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# SPORTS, RECREATION AND RESILIENCE

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# OBJECTIVES

- ▶ Play! Features and benefits
- ▶ Positive Youth Development 101
- ▶ Linking Recreation and Sports to Positive Youth Development
- ▶ How Recreation and Sports can help youth heal from adversity (a biological framework)

PLAY!

A GREAT PLACE TO START

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# PLAY

- ▶ Play is an engine for...
  - ▶ Benefits in Child Development
  - ▶ Benefits Child Health and Well-Being
- ▶ Current perspectives on play

# POSITIVE YOUTH DEVELOPMENT

101

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# KEY PRINCIPLES OF PYD

- Young people come for the content, but it is the connections that matter most.
- Connection to a caring and competent adult is the key to building resilience.
  - Must believe in the youth unconditionally
  - Must hold them to high expectations
- Youth live up or down to our expectations.
- Young people need to feel valued.
- Youth are the experts in their own lives.
- Adults can be instructive and supportive from the sidelines, but youth should choose and carry out activities as independently as possible.
- Youth are often the most effective teachers and role models for other youth.
- Teens are capable of growth and healing.

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WHAT DOES A PYD-ORIENTED TEAM LOOK LIKE?

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# 7 CS OF RESILIENCE

- Confidence
- Competence
- Connection
- Character
- Contribution
- Coping
- Control



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# HOW RECREATION AND SPORTS FIT IN

- Confidence
- Competence
- Connection
- Character
- Contribution
- Coping
- Control

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# PERSPECTIVES FROM “GRIT”

- Grit = passion and perseverance for long term goals
- How sports and recreation introduce
  - Interest, Practice, Purpose, Hope
- The science of “follow through”
- Can Grit translate from one domain to another?

# SPORTS, RECREATION AND HEALING FROM ADVERSITY

A PROPOSED BIOLOGICAL FRAMEWORK

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# ADVERSITY

- ▶ **Adverse Childhood Experiences (ACEs) Study**
  - ▶ Adults in Kaiser-Permanente System who received health appraisal examinations 1995 -1996
  - ▶ Survey mailed to 14,000 subjects. There were 10,000 respondents.
  - ▶ Survey asked about:
    - ▶ ACEs
    - ▶ Current health risk behaviors
    - ▶ Current health status

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# ADVERSITY

## ► Domains of Adversity

Physical Abuse

Sexual Abuse

Psychological Abuse

Household Member with Mental Illness or Suicidal

Household Member Incarcerated

Violence Against Mother

Household Member Substance Abuse

Possible ACE Score = 0 -

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# ADVERSITY

- ▶ Results

- ▶ Graded relationship between **ACE score** and **adult risk-behaviors**

- ▶ 4-12 x Risk: Alcoholism, Drug Abuse, Depression, Suicide Attempt

- ▶ 2- 4 x Risk: Smoking, Poor self-rated health, > 50 sexual partners, STI

- ▶ 1.5 x Risk: Physical Inactivity or Severe Obesity

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# ADVERSITY

- ▶ Results

- ▶ Graded relationship between ACE score and adult health outcomes



Heart  
Disease

Liver  
Disease

COPD

Cancer

Skeletal  
Fractures



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# ADVERSITY

## ▶ Impact

- ▶ Shift focus from effect of individual types of childhood victimization to **cumulative effect of ACEs** on child and adult **well-being**
- ▶ Ongoing collaboration between CDC and Kaiser-Permanente
- ▶ Basis for related studies and > 50 publications

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# ADVERSITY

- ▶ Since the original study, ACEs have been associated with a broader range of health outcomes...

Heart  
Disease

Liver  
Disease

COPD

Cancer

Skeletal  
Fractures

Metabolic  
Syndrome

Stroke

Immune  
Suppression

Autoimmune

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# ADVERSITY

- ▶ And a broader constellation of mental, somatic and behavioral health outcomes

Smoking

Alcoholism

Promiscuity

Ever Used  
Drugs

Depression

Hallucination

IV Drug Use

Early  
intercourse

Perpetrate  
IPV

Sexual  
dissatisfaction

Anger  
Problem

Anxiety

Insomnia

Panic

High Stress

Impaired  
memory

Multiple  
somatic  
symptoms

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# ADVERSITY

- ▶ Expanding the definition of adversity
  - ▶ Original ACEs chosen *a priori*, relied on retrospective reports by adults
  - ▶ Ongoing research efforts to expand/refine ACE inventory
  - ▶ Key research is youth-informed and local (CHOP and Penn!)



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# ADVERSITY

How can such a variety of challenging social experiences encountered early in life ultimately be linked to a consistent pattern of distal health outcomes?

# A Common Pathway

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# ADVERSITY

- ▶ ACEs and Traumatic Toxic Stress (TTS)
  - ▶ Physiologic Stress Response
    - ▶ HPA Axis and Sympathetic Nervous System Activation
    - ▶ Negative feedback/removal of stressor: prompt return to baseline
  - ▶ Traumatic Toxic Stress (TTS)
    - ▶ Chronic environmental factors lead to chronic stress response activation

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# ADVERSITY

- ▶ ACEs and Toxic Stress
  - ▶ Traumatic Toxic Stress (TTS)
    - ▶ Short term: overload of cortisol
    - ▶ Long term: relative lack of cortisol (target tissue/organ specific)



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# ADVERSITY

- ▶ ACEs and Toxic Stress

- ▶ Systemic Effects

- ▶ Immune Dysregulation and Suppression
    - ▶ Chronic Inflammatory State: CRP and IL-6
    - ▶ Alterations in metabolism: Cortisol, IGF-1, Insulin



Autoimmune Disease

Fibromyalgia

Chronic Fatigue

Obesity/DM/Metabolic Syndrome

Cancer Risk

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# ADVERSITY

- ▶ ACEs and Toxic Stress

- ▶ Neurologic effects

- ▶ Three regions of brain dense in glucocorticoid receptors:

- ▶ Hippocampus → atrophy

- ▶ Prefrontal Cortex → remodeling

- ▶ Amygdala → remodeling

- ▶ Suppressed BDNF response

- ▶ Inhibition of neurogenesis



Impulsive behavior

Alterations in memory

Alterations in executive function

Altered response to stimuli/coping

“Trauma-Organized Lifestyle”

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# ADVERSITY

- ▶ ACEs and Toxic Stress

- ▶ Epigenetics

- ▶ Disruption of HPA Axis results in enduring epigenetic changes
      - ▶ Key genes: GC receptor, Chaperone proteins, Metabolizing Enzymes
      - ▶ Genome wide studies: 180 - 2868 SNPS affecting key genes
      - ▶ “Epigenetic signature”
    - ▶ Intergenerational transmission of response to adverse events
      - ▶ Maternal stress response affects fetal epigenetic coding
      - ▶ Maternal and paternal stress predicts **teen epigenome** (Essex et al.)
    - ▶ Potential for reversibility

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# ADVERSITY

## ACEs are Powerful

They consistently predict negative health outcomes.

## ACEs are Not Fate

The biological model for ACEs exposes some ways in which this predictive relationship may be modifiable. (This is the curse and blessing of epigenetics!)

## There's Evidence

Apart from primary prevention, there are some potential ways to protect young people from ACEs.

# The Case for Social Interventions

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# CONNECTION TO COMPETENT AND CARING ADULTS

## ▶ Parenting interventions

- ▶ Focus on early childhood
- ▶ Growing evidence basis
  - ▶ Includes Cochrane review (13 RCTs, 3 quasi-RCTs)
- ▶ Classes for parents and foster parents shown to improve
  - ▶ child behavior
  - ▶ HPA axis function
  - ▶ cortisol regulation

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# CONNECTION TO COMPETENT CARE PROVIDERS

- ▶ Therapy and therapeutic relationships
- ▶ Therapy directly addresses **cognitive and behavioral symptoms**
- ▶ Therapy also addresses **epigenetics!**
  - ▶ In a study of 16 combat veterans with PTSD, intensive psychotherapy was associated with normalization of epigenetic changes in key genes associated with TTS.

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# CONNECTION TO COMPETENT AND CARING ADULTS

## Community Youth Development Programs (CYDPs)

- ▶ CYDPs are often built upon structured relationships between youth and caring adults who are acting *in loco parentis*, through activities that are specifically designed to foster youth skill development, trait development, behaviors and health outcomes.
- ▶ If skilled parenting and therapeutic relationships can modify the effects of TTS in children and adults then it's reasonable to imagine that CYDPs can have similar positive impacts on youth.



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# CONNECTION TO COMPETENT AND CARING ADULTS

## Community Youth Development Programs

- ▶ School-based and after-school programs have shown positive, lasting impacts on youth development and resilience.
- ▶ Most research not in framework/language of ACEs and TTS, but results relate.
- ▶ **Big Brothers Big Sisters**
  - ▶ better academic performance
  - ▶ more positive perceptions of academic abilities
  - ▶ more likely to report a “special adult” in their lives
- ▶ **Boy Scouts of America**
  - ▶ Scout self-ratings for positive character attributes increase longitudinally with engagement
  - ▶ Non-scouts show no change

# The Case for Exercise

# EXERCISE

- ▶ Exercise has a graded (dose-dependent) inverse relationship with chronic health conditions

Heart  
Disease

Chronic  
Kidney  
Disease

Chronic  
Lung  
Disease

Skeletal  
Fractures

Metabolic  
Syndrome

Stroke


Dementia

Cancer

# EXERCISE

- ▶ Exercise

- ▶ **Systemic effects**

- ▶ Decreases systemic inflammation:  CRP and IL-6
    - ▶ Increases parasympathetic tone
    - ▶ Improves lipid profile and glucose metabolism

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# EXERCISE

- ▶ Exercise
  - ▶ **Neurocognitive effects**
    - ▶ Reduces risk of dementia
    - ▶ Improves cognitive function in young adults
    - ▶ Reduces stress, anxiety and depression
  - ▶ **Neuroendocrine effects**
    - ▶ Increases BDNF (human and animal models)
      - ▶ Inhibits neuronal apoptosis
      - ▶ Promotes neurogenesis
      - ▶ Promotes synaptogenesis
        - ▶ Hippocampus hypertrophy
    - ▶ Decreases sensitivity to stress response (animal models)
      - ▶ Promotes GABAergic state, “stress tolerance”

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# EXERCISE

- ▶ Exercise

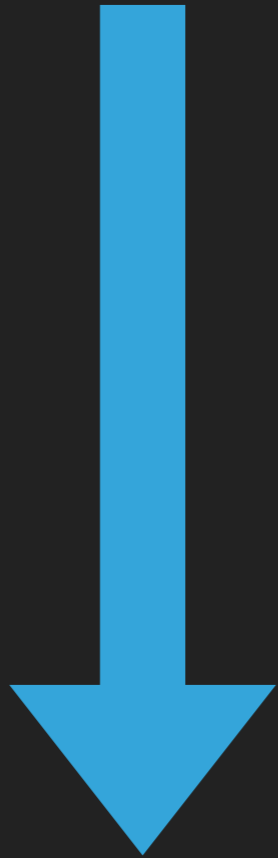
- ▶ Epigenetics

- ▶ Growing body of literature on broad epigenetic effects of exercise
    - ▶ One study showing **reversal** of SNP hyper-methylation in selected cancer-related genes and other SNPs due to an increase in physical activity in one year.

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# EXERCISE

ACEs



Exercise



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# EXERCISE

- ▶ Many CYDPs incorporate exercise into programming as a means to engage youth
- ▶ Limited research that directly examines how these CYDPs may shield youth from TTS.



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# EXERCISE

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# EXAMPLE PROGRAM

- ▶ Students Run Philly Style

- ▶ **CYDP + Running**

- ▶ Youth age 12-18, typically novice runners
    - ▶ Annual cycle
    - ▶ Meet several times per week in peer groups led by running mentors
    - ▶ Train to run Broad Street Run, Philly Half Marathon and Marathon



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# EXAMPLE ORGANIZATION

- ▶ Students Run Philly Style
- ▶ A “Reaching Teens” Organization
  - ▶ Running mentors receive ongoing support and training in resilience-based model.
  - ▶ Anecdotally, many youth identify running mentors as a consistent special caring adult.
  - ▶ Internal studies, while limited, show positive trends in youth character development and academic confidence.
- ▶ Current Research Collaboration with Children’s Hospital of Philadelphia

# TYING IT ALL TOGETHER

HOW CAN WE PROMOTE POSITIVE YOUTH  
DEVELOPMENT THROUGH SPORTS AND  
RECREATION IN OUR OWN COMMUNITIES

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# SUGGESTIONS

- ▶ Advocate in defense of play and recess for all children
- ▶ Advocate to protect sports, dance, music, and the arts because they are essential to health.
- ▶ Consider novel ways to incorporate activity into your school
- ▶ Can exercise help youth shift from “hot” to “cold” in your practice?
- ▶ Learn about sports and recreation programs in your community and evaluate them through the lens of PYD.
- ▶ Have a list of “gold star” programs available.