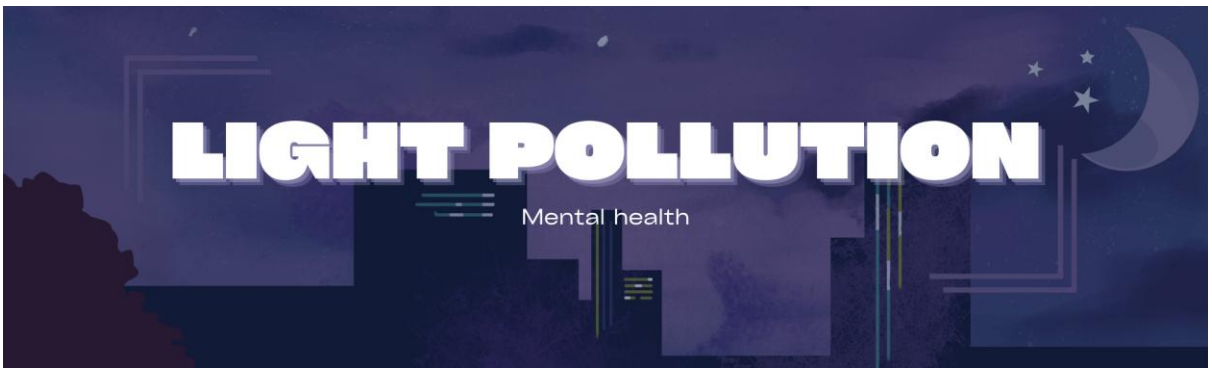

Impact of Light Pollution on Mental health

Duration	45 minutes
Age group	15-19 yo.
Objectives	• To understand better the impact of light pollution on human health • To know how to protect our health from light pollution • To develop coping strategies
Learning Outcomes in Line with Curriculum	• Advocate for responsible lighting practices • Formulate personal behavioral changes • Articulate an argument for the importance of natural darkness to both human health and the broader ecosystem
Teaching Methods	• Theoretical presentation • Practical Exercises

Materials Needed

☐ Materials on Impact on light pollution on mental health (attachment 13)

☐ Whiteboard or flipchart and markers

☐ Sticky notes or small pieces of paper

☐ Printed worksheet (attachment 14): Tracking Your Circadian Rhythm and Light Exposure

Workshop/Lesson Plan

Duration	Description	Notes
5 minutes	**Introductory part** Introduction to the topic and its meaning for the young people and the planet.	
10 minutes	**Foundation of light and health** <u>Objectives</u> • To establish a fundamental understanding of light as an environmental factor and its natural and artificial forms. • To introduce the concept of light pollution and its primary sources. • To explain the basic biological mechanisms through which light affects human physiology. <u>Learning outcomes</u> • Define light pollution and identify its main types and sources. • Explain the pathway through which non-visual light information travels from the eye	Materials – attachment 13

	to the brain's clock. • Distinguish between natural light exposure and disruptive artificial light exposure. 1.1. Introduction to Light Pollution 1.2. Researches on the Impact of Artificial Light on Human Health 1.3. Human Circadian Rhythm, Sleep, and Melatonin Production <u>Methods used:</u> - Theoretical presentation of the content to the students - Discussion	
15 minutes	**The Circadian Rhythm and Mental Health** <u>Objectives</u> • To detail the central role of the circadian rhythm in regulating human physiological processes. • To analyze the specific negative impacts of light pollution on sleep, mood, and cognitive function. • To connect circadian disruption directly to various mental and physical health issues <u>.Learning outcomes</u> • Describe the function of the SCN and how light timing entrains the human body clock. • Articulate how nocturnal light exposure negatively affects sleep quality and quantity. • Summarize the evidence linking circadian rhythm disruption from light pollution to common mental health conditions.	

	2.1. Researches on Circadian Rhythm – Nobel Prize in Medicine 2017 2.2. Impact of Circadian Rhythm Disorder on Insomnia and Mental Health <u>Methods used:</u> - Theoretical presentation of the content to the students - Discussion	
10 minutes	**Impact and mitigation strategies** <u>Objectives</u> • To explore the broader public health and environmental consequences of light pollution. • To examine practical, interdisciplinary solutions to mitigate light pollution and its health effects. • To review current research trends and areas for future study in chronobiology and environmental health. <u>Learning outcomes</u> • Propose and justify effective lighting design principles (The 4 principles: Fully Shielded, Correct Spectrum, Appropriate Intensity, Only When Needed) for reducing light pollution. • Identify at least three personal and three policy-level actions that can mitigate the negative health effects of artificial light at night. • Connect the impact of light pollution on human health to its broader environmental and public health context.	

	3.1. Wider impacts 3.2. Mitigation strategies: Design and solutions <u>Methods used:</u> - Theoretical presentation - Discussion - Practical exercises	
5 minutes	**Final review and learning outcomes check** The session concludes by reinforcing the final message: Darkness is a critical resource for health. We must commit to using the right light, at the right time, in the right place. Ask the learners: 1. Name two forms of light pollution. (Answer: Skyglow, Light Trespass) 2. Which color of light is most effective at suppressing melatonin? (Answer: Blue-rich light) 3. Name one of the Four Principles of dark-sky lighting. (Answer: Fully Shielded, Correct Spectrum, Appropriate Intensity, or Only When Needed)	

Reflection Questions

Module 1: Foundations of Light and Health

- How has artificial light changed the role of light as an environmental factor?
- Are all types of light pollution equally harmful? Explain using biological mechanisms.

- What is the role of ipRGCs in non-visual light perception, and why is it important?
- How does light spectrum (not just intensity) affect human health?
- To what extent can links between ALAN and diseases be considered causal rather than correlational?

Module 2: Circadian Rhythm and Mental Health

- Why is the SCN considered the “master clock” of the body?
- How do PER and TIM gene mechanisms explain the stability of circadian rhythms?
- Why can even low levels of light at night disrupt sleep?
- How does circadian disruption affect neurotransmitters like serotonin?
- Are sleep disturbances a cause or a consequence of mental health disorders?
- How does circadian misalignment impact cognitive functions such as memory and attention?

Module 3: Impact and Mitigation Strategies

- Why should light pollution be treated as both a public health and environmental issue?
- What are the strengths and limitations of current legal approaches to light pollution?
- Which of the four lighting principles is most important for human health, and why?
- What barriers exist to reducing light pollution at societal and individual levels?
- Can individual behavior effectively reduce the impact of urban light pollution?

Kahoot Quiz

1. Which type of light pollution creates a bright glow over cities?

A. Glare
B. Light trespass
C. Skyglow
D. Clutter

☐ **Correct:** C

2. Which hormone is most affected by light at night?

A. Cortisol
B. Melatonin
C. Dopamine
D. Insulin

☐ **Correct:** B

3. What is the main function of melatonin?

A. Regulates digestion
B. Controls movement
C. Signals sleep and darkness
D. Increases heart rate

☐ **Correct:** C

4. Where is the "master clock" (SCN) located?

A. Retina
B. Pineal gland
C. Hypothalamus
D. Brainstem

☐ **Correct:** C

5. Which type of light most strongly suppresses melatonin?

A. Red light
B. Blue light
C. Yellow light
D. Infrared light

 Correct: B

6. What is "circadian rhythm"?

A. A sleep disorder
B. A 24-hour biological cycle
C. A type of hormone
D. A brain disease

 Correct: B

7. Which condition is linked to circadian disruption?

A. Depression
B. Broken bones
C. Allergies
D. Hearing loss

 Correct: A

8. What does Social Jet Lag measure?

A. Travel fatigue
B. Sleep quality
C. Difference between weekday and weekend rhythms
D. Screen time

 Correct: C

9. Which strategy helps reduce blue light exposure at night?

A. Using bright LEDs
B. Screen filters or night mode
C. Turning on more lights
D. Watching TV in the dark

☐ **Correct:** B

10. What is the best time to reduce light exposure?

A. Morning
B. Midday
C. Afternoon
D. Evening

☐ **Correct:** D

Additional materials

Social jet lag: https://pubmed.ncbi.nlm.nih.gov/16687322

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