The Cooper Institute® Today

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The Cooper Institute®

Founded in 1970

- Mission: The Cooper Institute is dedicated to promoting life-long health and wellness through research and education.
- What we do:
  - Physical fitness assessment and programs for youth
  - FitnessGram®
  - Wellness and physical fitness research
  - Cooper Center Longitudinal Study® (CCLS)

Youth Education Division

FitnesGram®: Youth Physical Fitness Assessment and Software

- PACER
- BMI
- 90° Push-Up
- Curl-Up
- Trunk Lift
- Back Saver Sit-and-Reach

NFL Play 60 FitnessGram® Project

- Goal: Utilize FitnessGram® to evaluate the impact of the NFL PLAY 60 programs and initiatives on health-related fitness
- Funded by the NFL Foundation
- NFL PLAY 60 FitnessGram® Project by the numbers:
  - 35 schools per each NFL market
  - 1,685 schools enrolled since 2009
  - More than 1.1 million students impacted
- New grant cycle (2019 – 2021)
  - 160 new schools added each year
Research Division

Healthy Zone School Program

- Goal: Providing schools with resources to engage teachers, students, parents, and the broader community in a joint effort to create a "culture of health" in the DFW area
- In partnership with the United Way of Metropolitan Dallas
- Healthy Zone Schools by the numbers:
  - 177 schools since 2011
  - $7,000 per school
  - Over 145,000 students impacted

Cooper Center Longitudinal Study® (CCLS)

- Established in 1970 with first Cooper Clinic patient.
- Largest study in world with objectively measured cardiorespiratory fitness (CRF).
- Study goal: Evaluate fitness, prevention, and health outcomes

CCLS

- 50 years of data
- 114,800 patients
- 310,000 exercise tests

"You can go anywhere to study sick people; the CCLS is the only place to study healthy people.”
Jonathan Cohen, PhD

Cooper Clinic Medical Evaluation

- Extensive medical, family, and social history
- Medication history and use
- Exercise treadmill testing
- Geriatric screening
- Laboratory testing
- Coronary artery calcium scanning
- DEXA scanning
- Skin cancer screening
Maximal Treadmill Test: Balke Protocol

- Minute 1: 3.3 mph at 0% elevation
- Minute 2: 3.3 mph at 2% elevation
- 1% increase in elevation each minute thereafter
- At 25 minutes, increase speed by 0.2 mph each minute
- Patient is not allowed to hold on to front railing
- The treadmill always wins!!!

What are the Health Benefits of Being Fit?

In the CCLS, being fit is associated with:

- Lower all-cause and heart disease mortality
- Decreased:
  - Heart disease
  - Stroke
  - Diabetes
  - Hypertension
  - Certain cancers
  - Depression

Low CRF and Risk of All-Cause Mortality

- 6251 healthy men
- Low CRF:
  - 1st quintile of fitness within age category
- Low CRF split into tertiles:
  - High, medium, low

Each 1-min increment in treadmill time was associated with a ~12% reduction in risk of all-cause mortality.

CRF, adiposity, and CVD mortality in Women

- 19,838 women
- Adiposity:
  - Body mass index (BMI)
  - Waist circumference (WC)
  - Waist to height ratio (W:HT)
  - % Body fat via Skinfold
- CRF:
  - Low (quintile 1)
  - Moderate (quintile 2 & 3)
  - High (quintile 4 & 5)

Cardiorespiratory Fitness and Novel Clinical Measures

CRF and Highly Sensitive Cardiac Troponin

- CRF and highly sensitive cardiac troponin (hs-cTnT) associated with:
  - All-cause mortality
  - Cardiovascular mortality
  - Incident heart failure
- Purpose: to investigate the potential link of low CRF with myocardial injury, we studied the association of CRF and hs-cTnT.
**CRF and Highly Sensitive Cardiac Troponin**

- 2,498 participants (24.7% female)
- hs-cTnT obtained via plasma specimens
- CRF:
  - Low (quintile 1)
  - Moderate (quintile 2 & 3)
  - High (quintile 4 & 5)

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**Cardiorespiratory Fitness and Mental Health**

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**Midlife CRF and Later-Life Dementia**

- MIDLIFE
  - 19,458 men and women
  - Age 50
  - Apparently healthy at baseline
- CRF (quintiles)

**Cardiorespiratory Fitness levels**

- MEDICARE
  - Mean follow-up 24 years

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**CRF, Depression and CVD Death**

- Depression and depressive disorders are associated with cardiovascular disease/mortality.
- In those with CVD, the prevalence of depression is high (~1 in 5 patients)
- CRF is inversely associated with:
  - All cause and CVD mortality
  - Lower incidence of depression and physician visits concerning depression

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**CRF, Depression and CVD Death**

- Purpose: To examine the association between CRF in middle age with later life depression and CVD mortality following incident depression.
CRF, Depression and CVD Death

Montreal Cognitive Assessment (MoCA)

MoCA:
- Paper and pencil screening tool
- Scored on a scale of 0 – 30
- Assesses various cognitive domains:
  - Attention
  - Executive functions/Visuospatial
  - Memory
  - Language
  - Delayed recall
  - Orientation
- Normal scores: 26 – 30

CRF and MoCA

Purpose: to evaluate the relationship between CRF and cognitive function (MoCA) in adults aged 55 and older.

Vitamin D and MoCA

Purpose
- Vitamin D deficiency has been linked to the development of cognitive impairment in older adults.
- Purpose: to examine the relationship between serum vitamin D and cognition (MoCA) in a healthy, older population.

Findings
- A low MoCA score was directly associated with age and inversely associated with female sex and years of education.
- Low serum vitamin D group (<30 ng/mL) was 26% more likely to have a low MoCA score.
- This relationship remained significant (OR: 1.23, 95% CI: 1.02, 1.48) when CRF was added to the model.

Lifestyle and Behavioral Exposures in the CCLS

Dietary Patterns

- Dietary Approaches to Stop Hypertension (DASH)
  - Emphasizes reduced intake of saturated fats, simple sugars, and sodium.
- Mediterranean Diet
  - Encourages moderate consumption of olive oil and wine
- Both diets recommend the following:
  - Fruits and vegetables
  - Whole grains
  - Legumes
  - Nuts and seeds
  - Reduced fat dairy
  - Lean meats and fatty fish
**Dietary Patterns and All-Cause Mortality**

- **Purpose:** to examine the association between dietary patterns and long-term survival in a middle-aged, healthy population.

- **Sample:** 11,376 men and women with no history of MI or stroke
- **Completed a baseline dietary assessment between 1987 and 1999
- **Followed for ~18 years**

**Key Findings:**

- **All-Cause Mortality**
  - Decreased 6% per quintile of adherence to DASH diet
  - Decreased 7% per quintile with vegetables intake
  - Increased with solid fat and added sugar
  - Highest risk in those consuming a diet that is 34% solid fats

- **Cardiovascular Disease Mortality**
  - Decreased 30% with high fruit and nut intake
  - Decreased 38% with high grain intake

**Sitting Time and Cardiometabolic Risk Factors**

- **4,486 men and 1,845 women** reported daily estimated sitting time
- **Variables measured:**
  - Adiposity
  - Blood lipids
  - Glucose
  - Blood pressure
  - CRF

**Findings:**

- Compared to men who sat almost none of the time, men who sat most of the time were more likely to be obese by:
  - Waist circumference (OR: 2.61; 95% CI: 1.25 – 5.47)
  - Percent body fat (OR: 3.33; 95% CI: 1.35 – 8.20)

- Sitting was not significantly associated with other risk factors after controlling for CRF.

**High Levels of Physical Activity and Coronary Artery Calcification (CAC)**

- High levels of endurance activity have recently been linked to the presence of subclinical atherosclerosis as indicated by CAC.

- **Purpose:**
  - Examine the association of prevalent CAC with high levels of physical activity
  - Evaluate if high levels of physical activity are associated with increased mortality in those with CAC

**High Levels of Physical Activity and CAC ≥ 100 AU**

- [Graph showing the relationship between physical activity and CAC](image)
High Levels of Physical Activity and Coronary Artery Calcification (CAC)

While highly active individuals have increased prevalence of CAC, they do not have an increased risk for CVD or all-cause mortality.

<table>
<thead>
<tr>
<th>Physical Activity Category, MET mins/wk</th>
<th>Fully Adjusted*</th>
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<tbody>
<tr>
<td>&lt;1500</td>
<td>1 (Reference)</td>
</tr>
<tr>
<td>1500-1999</td>
<td>0.87(0.55-1.37)</td>
</tr>
<tr>
<td>≥2000</td>
<td>0.77(0.53-1.15)</td>
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Cardiorespiratory Fitness and Health Care Costs

Cost of Health Care in the U.S.

- In US, $3.65 trillion in healthcare spending
  - $11,212 per person
  - 59% to hospitals, doctors, and clinical services
  - Prescription drug spending increasing by ~3.3% per year

- This level of spending is highest in the developed world.

- Despite highest spending, the United States ranks 27th in the world in quality of health care.

Cardiorespiratory Fitness, Cardiovascular Risk Status and Health Care Costs

Summary:

- Physical fitness and healthy lifestyle behaviors continue to significantly impact:
  - All-cause and CVD mortality
  - Clinical cardiovascular measures
  - Mental health
  - Health care costs
“Fitness is a journey, not a destination.”

-Dr. Kenneth Cooper, MD, MPH

THANK YOU