


# Optimizing Preventative Movement Strategies through Understanding Human Biomechanics

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## Learning Objectives

Introduce principles of Chain reaction biomechanics and discuss how these principles pertain to human function in a manufacturing environment.	Discuss preventative movement strategies
Discuss the misconceptions surrounding preventative movement strategies in a manufacturing environment	Provide a framework for development of optimal preventative movement strategies aimed at injury risk reduction

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# Optimization of Human Movement

Vastly important in the prevention of workplace injuries.

Often overlooked and misunderstood as an Ergonomic solution

Human movement is Complex. Human behavior is even more complex.

**Difficulty** in **injury risk reduction** can be attributed to the fact that work place injuries are **almost always multifactorial** in nature. It is never just one **risk factor**.

The path of least resistance.

We chose to focus our efforts on a single risk factor.

Often the one we have the most power to control.

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**Extrinsic Injury Risk →  
Environmental Risk Factors**

- **Work/manufacturing process**
- **Machinery/Equipment design**
- **Production Rates**
- **Work/Rest Cycles**
- **Faulty equipment**
- **Temperature in facility**
- **Tools required**
- **Manufacturing Materials**
- **PPE required**
- **Lighting, etc.**

**Intrinsic Injury Risk →  
Behavioral + Personal Risk Factors**

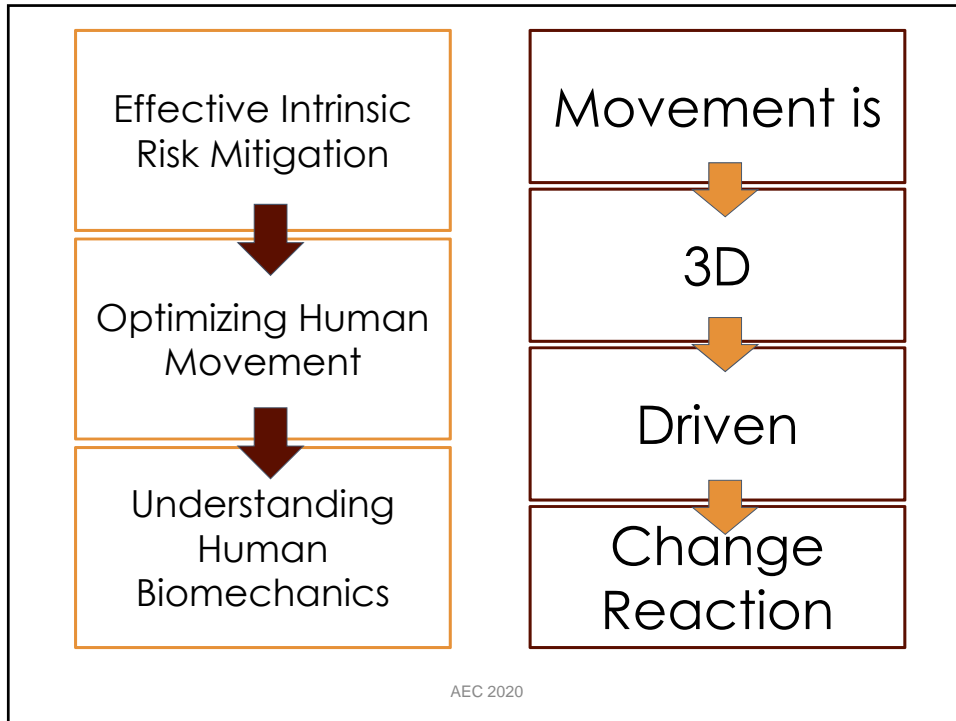
- Poor posture
- Limited Range of Motion
- Limited stability
- Poor cardiac conditioning
- Limited balance or Proprioception
- Poor work habits
- Previous Injury
- Fatigue or lack of sleep
- Excessively stress with non work related happening
- Lack of mindfulness, etc.

**In order truly risk mitigation,  
I must address both side of the coin.**

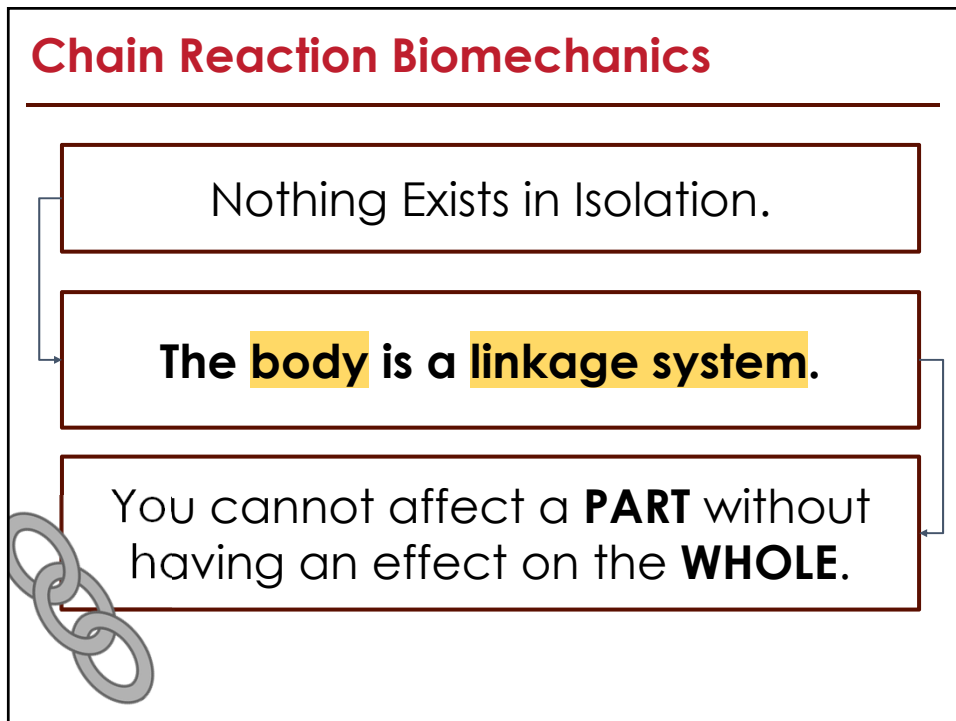
You cannot have effective extrinsic Injury risk controls without effective Intrinsic injury risk controls and vice versa.

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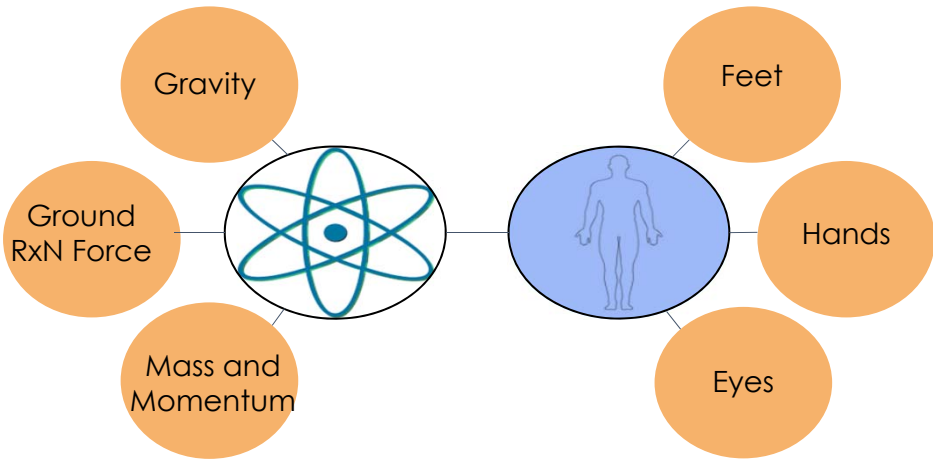


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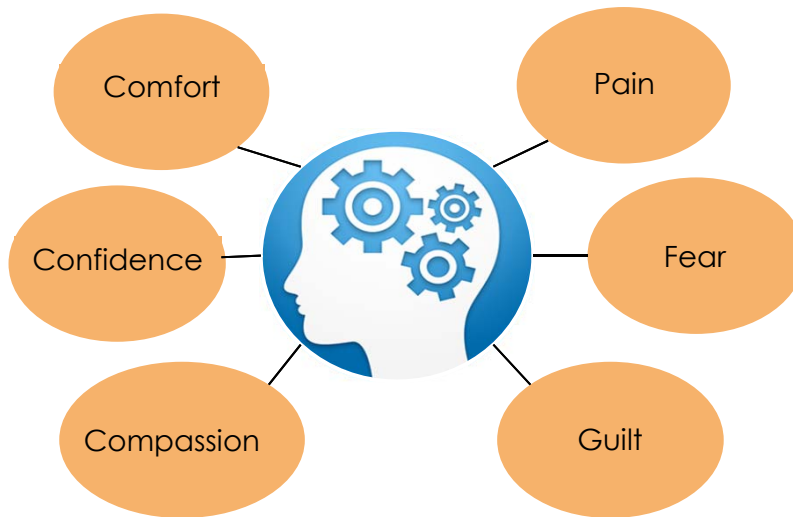
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## Movement is Driven: Environmental and Anatomical Drivers



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## Movement is Driven: Physiological Drivers



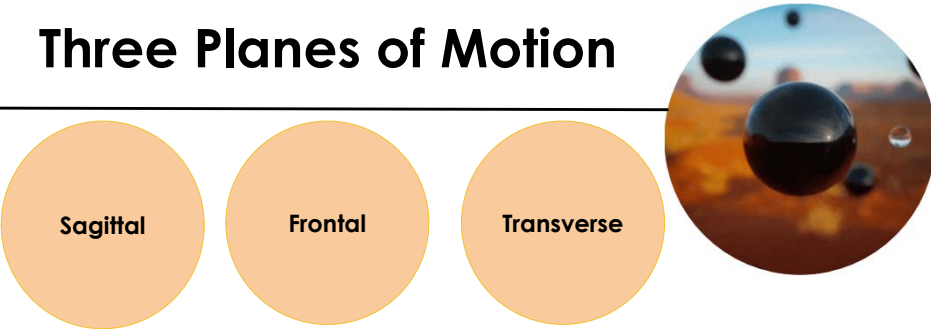
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**We are 3 Dimensional Be**

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**Movement is 3 Dimensional**

**Three Planes of Motion**



The diagram illustrates the three planes of motion. On the left, three orange circles are labeled 'Sagittal', 'Frontal', and 'Transverse'. To the right is a circular image showing several black spheres of different sizes on a surface, with a larger sphere in the foreground.

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**Movement Interventions:**  
**Pre-Shift Warm Up**

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**Misconceptions →**  
Common practice for Traditional Athletes vs. Industrial Athletes.  
"Pre-shift stretching doesn't prevent injury incidents"

Dynamic Warm up	VS.	Static Stretching
Integration		Isolation
Job Specific Functional		Non - Functional

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## Movement Interventions: Job Coaching

**Behavior** is just as **important** as **engineering**.

Causative Cures.

Sometimes movement **needs** to be felt, not shown.

**Small** tweaks = **Big** differences in the chain reaction.

Arthrokinematics / the Path of Least Resistance / Proprioception / Muscle Load

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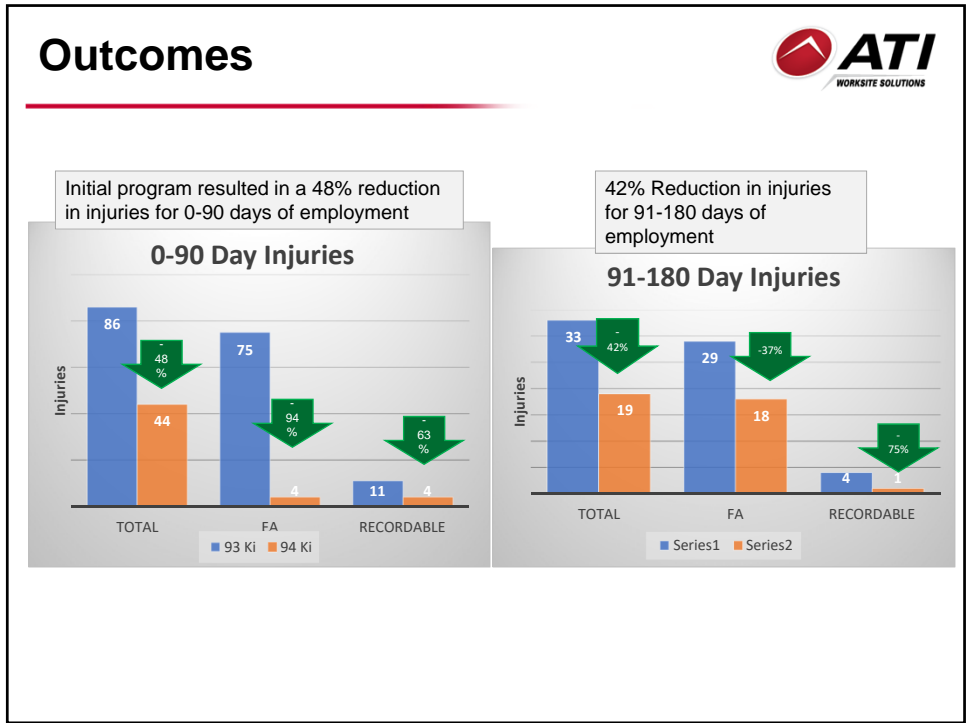
## Movement Interventions: Work Conditioning/ Work Hardening

Earliest Early Intervention

- Establish a Foundation for optimal movement → MoStability and Functional Endurance
- Gradual Adaptation → slowly increases in tissue stress over time.
- Movement Matrices → Tri-Plane Loading
- Points of Reference → for anatomical Drivers
- Continuation of Care

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A systematic human movement analysis of movements for proactive recognition of intrinsic injury risk.

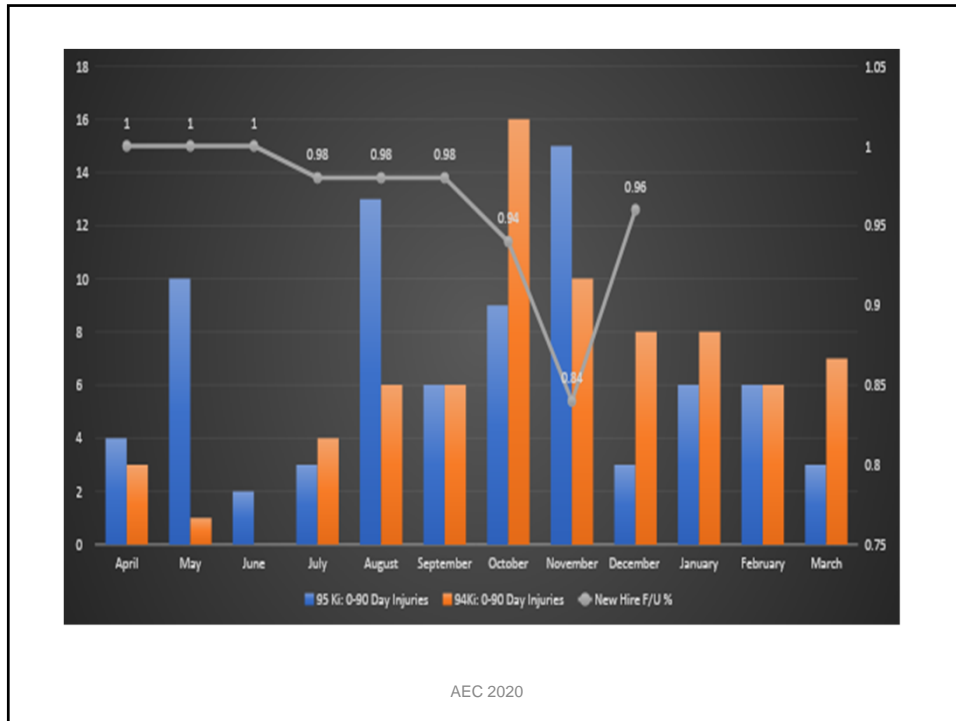
**DMA** → Dynamic Movement Assessment

Allows for →

- Identification of opportunities for improvement and risk reduction
- Prioritization of care
- Individualized plan of action for movement optimization
- Providing the tool needed to succeed on the job

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**Framework:**  
 Optimal Movement Strategies

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- Gradual
- Proactive
- Individualized
- Functional and purposeful
- Integrated with the entire kinetic chain
- Addresses a 3 planes of human motion

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**Resources:**

<https://www.grayinstitute.com/>

<https://www.atiworksitesolutions.com/>

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