Strategies, Interventions and Policies for Health Promotion, High Risk Behavior Prevention and Increased Performance of the DHS Law Enforcement Workforce

Physical Fitness and Resilience

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Session IIA

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Disclaimer

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“Intelligence and skill can only function at the peak of their capacity when the body is healthy and strong; that hardy spirits and tough minds usually inhabit sound bodies”
Physical Fitness and Resilience

A Defense Center of Excellence
Objectives

• Define selected terms
• Show evidence on the connections between physical activity, fitness, and resilience
• Identify how much activity is needed to effect resilience
• Describe how physical fitness promotes resilience
• Identify a physical fitness and resilience model
• Summarize conclusions
Resilience

• Resilience – The ability to withstand, recover and grow in the face of stressors and changing demands.
- DCoE, 2011

• Other disciplines use the term “stress management”, “stress reduction”, “hardiness”, and “grit”
What is Physical Fitness?

- **Physical fitness** is defined as the ability to carry out the essential functions of daily living with vigor and alertness including employment requirements without undue fatigue and with sufficient reserve for unplanned contingencies.
  
  - Hoffman and Collingwood, 2005

- Adequate fitness is needed in order for DHS Officers and Agents to successfully perform the essential tasks of law enforcement work which includes running, climbing, jumping, dragging, pushing/pulling, use of force, and sustained high levels of work during emergencies.
YOU'RE FLabby! If a crisis ever occurred, your muscles would never respond!
SHE'S RIGHT... THAT MEANS I HAVE A CHOICE BETWEEN EXERCISING AND HOPING THAT A CRISIS WILL NEVER OCCUR.
I HOPE A CRISIS WILL NEVER OCCUR...
Contributors to Physical Fitness

PHYSICAL ACTIVITY
Spontaneous/Informal

EXERCISE
Planned and Structured
Fitness Components / Constructs

Physical Fitness is divided into five Health-Related and six Skill-Related components.

- Cardiorespiratory Fitness
- Muscular Strength
- Muscular Endurance
- Flexibility
- Body Composition
- Agility
- Balance
- Power
- Speed
- Coordination
- Reaction Time
Components of Health-Related Physical Fitness

1. **Cardiovascular Fitness**: the ability of the circulatory and respiratory system to supply oxygen during sustained physical activity. Also referred to as aerobic or cardiorespiratory endurance.

2. **Muscular Strength**: The ability of muscle to exert force.

3. **Body Composition**: The relative amounts of muscle, fat, bone and other vital parts of the body.

4. **Flexibility**: The range of motion available at a joint. The ability to move a joint through its complete normal range of motion.

5. **Muscular Endurance**: The ability of muscle to continue to perform without fatigue.

Components of Skill-Related Fitness

1. **Agility:** The ability to rapidly change the position of the body with speed and accuracy.

2. **Balance:** The ability to maintain equilibrium while stationary or moving.

3. **Explosive Power:** The ability to use a maximum burst of muscular force in one second or less.

4. **Speed:** The ability to sprint or move ones body quickly from one point to another.

5. **Coordination:** The ability to use the senses, such as sight and hearing, together with body parts in performing tasks smoothly and accurately.

6. **Reaction Time:** The ability to quickly respond to a stimulus.

Evidence Connecting Physical Fitness and Resilience

• Improved Health and Quality of Life (Pate et al., 1995; Haskell et al., 2007)
• Reduced Risk of Cardiovascular Disease (Elrick, 1996)
  – Prevention and Management of hypertension (Welton et al., 2002; Cifu and Davis, 2017)
  – Improved blood lipid profile (Leon et al., 2001; Varady and Jones, 2005;)
• Improved Bone Mass (ACSM. 2004. Physical Activity and Bone Health)
• Improved Weight Control (Blair 1993; McGuire et al., 1998)
• Reduced Mortality (Kujala et al., 1998; Samitz et al., 2011; Kohl et al., 2012)
• Reduced Low Back Pain (Macedo et al., 2013; Wang et al., 2012)
• Improved Tolerance to Heat Stress (Armstrong, 1998)
• Economic Cost of Inactivity (Colditz, 1999)
• Improved Physical Fitness and Productivity (Sharifzadeh, 2013)
• Improved Mental Health and Stress Management
  – Depression (Dinas et al. 2011)
  – Improved Mood and Reduced Anxiety (Dua and Hargraves, 1992; Slaven and Lee, 1997; Goodwin 2003)
  – Resistance to Stress (Kobasa et al., 1982; Sothmann, 2006; McEwen, 2007; Rimmle et al., 2007; Childs and De Wit, 2014)
• Improved Sleep Patterns (King et al., 1997; Reid et al., 2009; Yang et al., 2012)
How Much Activity is Needed to Effect Resiliency in Adults?

• Aerobic physical activity of at least
  - 150 minutes / week at a moderate intensity (3-6 METS) or
  - 75 minutes / week at a vigorous intensity (> 6 METS) or an equivalent combination.

  AND

• Strengthening activities with a focus of major muscle groups
  - 2 or more days of the week

• Additional health benefits can be made with….
  - 300 minutes / week at a moderate intensity or
  - 150 minutes / week at a vigorous intensity or an equivalent combination.

How Does Physical Fitness Promote Resilience?

• Confers multiple physiological & psychological benefits

• Blunts stress reactivity in response to both physical and psychosocial stressors
  – ↓ Sympathetic nervous system and HPA axis reactivity

• Serves as a buffer against stress
  – ↑ positive mood and ↓ state anxiety
  – Helps prevent the negative effects of high stress on sleep and well-being

• Protects against stress-related disorders and many chronic diseases
Training and HPA Axis Responsiveness

ACTH (pg/ml) vs. \( O_2 \) Uptake (ml/kg/min)

- Untrained
- Moderately Trained
- Highly Trained

- ~ 4 METs
- ~ 7 METs
- ~ 10 METs
“Stress-buffering” Effect of Physical Fitness

• Physical fitness enhances self-efficacy and self-esteem
  – Requires self-management strategies
  – Need self-efficacy and self-esteem to be willing to take on a challenge

• Physical fitness requires motivation and commitment
  – Characteristics of hardiness and mental toughness
  – Essential in commencing/maintaining regular exercise

• Underlying “aerobic fitness” is important for perseverance under typical circumstances and when fatigued
Physical Fitness and Stress

Physical activity and mental health

Being physically active:

- Protects against mental health problems
- Decreases depression in older adults
- Reduces the symptoms of postnatal depression
- Is as effective as medication for mild to moderate anxiety and depression
- Improves self-esteem and cognitive function in young people
- Playing sport reduces psychological distress by
  - 34% 1-3 times a week
  - 47% 4+ times a week
- People who participate in sports clubs and organised recreational activity enjoy better mental health.

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Regular Exercise and Chronic Diseases

• Regular physical activity is associated with:
  – ↓ incidence of obesity, type II diabetes, cardiovascular disease, metabolic syndrome, insulin resistance, breast and colon cancers
  – ↑ function in persons with fibromyalgia, osteoarthritis, rheumatoid, depression, and chronic fatigue syndrome
  – ↓ medical problems for those working long hours.

• Physical inactivity serves an independent role in:
  – Shortening of healthspan, lowering of the age for onset of first chronic disease, decreases quality of life, increases health care costs, and accelerates mortality risk
  – Rising prevalence of stress- and inflammatory-related chronic diseases
  – Predisposing to musculoskeletal injury
Lack of Physical Fitness: A Major Public Health and National Security Problem


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Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Texas
Model of Physical Fitness and Resilience

Vulnerable
- Physically Unfit (Aerobically unfit/fat)
  - Sedentary
  - Low self-esteem
  - Low self-efficacy
  - Anxious
  - Depressed
  - Lethargic
  - Unsure/uncertain
  - Timid

Resilient
- Physically Fit (Aerobically fit/lean)
  - Physically active
  - High self-esteem
  - High self-efficacy
  - Motivated
  - Mentally tough (hardy)
  - Energetic
  - Committed
  - Confident

Physical and Mental Resilience

Neurotransmitters
Growth Factors
CRH, AVP
Adrenal Glands
Thymus
Spleen
Bone Marrow
Lymph Nodes
Immune Cells & Organs
HPA Axis
Stressors
CNS, Cryokines, Neurotransmitters, Growth Factors

Physical and Mental Resilience
Conclusions

• Physical fitness promotes various attributes that confer resilience and certain “resilience” traits promote adherence to regular physical activity

  Physical Fitness ↔ Resilience
  Physical Inactivity ↔ Vulnerability

• Regular physical activity/exercise induces physiological and psychological changes to “buffer” the effects of chronic stress and development of stress-related disorders and chronic disease

• A valid measure of aerobic fitness is one of the best indicators of resilience and index of long-term health
Additional References

“Physical fitness is not only one of the most important keys to a healthy body; it is the basis of dynamic and creative intellectual activity”
-John F. Kennedy 1960
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