

HERE COMES THE SUN

Honors Thesis

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By

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Abstract

Sunlight exposure is a natural part of one's daily life. This study (N=30) researched how sunlight exposure affects one's physical, mental and cognitive health in order to observe sunlight's impacts on one's overall wellness. Participants completed a brief, online survey about overall well being, perceptions of well-being, and time spent outdoors in order to explore a relationship between well-being and exposure to sunlight. No significant correlations were found between the number of hours participants spent in direct sunlight and wellness. Some correlations neared significance, suggesting the possibility of relationships. These findings suggest that increased sunlight exposure may not affect one's overall wellness. The implications of these findings for social work practice and future research are discussed.

Exposure to sunlight is a natural part of one's life and it may be more vital than is generally perceived. Across the United States of America almost one in every five adults are diagnosed with a mental health issue, one in four have a physical health issue and seven in every hundred (CDC, 2020). This shows a wide spread need for intervention measures across the country. Previous research has explored how sunlight exposure affects aspects of an individual's wellness but studies have not looked into the overall impact sunlight exposure can have on an individual. According to the Merriam-Webster dictionary, wellness is defined as, "...the quality or state of being in good health especially as an actively sought goal" (2020). Research has demonstrated that sunlight impacts one's mental health by regulating the release of hormones that affect our mood (Kent, 2009). Increased sunlight exposure has also been linked to decreased cognitive impairments both in individuals with previous impairments and without (Kent, 2009). Similarly, there are relationships between exposure to sunlight and a decrease in the severity of many physical ailments such as, type 2 diabetes, hypertension, certain cancers, asthma, arthritis and even infectious diseases (Mead, 2008). Each of these aspects are important components of an individual's overall well-being. Sunlight is a free and natural resource that has the potential to be used to increase one's overall wellness. By researching the potential benefits and effects sunlight can have on one's health, individuals can be made aware of an additional supplement that is often forgotten: sunlight. This research explores the process of observing how access to sunlight can impact an individual's well-being, in hopes to significantly lower the number of individuals affected by health issues.

Literature Review

Effect on Physical Health

Sunlight has been recognized as a beneficial resource for one's physical health as early as 400 B.C. Genius (2006) writes that Hippocrates, known as the father of medicine, often prescribed a "bath" in sunlight for patients suffering from a variety of ailments such as jaundice and tuberculosis. During Hippocrates' time, hospitals were encouraged to utilize large windows to create natural light that would benefit the health of patients (Genius, 2006). The use of sunlight as a healing property continued on throughout history as sanatoriums began popping up around the more advanced countries of the world, using light to benefit patients within hospital suffering from a number of diseases such as tuberculosis, cystic fibrosis and mood disorders (Carter, 2012).

In more recent studies, scientists have been able to conclude that sunlight is essential for human health. Sunlight exposure provides humans with up to 90% of their Vitamin D requirement (Holick, 2004). Vitamin D deficiency can lead to a variety of health issues such as, low bone density, cancer, and autoimmune diseases (Holick, 2004). Vitamin D can be found in foods such as fish and egg yolks, but it is nearly impossible to consume enough vitamin D through nutrition (Holick, 2004). Therefore, sunlight exposure is vital to daily Vitamin D requirements. There are many illnesses to this day, that are treated using sunlight's natural healing qualities. Treatment with light is called "phototherapy" (Horn et al, 2019). According to pediatric specialists at Rochford Hospital in Essex, England, jaundice is a very common ailment for newborn babies (Horn et al, 2019). Jaundice occurs when the baby's liver does not remove excess bilirubin in their system quick enough, resulting in a yellow skin complexion. Research conducted by

physicians at Rochford Hospital show phototherapy as an effective intervention to treating the ailment, even without the presence of additional medical treatment (Horn et al, 2019). In addition to jaundice, sunlight has also been effectively used to treat acne, psoriasis, eczema, thyroiditis and arthritis (Mead, 2008). This is completed by using UVB light, which penetrates the skin and slows the growth of affected skin cells. UVB is found in natural sunlight (National Psoriasis Foundation, n.d.). Sunlight has been used as a natural remedy for physical ailments for many centuries.

Effect on Cognition

In addition to physical health, sunlight exposure can have important effects on cognitive function. Dimitriu (2020) describes the role that sunlight plays on an individual's circadian rhythm which affects their ability to regulate their sleep patterns and cognition. Morning sunlight exposure acts as the body's alarm clock, and without this exposure an individual may not properly wake up for the day. If individuals do not have enough exposure to sunlight, they may feel more lethargic and tired, creating a cognitive deficit (Dimitriu, 2020). Studies completed in regards to employees working in office buildings have also shown higher performance levels in terms of work productivity when natural light is available due to having more windows within the workplace(Figueiro, 2016). Access to natural light improved the worker's performance levels, showing a higher level of cognitive functioning in the presence of sunlight. This means the workers were more alert, focused and were able to think on a more fast paced and productive level.

Decreased exposure to sunlight creates a cycle of decreased cognitive functioning (Kent et al, 2009). The cycle is most common in individuals who have seasonal affective disorder (depression that occurs during the changing of seasons) or other depressive mental health concerns (Kent et al, 2009). However, this relationship is also present in individuals with no current mental health diagnosis. In a 2012 study completed using participants with no current mental health diagnoses, research showed a positive correlation between natural light and alertness, as well as performance levels (Kantermann et al., 2012). Participants rode a stationary bike while exposed to natural light. The results showed that participants were more focused and alert while working in natural light, as evidenced by a faster pace and increased gas and oxygen secretion. Participants were more inclined to work hard and improve their workout rhythm when sunlight in direct sunlight (Kantermann & et. al, 2012). Research has shown that cognitive improvements are encouraged by access to sunlight in an individual's environment.

Effect on Mental Health

The key factor in sunlight's effect on an individual's mental health is the hormones melatonin and serotonin (Dimitriu, 2020). Melatonin is "...often referred to as the sleep hormone..." and assists the body in promoting sleep (Dimitriu, 2020). Serotonin however, does the opposite. Serotonin is a chemical that promotes mood and makes a person feel more elated (Dimitriu, 2020). Sunlight triggers the release of serotonin in the brain which elevates mood and increases feelings of joy and contentment. Melatonin is released in the absence of light and promotes sleep. As the hormone encourages sleep, it leads to a risk of lowering one's mood and energy levels significantly (Wendelien et al,

2007). When an individual has higher sunlight exposure throughout the day, they will have higher levels of serotonin released and less melatonin released (Wendelien et al, 2007).

Low levels of sunlight exposure can cause a decrease in serotonin levels and increase risk of developing depression (Wendelien et al, 2007). Changing seasons, such as summer to fall, can have negative effects on individuals diagnosed with Seasonal affective disorder (SAD), as the decrease in sunlight may trigger symptoms of the illness (Dimitriu, 2020). Light exposure has also been linked to relief from other mental health conditions such as, anxiety disorders, PTSD and other depressive disorders (Mead, 2008).

Light therapy, also called phototherapy, is often used to treat individuals with SAD as a way to promote the release of melatonin. During light therapy an individual completes daily tasks in close proximity to as a light therapy box. Light therapy boxes emit bright light that is supposed to mimic sunlight. In addition to SAD, light therapy is used to treat a variety of other conditions. These include sleep disorders, dementia, other depressive ailments and jet lag (Horn et al, 2019). Light therapy can be beneficial to all individuals, especially during winter months where natural sunlight is not as readily accessible. Light therapy mimics natural sunlight when it is not readily available, causing a similar reaction in the brain and the release of serotonin. The success of light therapy suggests a correlation between light exposure and decreased negative mental health symptoms.

Sunlight provides natural remedies to the physical, mental and cognitive health of an individual. Light therapy has shown how exposure to light can improve these areas of

health. Therefore, there is reason to believe that further research would determine that the more exposure to sunlight that an individual has, the more well they will feel overall. This research explores whether sunlight exposure not only affects an individual's health in one area but as an overall improvement on one's wellness.

Methods

Participants

Participants (N= 30) were adults over the age of 18. There were no exclusion criteria. Participants were recruited using the researcher's personal social media platforms, as well as social networks. The survey monkey link was distributed along with a brief message describing the purpose and nature of the survey.

Design & Procedures

This was a cross-sectional design for a descriptive research study. The independent variable was one's exposure to sunlight. Exposure to sunlight for the purpose of this experiment is defined as the number of hours spent outdoors daily and weekly. When discussing access to light in areas where natural light is not available, artificial light replaces the term. The dependent variable is one's overall wellness. Overall wellness is defined as physical, mental and cognitive health.

Data collection took place using an anonymous brief electronic survey using the online survey platform Survey Monkey. This 32 question survey consisted of 30 multiple choice based questions and two open ended questions. It took participants on average, four minutes to complete the survey with a 100% (n=30) completion rate. It was

distributed using the researcher's personal social media accounts where the link was included. The survey included a series of true or false, multiple choice and open ended questions. Participants had the option to skip any question they chose. Links and contact information for available resources and support lines were included at the end of the survey, should participants experience additional distress after completing the survey.

Materials

In order to measure the constructs multiple scales were used. Mental health was measured utilizing the Brief Mood Introspection Scale (BMIS), which asks participants to describe their mood using specific feeling words (Mayer, 1988). Cognitive functioning was measured using the Cognitive Assessment Battery for Chemo Fog (CAB-CF) scale (American Cancer Society, 2020). This scale is usually utilized in patients who are undergoing chemotherapy treatment and are experiencing cognitive impairments or delays due to the treatment. This scale asks participants to describe their cognitive functioning in relation to variables, which for the purpose of this study was exposure to sunlight. Physical functioning was measured using the Health Orientation Scale (HOS) (Snell, 1991). The Health Orientation scale asks participants to agree or disagree with varying statements about their physical health.

Data Analysis

Data was downloaded from Survey Monkey to Excel. Correlations were used to examine the relationship between the number of hours spent exposed to sunlight per week and per day and one's overall wellness. Scores were computed for each of the three scales measuring the three categories of wellness; physical health (Health Orientation

Scale, Snell, 1991), mental health (Brief Mood Introspection scale) and cognitive health (Cognitive Assessment Battery for Chemo Fog, American Cancer Society, 2020). Three correlations were run between each of scores on the three areas of wellness and the number of hours spent outdoors per day. Three more correlations were run to determine a relationship between the number of hours a week the participants spent outdoors and the three wellness scores.

Findings

Participants (N=30) consisted of 93.1% females (n=27) and 6.9% (n=2) male, with one participant choosing to skip this question. Most participants (53%, n= 16) were 18-24 years old, with 13% (n=4) between 25-34 years old, 10% (n=3) between 35-44 years old, 10% (n=3) ages 45-54 years, 6.67% (n=2) between 55-64 and 6.67% (n=2) over 65 years old.

There was no significant statistical correlation between physical health and number of hours spent outdoors per week ($r=.224$) ($p=.243$) or per day ($r=.347$) ($p=.065$). Cognitive functioning did not show significant relationships with the number of hours spent outdoors per week ($r=-.239$) ($p=.203$) or per day ($r=-.033$) ($p=.863$) The degree of freedom for this study was 29. Of responses, most participants (96%) showed that individuals chose happiness as their mood on a sunny day. Significant data findings were limited to the correlation between number of hours spent outdoors per week and per day ($r=.419$). Most individuals surveyed responded that the majority of their days were spent indoors (76%).

In addition to these evidence based findings, participants also responded to several perception questions for each of the three categories. The majority of participants

(73%) responded that they were aware of their physical health. All participants (100%) gave agreeing answers to the prompt, “I feel more physically well on sunny days”. The majority of participants (76.67%) stated they were in good physical health. In regards to mental health, almost all participants (96.67%) stated that they feel “happy” on a sunny day and 73.33% stated they felt “fatigued” on cloudy days. In response to the statement “I feel more alert and engaged when completing tasks in a bright room” there was a mean answer of 82 (M=82) on an agreement scale of 0-100. Of all participants, 50% (n=15) agreed and 33.33% (n=10) that their ability to focus were benefited by a well lit room. Perception questions measure how participant’s think about sunlight’s effect on their overall wellness.

Chart.1		HOURS (DAY)	HOURS (WEEK)	PHYSICAL HEALTH	COGNITIVE HEALTH
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HOURS (DAY)	Pearson Correlation	1	.419	.224	-.239
	Sig. (2-tailed)		.024	.234	.204
	N	30	29	30	30
HOURS (WEEK)	Pearson Correlation	.419	1	.347	-.033
	Sig. (2-tailed)	.024		.065	.867
	N	29	29	29	29
PHYSICAL HEALTH	Pearson Correlation	.224	.347	1	.078
	Sig. (2-tailed)	.234	.065		.683
	N	30	29	30	30
COGNITIVE HEALTH	Pearson Correlation	-.239	-.033	.078	1

	Sig. (2-tailed)	.204	.867	.683	
	N	30	29	30	30

Discussion

In relation to the stated hypothesis, no significant findings were determined from the data. Most individuals surveyed responded that the majority of their days were spent indoors. This was likely due to the timing of the survey in Fall 2020, when many individuals were working from home and schools remained hybrid or remote due to the ongoing COVID-19 pandemic.

The findings did not demonstrate a significant relationship between sunlight exposure and physical health. Results also showed no significant relationship between sunlight exposure and mental health. However, numbers were nearing significance between cognitive functioning and number of hours spent outside per week, which suggests that with a larger sample size, a significant relationship might be found within that category.

In terms of perceived wellness, participants believed that sunlight affects their physical, cognitive and mental health. The majority of participants (76.67%) stated they were in good physical health, meaning the participants have no current physical ailments. This shows one's perception of their physical wellbeing is increased on days where their sunlight exposure is increased. There was no significant relationship found between the number of hours spent outdoors and cognitive functioning. However, participants' perceived that they felt more alert and engaged when completing tasks in bright light.

Mental health state was determined using mean calculations, as participants were asked to choose appropriate moods based on the BMI scale. Most participants described feeling “happy” on sunny days and “fatigued” on cloudy days. Previous research predicts this to be true, as sunlight directly impacts the hormones released in the brain which determine mood (Wendelien et al, 2007). Important determinants could be drawn, as the mean answers show perceived mood to be elevated by direct exposure to sunlight.

Although findings did not specifically determine correlations between each aspect of wellness, participants perceived themselves as feeling more well on sunny days or days when they are exposed to sunlight, in all three categories. This reflects findings from previous research, which determined “...weather can have a positive effect on people’s thoughts, feelings and behaviors” (Lucas & Lawless, 2013). Due to participants generally stating they felt more cognitively, mentally and physically well, this shows that this may be accurate.

Limitations

Like all research studies this project has limitations. Due to the small sample size the power of the analysis is low, limiting the ability to find significant relationships. It is also possible that with more diversity in terms of gender and age representation findings would have been different. This research used non-probability sampling, since participants were recruited directly from the researcher’s personal accounts and not the general public. This causes a lack in generalizability, as the sample was specifically chosen. In addition, 76% of participants stated they spent most of their time at home but they allow as much light as possible into their home. The results may be affected by the government mandated stay at home order in response to the global pandemic. Many

individuals do not have access to a private outdoors space and are mandated to stay within their homes much of the time, causing unusual sunlight diversion. Results could be altered had the study taken place during less unprecedented times. Results were limited due to the COVID-19 pandemic emergency procedures.

Implications

The research provides us with several implications despite the lack of statistical findings. The social work field is constantly searching for positive intervention strategies to utilize in the field and with client populations. Due to perceived benefits on participants' physical, cognitive and mental health when exposed to natural light, one can advocate for clients who struggle with any impairment of their wellness to incorporate sunlight into the area where they spend the majority of their day. Previous research suggests improvements for some specific physical illnesses such as asthma, rheumatoid arthritis, type two diabetes and certain cancers when an individual has increased exposure to sunlight (Holick, 2004). In addition, 96.67% of participants chose "happy" as their perceived mood on a sunny day, showing that individuals feel as if they are positively impacted by exposure to sunlight. According to research completed by Zadra & Clore, one's emotions and perception are often connected, leading with a more positive outlook on life when faced with positive emotions (2011). Since participants' perceived positive impacts on their mental, physical and cognitive functioning when exposed to sunlight, it is possible that their perception will actually increase their wellness.

The social work field relies heavily on peer reviewed research and research based intervention measures, as it is an expanding field. The social work field can be positively impacted by the implementation of sunlight exposure as an intervention method, as it is

perceived to positively affect multiple aspects of one's wellness and is free and readily accessible to all clients. Sunlight exposure is a natural remedy that does not require a prescription or the intake of any drugs or supplements. For clients who prefer to abstain from the use of prescription drugs or who live in areas where services are not readily available, sunlight exposure can be an alternative for them if more research is done to prove its benefits. Should more research be conducted on the significance of sunlight exposure on overall wellness, social work, as well as many other professions, could benefit from utilizing it as an intervention.

Conclusion

In conclusion, the impact of sunlight exposure on one's overall wellness can not yet be determined. Sunlight exposure has been used as a natural remedy for many physical, mental and cognitive impairments in the past. However, these research findings provided limited insight into its ability to improve physical, mental and cognitive wellness, as no relationships were found between hours of sunlight exposure and wellness. Future research should continue to explore this topic as it could have positive impacts on the social work field's ability to intervene with clients.

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