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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

PLAY

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

POSITIVE YOUTH DEVELOPMENT

101

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.

WHAT DOES A PYD-ORIENTED TEAM LOOK LIKE?

7 CS OF RESILIENCE

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

HOW RECREATION AND SPORTS FIT IN

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

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

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

ADVERSITY

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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 -

7

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

ADVERSITY

- ▶ Results

- ▶ Graded relationship between ACE score and adult health outcomes



Heart
Disease

Liver
Disease

COPD

Cancer

Skeletal
Fractures

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

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

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

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!)



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

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

ADVERSITY

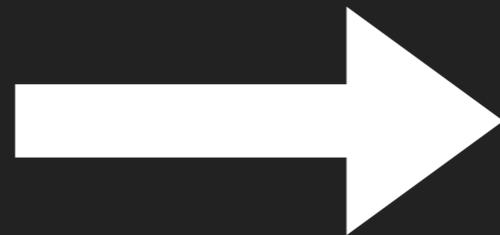
- ▶ ACEs and Toxic Stress
 - ▶ Traumatic Toxic Stress (TTS)
 - ▶ Short term: overload of cortisol
 - ▶ Long term: relative lack of cortisol (target tissue/organ specific)

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

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”

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

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

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

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 normalization of epigenetic changes in key genes associated with TTS.

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.

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

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”

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.

EXERCISE

ACEs



Exercise



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.

EXERCISE

- ▶ Many CYDPs incorporate exercise into programming as a means to engage youth

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



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

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.