestion of drugs should make them a logical candidate. The use of natural and alternative methods to antidepressants can effectively minimize the symptoms from SAD, while also significantly limiting the side effects that typically develop from antidepressant treatment¹³. While antidepressants have a long list of side effects, the most prominent one being increase in suicidal thoughts, the use of light therapy only poses very minimal risk (i.e., occasional eye irritation)⁵.

Although the method of light therapy is still an experimental method for treating SAD, the knowledge linked to the relationship between light and depression is a strong advocate that this therapy may very well be effective. This therapeutic method not only can be used as a natural treatment plan for patients diagnosed with seasonal depression, but it can also serve as preventative care for patients that may not yet be officially diagnosed with SAD, but still experience mood fluctuations and symptoms of depression. Below contains a proposal for a product that can help to not only treat, but also prevent, the growing number of individuals in the population suffering from SAD.

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THIRD EYE THERAPY

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Product Overview

I. Product Synopsis

Third Eye Therapy lightbulbs are natural light-simulating lightbulbs that can be installed in bedside lamps or overhead light fixtures. The primary purpose of these lightbulbs is to provide individuals who suffer from seasonal affective disorder a more natural, therapeutic way to reduce the symptoms of Seasonal Affective Disorder. Each lightbulb has the option to connect to an app on cell phones that allows the user to create a customized timer that fits their individualized schedule. Once the designated time set by the user arrives, the lightbulb will gradually increase luminescence to simulate the sun rising. The wide projection of light onto the user will have numerous benefits such as increasing mood, resetting the circadian cycle to reduce oversleeping, and increase productivity for the day. A factory setting on the app requires the bulb to stay on once the designated time set by the user is reached and is only able to be turned off after thirty minutes, the recommended therapy time to reach full effectiveness. The ultimate goal of this product is to allow users to customization based on their schedules and implement consistent therapy into the daily routine.

II. Mission and Goals

1. Promote a more natural way to improve symptoms of seasonal affective disorder (SAD) including improvement of sleep cycles, mood, and focus.
2. Create a product that is adaptable to each individual and various lifestyles.
3. Instill an automatic therapy system that does not require the initiation of patients in order to be completed.

III. Features

High Light Intensity

In most current homes and offices, the light intensity does not typically exceed more than 500 lux. The intensity of sunlight necessary to suppress melatonin release is 2,500 lux, which is the intensity of sunlight measured at a window. This product will deliver 10,000 lux, which is considered the appropriate intensity for light therapy to be considered effective.

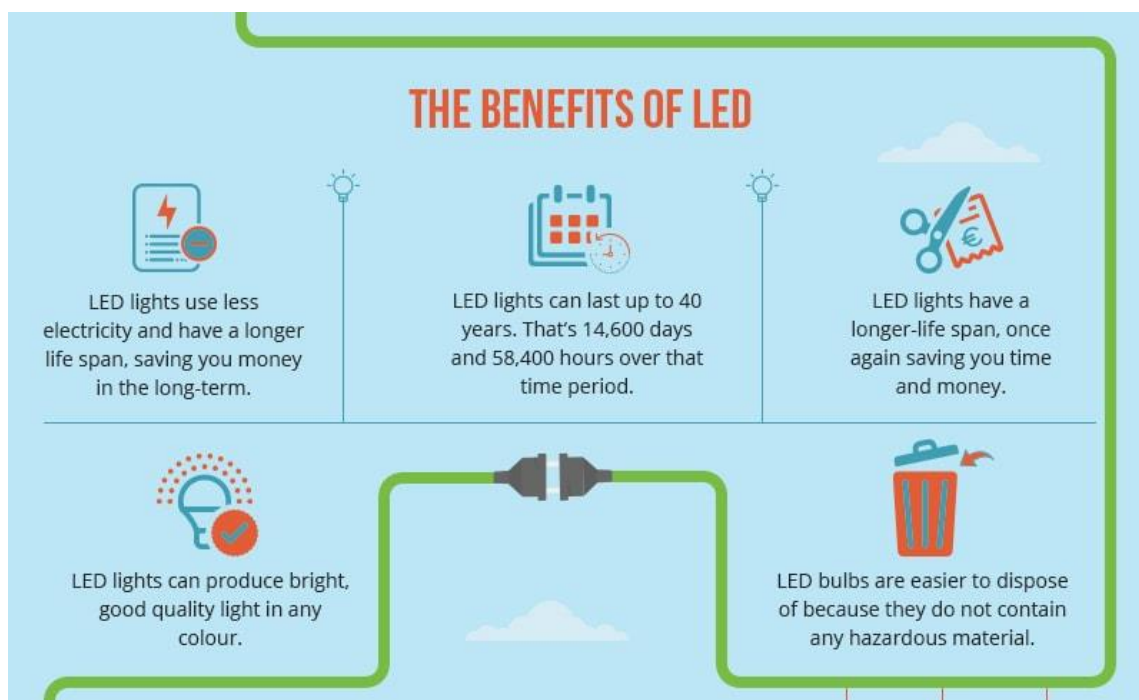
UV Filters

It is extremely important that this product filter out UV light in order to prevent any skin or eye damage. This product will ensure proper filtration of UV light.

Type of Bulb

For this product, LED bulbs would be utilized for the following reasons:

- Heat dissipates from the bulb, resulting in no overheating and longer lifespan
- Variations in LED color, including a daylight simulating options
- LED produce very small amounts of UV rays as opposed to other bulb options
- The wavelength of natural sunlight is approximately 500 nm, and the wavelength of bright white (daylight) LED bulbs is approximately 475 nm.



IV. Safety

- The use of LED lightbulbs significantly reduces the safety risks involved with UV radiation exposure listed below:
 - o UV radiation can cause premature aging of the skin through promoting wrinkles and dark spots as well as an increase risk of skin cancer.
 - o UV radiation can result in inflammation of the cornea of the eye and potentially lead to the formation of cataracts.
 - o UV radiation exposure can also lead to the weakening of the immune system.

V. Consumer Analysis

The consumer target for this product is patients who suffer from seasonal affective disorder. Approximately 10 million Americans suffer from seasonal affective disorder. With this number only including patients who have been clinically diagnosed, I suspect the demand for an easy to use, natural remedy to be high. While patients suffering from this disorder are the individuals who will benefit from this technology, I aspire to reach the attention of practicing psychiatrists and physicians who can recommend this type of therapy to their patients as an alternative to prescribing anti-depressants.

Marketing

I. Advertising and Promoting

My primary method for advertising and promoting this product would be online webinars that target psychiatrists and physicians who will be recommending this type of therapy to their patients. In addition to webinars, I will implement follow-up meetings that will include demos of the product, which will include a full overview of the product itself and the benefits it can have on patients with seasonal affective disorder. The last step would be to gather feedback from clinics and their patients regarding how the product has impacted their symptoms.

II. Strategy and Implementation

1. Layout a business plan, including an overall budget.
2. Obtain funding by raising awareness regarding the seasonal affective disorder (donations, charity events, etc.).
3. Partner with an established lightbulb manufacturer.
4. Build website/social media platforms.
5. Start advertising and marketing campaigns.
6. Manage relationships with leads/customers.

Competition Analysis:



The most common product used for light-therapy currently is light therapy boxes. With these products, it is essential for the patient to make a conscious routine; patients are asked to use the light box at the same time every day for a total of 30-60 minutes in order for the treatment to be considered effective.

I. Strengths of Light Box Therapy

- Light box therapy is currently the only product on the market for seasonal affective disorder therapy. The companies that sell this product have a monopoly and a large percentage of the marketplaces. Therefore, entering this new marketplace will be difficult for my product because it is an innovation that is not well-established or well-known.

II. How Third Eye Therapy Will Counter These Strengths

- I plan to break into the market with advanced technological features as well as a more convenient product for the consumer. In order to push this product and make a shift in this monopolized market, I intent to advertise heavily with the marketing/promotion plan listed above (see Marketing I and II). This will ensure my product will make a breakthrough and obtain a percentage of the marketplace.

III. Weaknesses of Light Box Therapy

- The current Light Box Therapy products are not linked to automatic timers, which, in turn, requires the patient to remember to make therapy a part of their routine every day, making it less convenient for the consumer.
- The patient must be in close proximity to the light box to reap the benefits and therefore it is strongly recommended that the patient does not look directly into the artificial light to avoid damage to the eyes. This method has a higher risk of damage to the eyes.

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- The size of the light box is too big to be considered portable, which can lead to breaking the therapy routine and requiring the individual to be homebound or possibly skip treatments during times of travel.

IV. How Third Eye Therapy Differs

- In comparison to light box therapy products, my product will be individualized to each consumers' needs and lifestyles. Each user will be able to set a timer as to when light therapy should begin each day and how long the duration of therapy is needed.
- With the product either in an overhead light fixture or in a bedside lamp, this form of therapy will be much less damaging to the eyes compared to light box therapy products.
- With lightbulbs being very portable and easy to change, Third Eye Therapy products are able to travel when the patient travels, ensuring no disruption in the patient's routine.