# uBEATS Teacher's Guide:

# Resiliency Training - Part 2

This teacher guide is a supplementary text to support the use of the uBEATS "Resiliency Training – Part 2" module for grades 6-12.

To help students develop the knowledge necessary for an incredible future in health care, we created UNMC Building Excellence in Academics Through STEM (uBEATS), an online health science resource for students.

UNMC uBEATS modules are short (15 minutes or less), interactive online health science modules to supplement curriculum taught in grades 6 – 12. These do not replace curriculum, but they are a supplement for teachers and students incorporating evidence-based information and UNMC expert guided material. Each module is chunked into sections with formative and summative assessments with immediate feedback provided.

Tips on how to utilize uBEATS modules:

- Internet access is required to view uBEATS modules.
    - For those who have access to one-to-one technology, modules can be used in or outside of the classroom as a topic introduction, extension, or review. For classrooms without individual student devices, modules can be used in whole group instruction. Formative assessment questions can use the teacher's preferred call-and-response method and summative assessment questions can be displayed on the board and answered individually by students or printed and distributed to students after viewing the module.

## Objectives

1. Define the role of IgA in physiology and how its function is impacted by stress.
2. Explain the role of Heart Rate Variability in the adaptability of body and mind.
3. Differentiate between Incoherence and Coherence and learn a strategy to achieve coherence.

# Introduction

Welcome to the second module in this e-learning series on Resiliency Training. In our previous module, we learned about the fundamental aspects of stress, including its definition and various types, such as positive stress, traumatic stress, acute stress, and chronic stress. We explored the intricate workings of the brain, specifically the amygdala and hypothalamus, and examined the autonomic nervous system's dynamic balance between the sympathetic and parasympathetic branches. Additionally, we examined concrete examples of how stress impacts the human body and differentiated between depleting and renewing emotions.

In this module, we will embark on a deeper exploration of the physiological underpinnings of stress by focusing on two crucial components: Immunoglobulin A (IgA) and Heart Rate Variability. We will explore the role of IgA in the body's immune system and its impact on our overall health. Understanding the intricacies of Heart Rate Variability will allow us to grasp the autonomic nervous system's nuances and its relationship with stress responses. And lastly, we will explore the concept of coherence, a state of physiological and emotional harmony, and contrast it with incoherence, a state of dissonance within the body. This differentiation will provide us with valuable insights into managing stress effectively.

As we progress through this module, you will gain a comprehensive understanding of these essential physiological aspects of stress, equipping you with the knowledge and tools needed to navigate and mitigate the effects of stress in your personal and professional life.

# Prior Knowledge

Before beginning this module, the teacher should understand the Next Generation Science Standards (NGSS) featuring Three-Dimensional Learning.

**Dimension 3: Disciplinary Core Ideas—Life Sciences**. A Framework for K-12 Science Education

Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. Feedback mechanisms maintain a living system’s internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Outside that range (e.g., at a too high or too low external temperature, with too little food or water available), the organism cannot survive. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.

National Academies of Sciences, Engineering, and Medicine. 2012. A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas. Washington, DC: The National Academies Press. https://doi.org/10.17226/13165.

**Science and Engineering Practices** NGSS

1. Asking questions (for science) and defining problems (for engineering)

6. Constructing explanations (for science) and designing solutions (for engineering)

**Crosscutting Concepts** NGSS

1. Patterns

2. Cause and Effect

7. Stability and Change

# Key Terms/Vocabulary

Stress, physiology, immunoglobulin A (IgA), secretory antibody, immune system, mucous membranes, mucosal surfaces, pathogens, stress response, chronic stress, gut-brain connection, gut microbiota, Heart Rate Variability (HRV), arrhythmia, autonomic nervous system, sympathetic nervous system, parasympathetic nervous system, electrocardiogram (EKG), harmony, dissonance, biofeedback, coherence, incoherence, cross coherence, quick coherence.

# Science Standards

Nebraska's College and Career Ready Standards for Science 2024 **Nebraska Science Standards**

- SC.HSP.6.5. Gather, analyze, and communicate evidence of the relationship between the structures and physiological processes of the nervous system.

National Consortium for Health Science Education **NCHSE**

- Foundation Standard 1: Academic Foundation
    - 1.1.2.g. Identify basic structures and describe functions of the human nervous system.
    - 1.1.2.e. Identify basic structures and describe functions of the human lymphatic/immune system.
    - 1.1.2.h. Identify basic structures and describe functions of the human endocrine system.

- Foundation Standard 9:  Health Maintenance Practices
    - 9.1.1. Promote self-care behaviors of health and wellness
        - Stress management

# Extensions of the lesson

To help students become more familiar with the Key Terms of this module, the teacher can use the vocabulary list for a classroom Word Wall, or integrate the vocabulary into review sessions.

Encourage students to check current events for the latest news involving biofeedback techniques.

As student misconceptions become apparent, the teacher may need to reinforce these concepts:

- The body's immune system protects against outside invaders such as bacteria, viruses, and other pathogens. Chronic stress weakens the immune system and leaves a person more vulnerable to infection and disease.
- Heart Rate Variability (HRV) is not the same as arrhythmia. HRV involves healthy, rhythmic variations in the time intervals between heartbeats while arrhythmia involves irregular and often abnormal heart rhythms.
- Heart Rate Variability reflects your body's adaptability. High variability in your heart rate indicates that your body can readily adjust to various changes. Typically, individuals with high heart rate variability experience lower levels of stress and greater overall happiness.
- HRV training is a specific form of biofeedback that focuses on improving Heart Rate Variability. It involves guided exercises and practices aimed at increasing HRV.
- Incoherence is a state where heart rhythms are irregular and lack synchronization. Coherence, on the other hand, is a state of harmony, when heart rhythms are in a smooth and balanced pattern. Cross coherence combines both incoherent and coherent patterns within the heart rhythms. Cross Coherence occurs when we're challenged or faced with change. It reflects our ability to adapt and self-regulate amidst stress or shifting situations.

# Enrichment

Practice the “Quick Coherence” technique that is explained in this module.

Explore the website of the Mayo Clinic to learn more about managing stress. For example, see the article Stress symptoms: Effects on your body and behavior.

To review the functions of the immune system, watch a 5-minute video from TED Ed: How does your immune system work?

Visit the Harvard Medical School’s *Heart Letter* to read about HRV: What is heart rate variability?

Read articles in the Cleveland Clinic that explain Heart Rate Variability (HRV).