

# Exercise and a Healthy Brain ;

## *What's the Connection?*



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*Every Body* **WALK!**  
The Campaign to Get America Walking

*Exercise*  
*is Medicine*™

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# Exercise and Health

- Physical inactivity has an astonishing array of harmful health effects.
- Exercise is a powerful tool for both the treatment and prevention of chronic disease and obesity, as well as premature death.
  - There is a linear relationship between physical activity and health status.
  - The association between disease and an inactive and unfit way of life persists in every subgroup of the population.
- Physical inactivity is **THE** major public health problem of our time.

# Boris Lushniak, MD, MPH

## Acting United States Surgeon General



U.S. Department of Health & Human Services



Office of the Surgeon General

**ACSM Annual Meeting**  
Orlando, Florida; May 30, 2016



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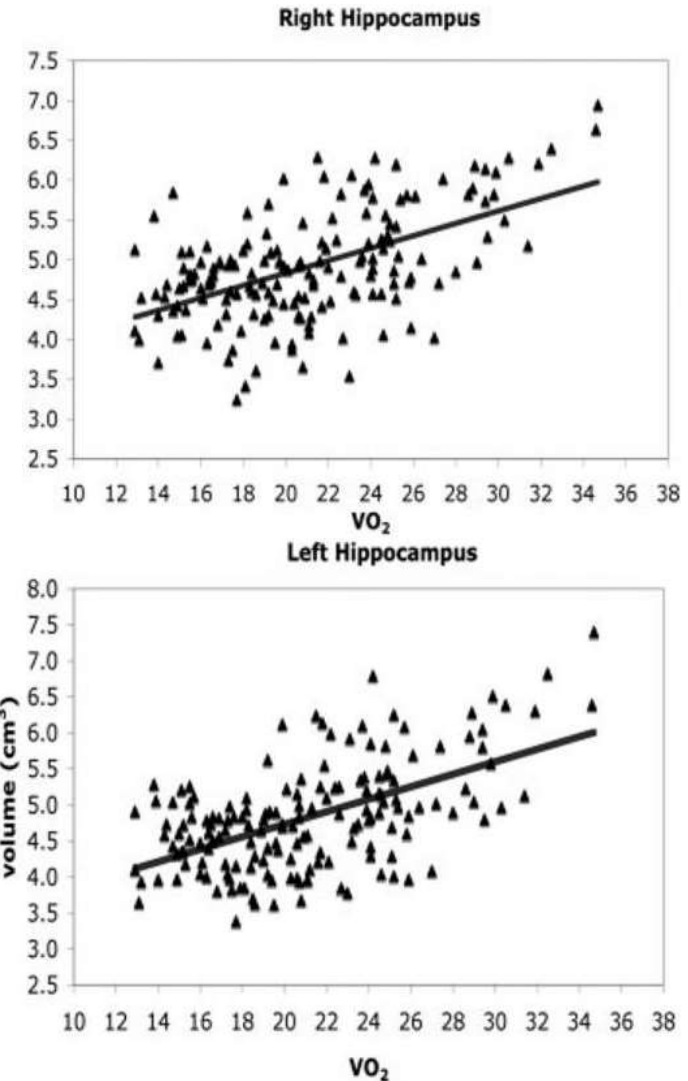
# Most Powerful Effect of Exercise May be on the Brain!

- Observational studies showed:
  - More physically active are less likely to show cognitive decline & dementia.
  - Improvements in cognitive scores, psychomotor speed and info processing seen after exercise intervention.
  - Improvements in executive function seen after regular exercise.
  - Both aerobic and resistance exercise show benefits.



# Aerobic Fitness Associated with Hippocampus Volume

- 165 healthy older adults (age 59-81) tested  $VO_2$  with max treadmill.
- Brain MRI done with volumetric analysis of hippocampus.
- Higher  $VO_2$  associated with;
  - Larger hippocampus volume.
  - Better spatial memory.
  - Higher levels of BDNF.
  - Similar studies in kids and middle age adults.



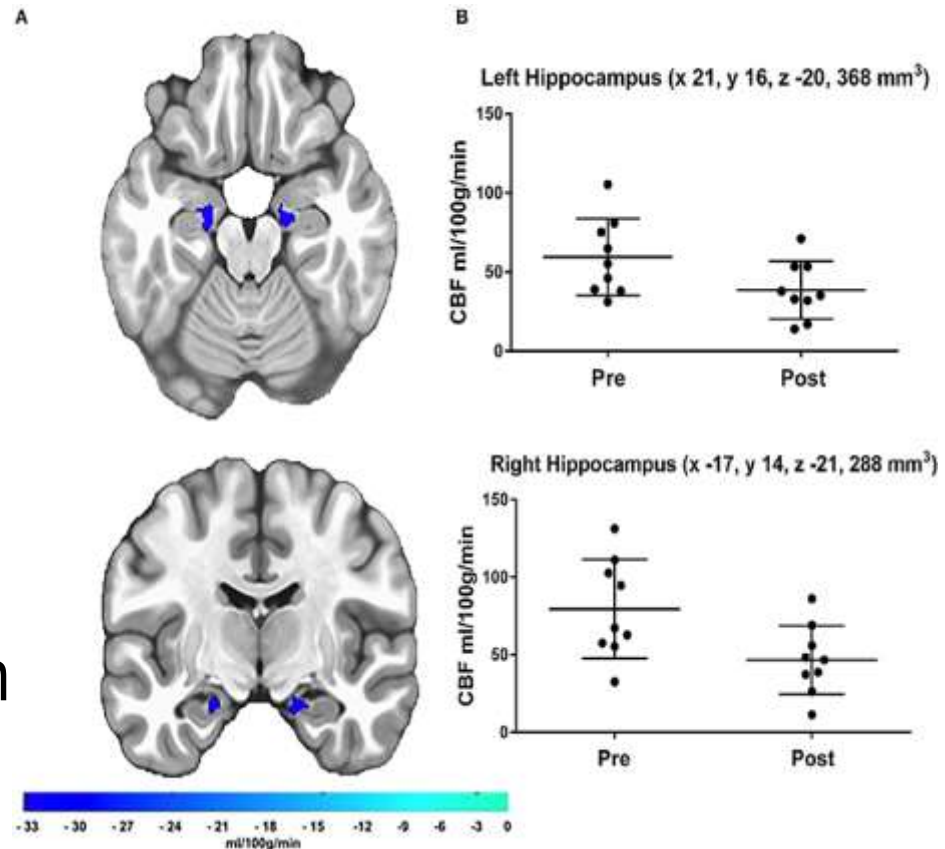
# Twins Study; One exercises, the Other Does Not

- Finland twins data base; 10 sets male twins in early to mid-30's; Divergent exercise patterns (avg ~3 yrs).
  - Compared active vs sedentary identical twins.
  - Diets were very similar.
- Measured endurance capacity, body comp, insulin sensitivity and brain scan; Sedentary twin had:
  - Lower endurance capacities, higher body fat percentages, and signs of insulin resistance.
  - Less grey matter, especially areas involved in motor control and coordination.



# Cerebral Blood Flow Decreases with Detraining in Masters Athletes

- Perfusion weighted MRI done on 12 endurance athletes (avg age 60) before & after 10 day cessation of exercise
- Resting cerebral blood flow significantly decreased in 8 regions of brain, including L and R hippocampus.
- Detraining likely affects brain health like it does CV and metabolic health.



# Benefits of Physical Activity in Kids





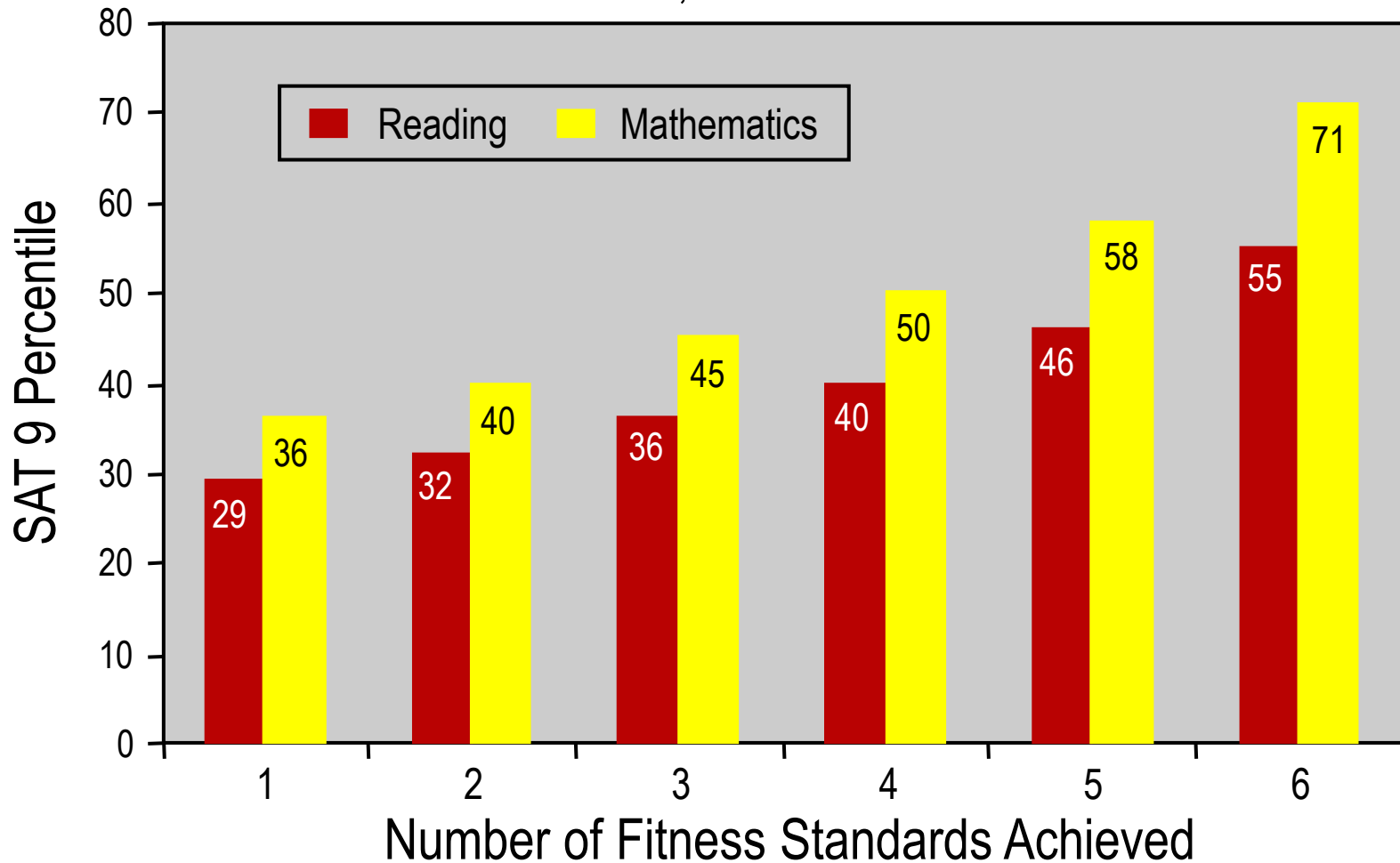
# Fitness and Stanford Achievement Test 9<sup>th</sup> Ed SAT-9 and Fitnessgram Results

- Fitnessgram test:
  - 1. Aerobic Capacity
  - 2. Body Composition (% of body fat)
  - 3. Abdominal Strength and Endurance
  - 4. Trunk Strength and Flexibility
  - 5. Upper Body Strength and Endurance
  - 6. Overall Flexibility

# Grade 5

## SAT 9 and Physical Fitness

353,000 Students

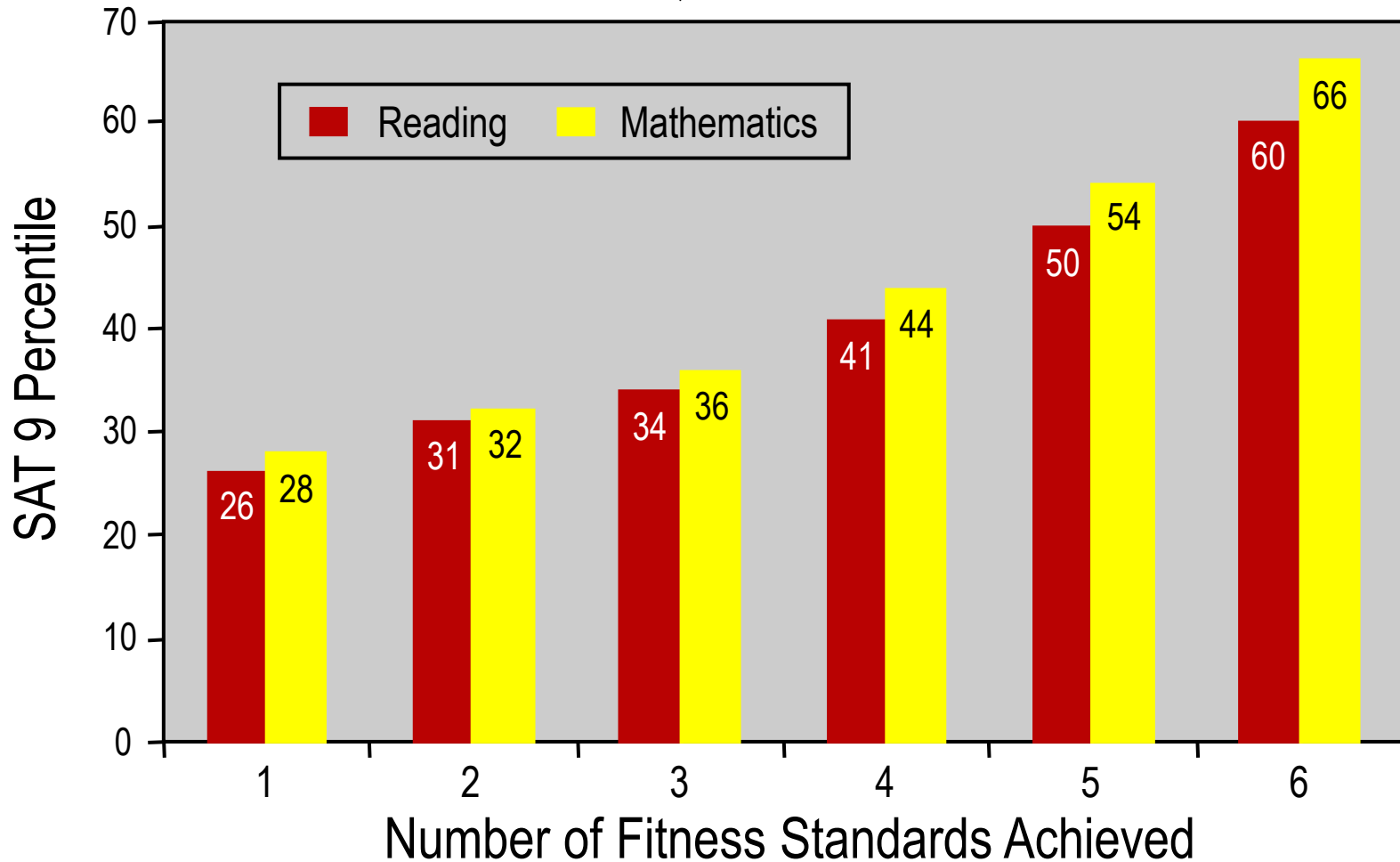


Source: California Dept. of Education Study, December 10, 2002

# Grade 7

## SAT 9 and Physical Fitness

322,000 Students

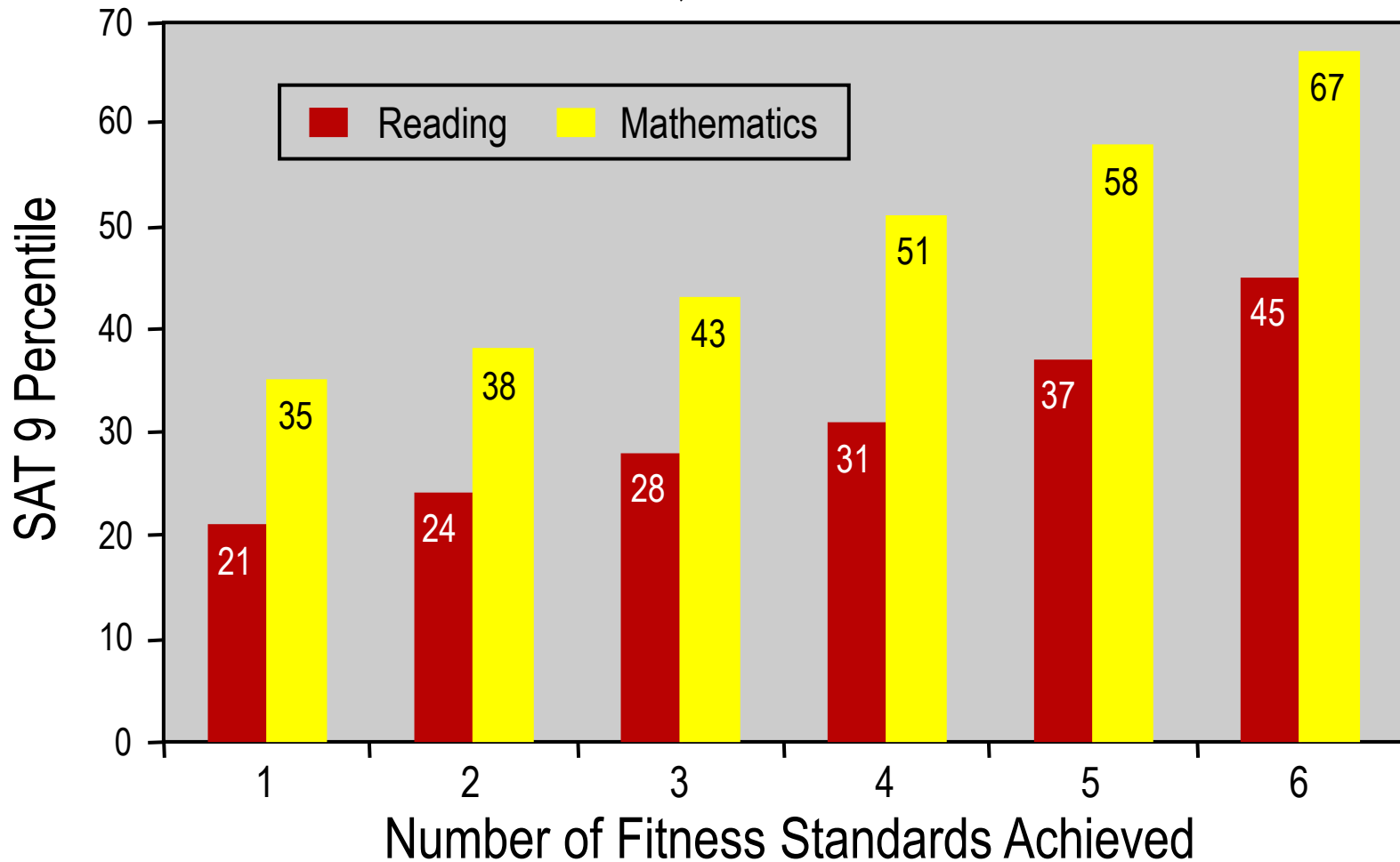


Source: California Dept. of Education Study, December 10, 2002

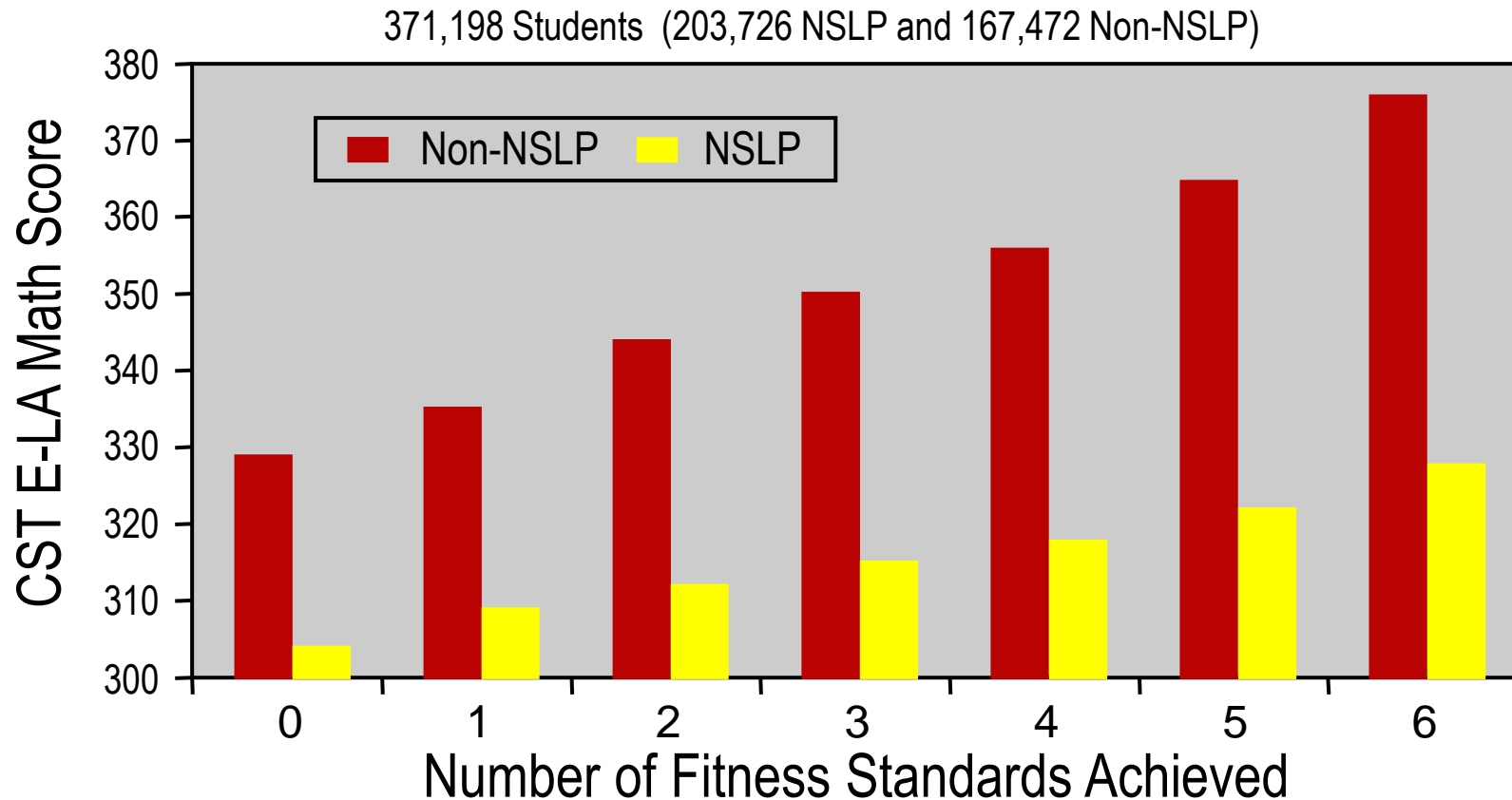
# Grade 9

## SAT 9 and Physical Fitness

279,000 Students



# Socioeconomic Status\*\* & Number of Fitness Standards 2004 CST\* Scores in English- Grade 5



\*California Standards Test

\*\*National School Lunch Program

Results using math scores were consistent with those using English-Language Arts scores.

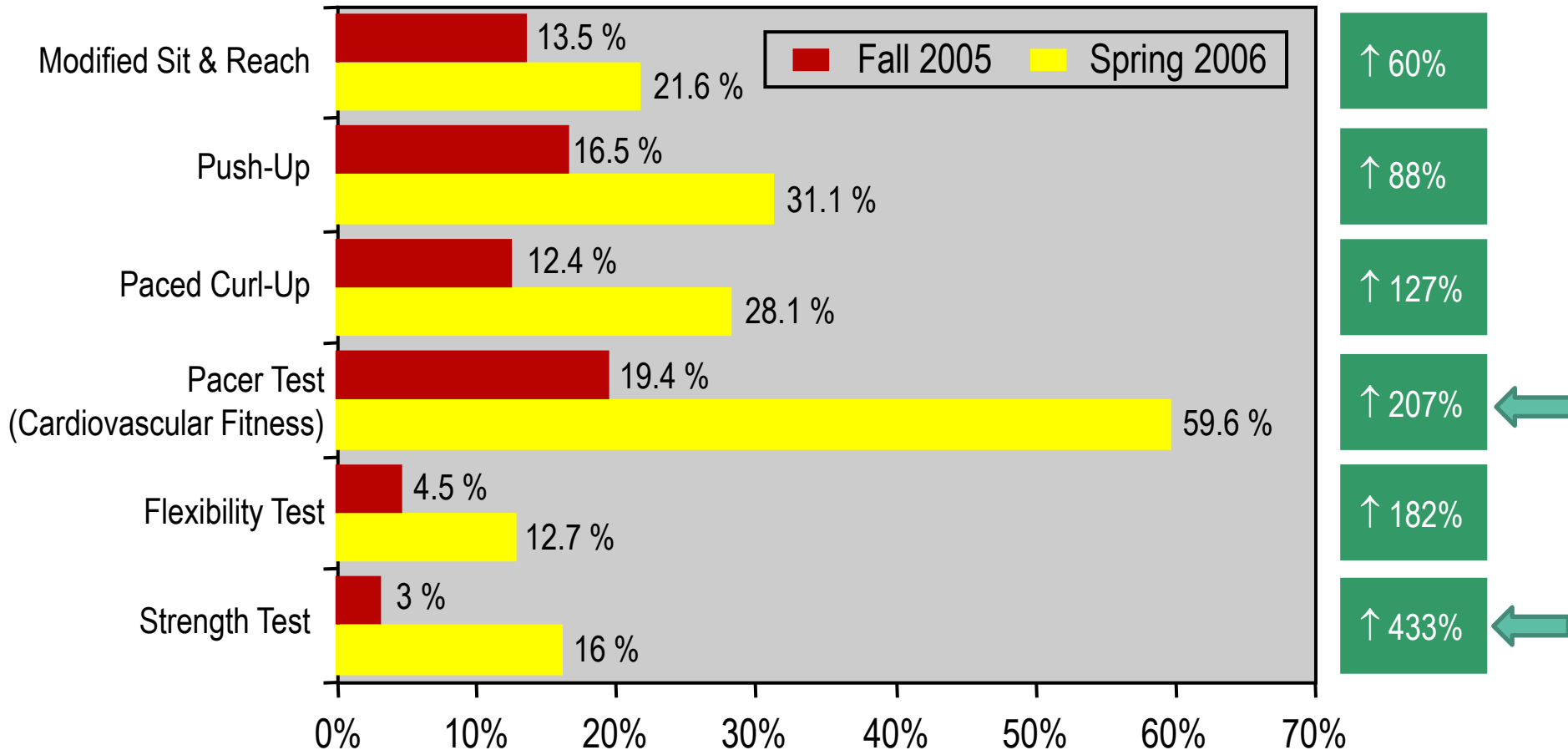
Results for seventh- and ninth-grade students were consistent with those for fifth graders.

Source: California Physical Fitness Test, 2004 Results, Calif. Dept. of Ed., April 2005

# Improvements in Fitnessgram Results

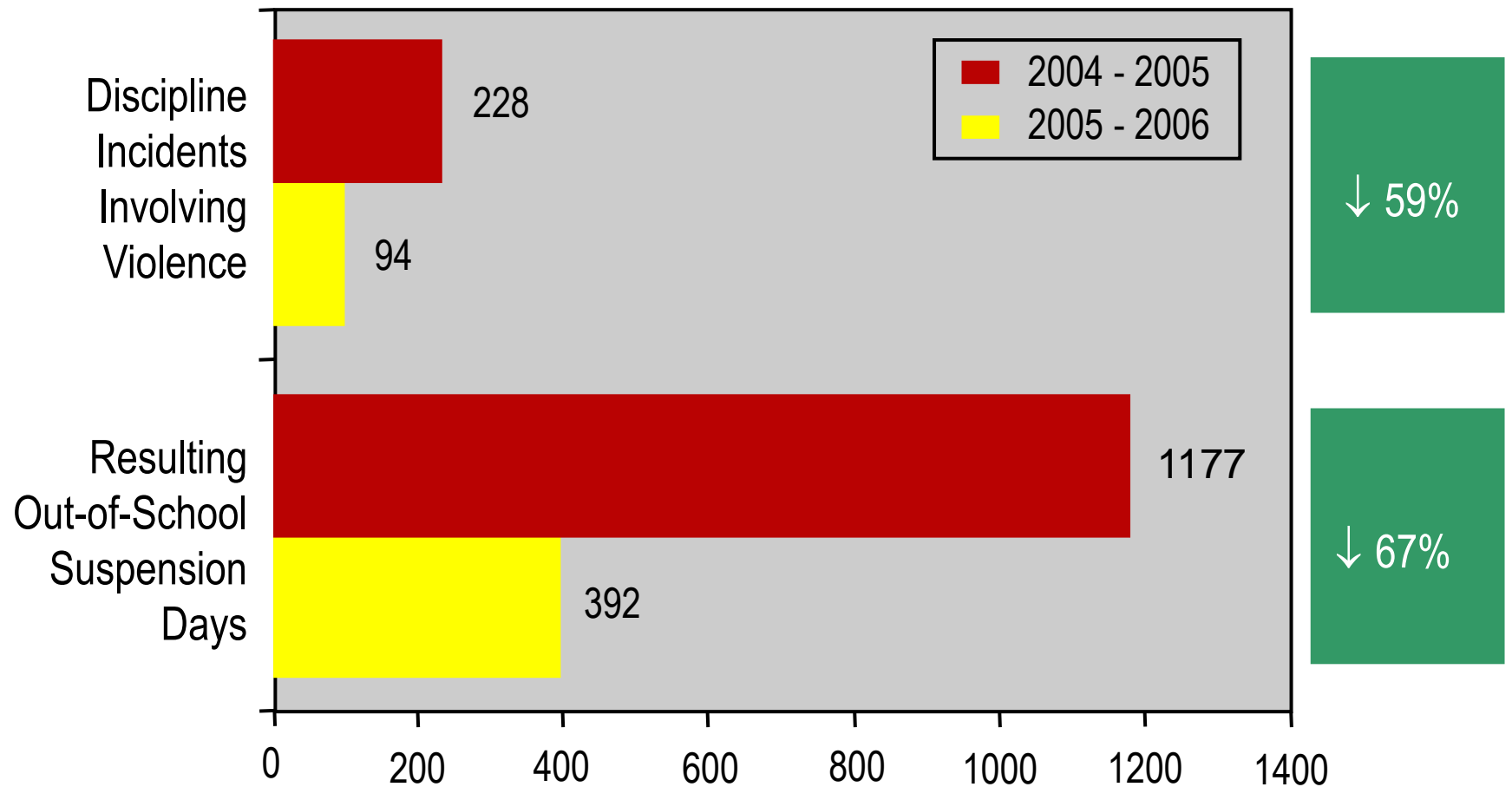
## PE 4 Life Program at 6 months

Woodland Elementary School, Kansas City PSD  
Fall 2005 – Spring 2006, Grades 4 and 5



# Percent Reduction in Disciplinary Issues PE 4 Life Program at 6 months

Woodland Elementary School, Kansas City PSD #33  
Fall 2005 – Spring 2006, Grades 4 and 5



# Fitness and Neurocognitive Function in Preadolescent Children

- 24 children, mean age, 9.6 years
- Fitness assessed by FITNESSGRAM
- Neurocognitive function assessed by responses to a stimulus discrimination task
- Fitness was positively associated with attention, working memory, response speed, and cognitive processing speed



# Studies suggest Physical Activity Improves Mental Health in Kids

- Regular PA increases self esteem
- Regular PA decreases rates of anxiety/depression\*
- Evidence shows teen girls have lower rates of sexual activity and pregnancy when PA is increased
- Evidence show regular PA associated with decreased smoking, alcohol and drug abuse

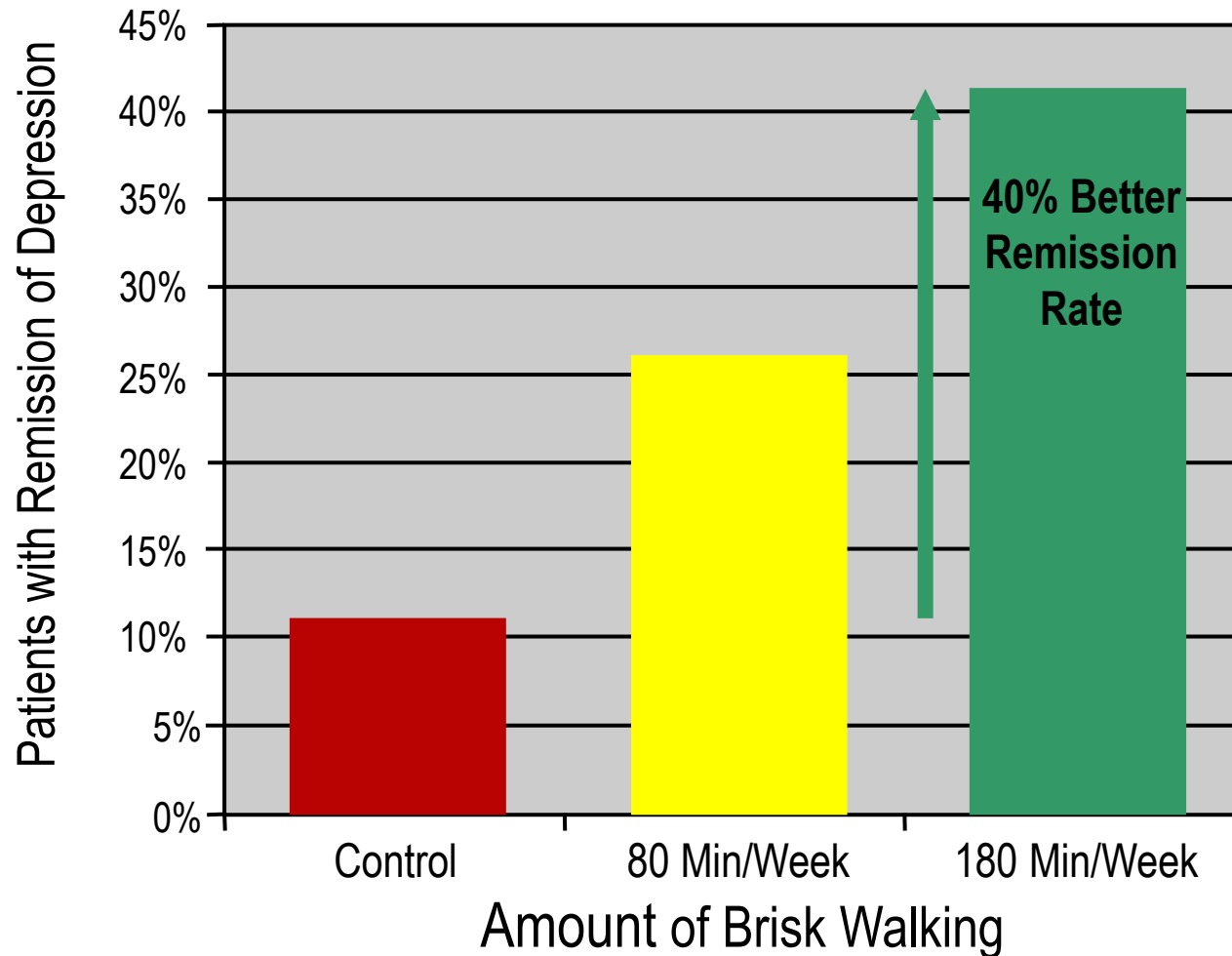


*K.J. Calfas, W.C. Taylor. Ped Exerc Sci 1994. 6:406-423*  
*Sabo et al. J Adolesc Health 1999;25:207-16*

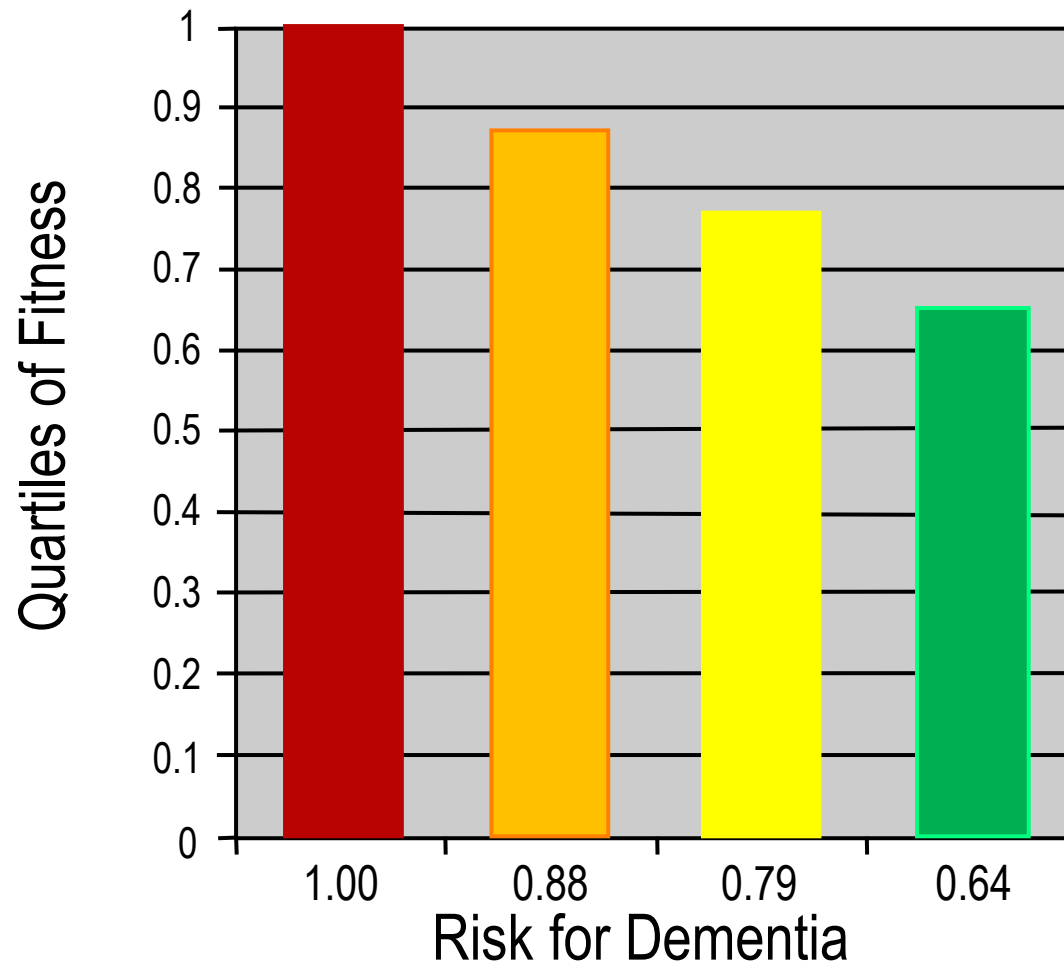
# Brain Benefits of Physical Activity as We Age



# Exercise is a Treatment for *Depression*



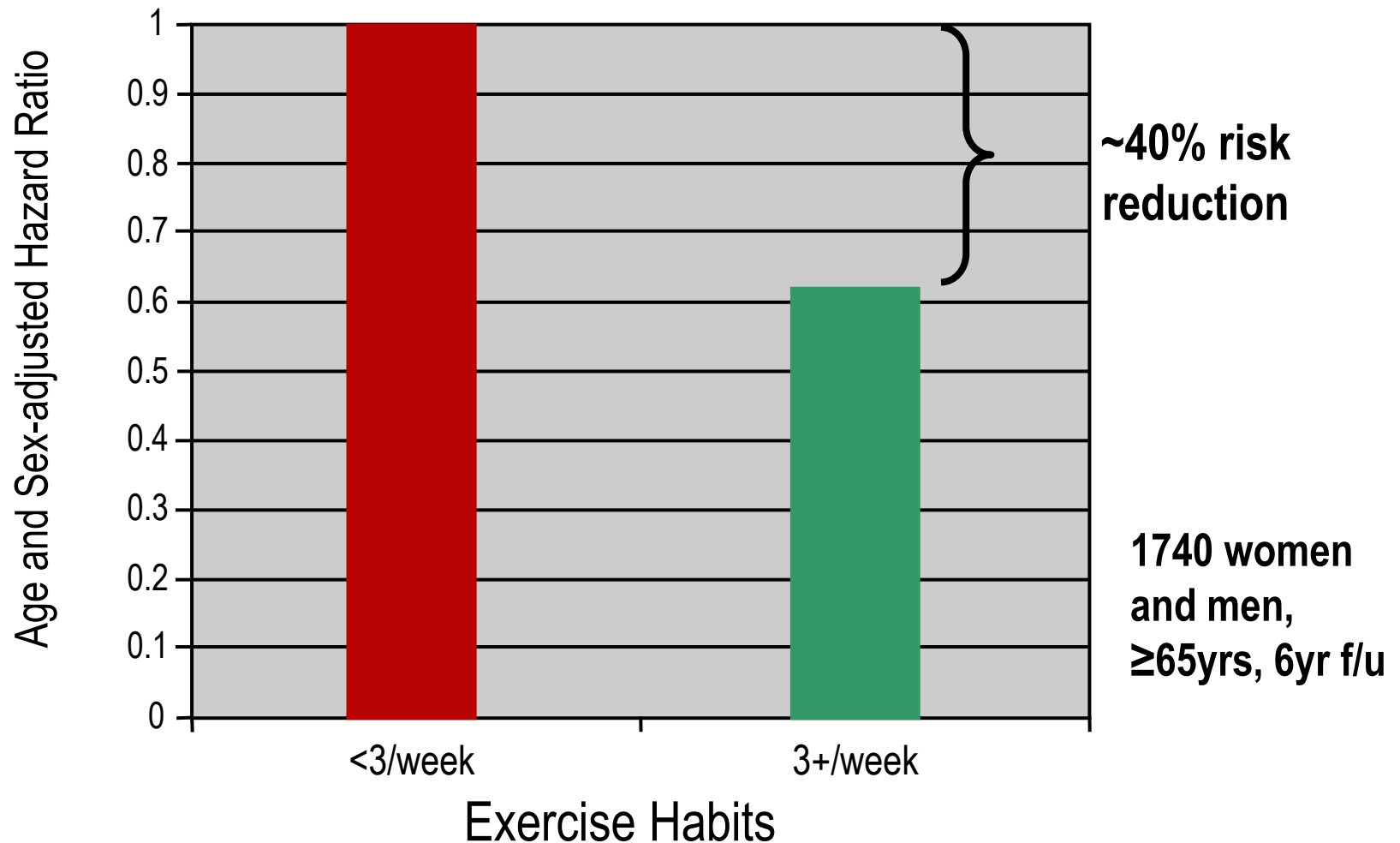
# Middle Age Fitness and Dementia *Risk*



Most fit ~36% less likely have dementia

- 19,458 men & women;
- Mean age 49.9 yrs
- Treadmill Fitness test
- Followed avg. 25 yrs;
- 1659 dementia cases.

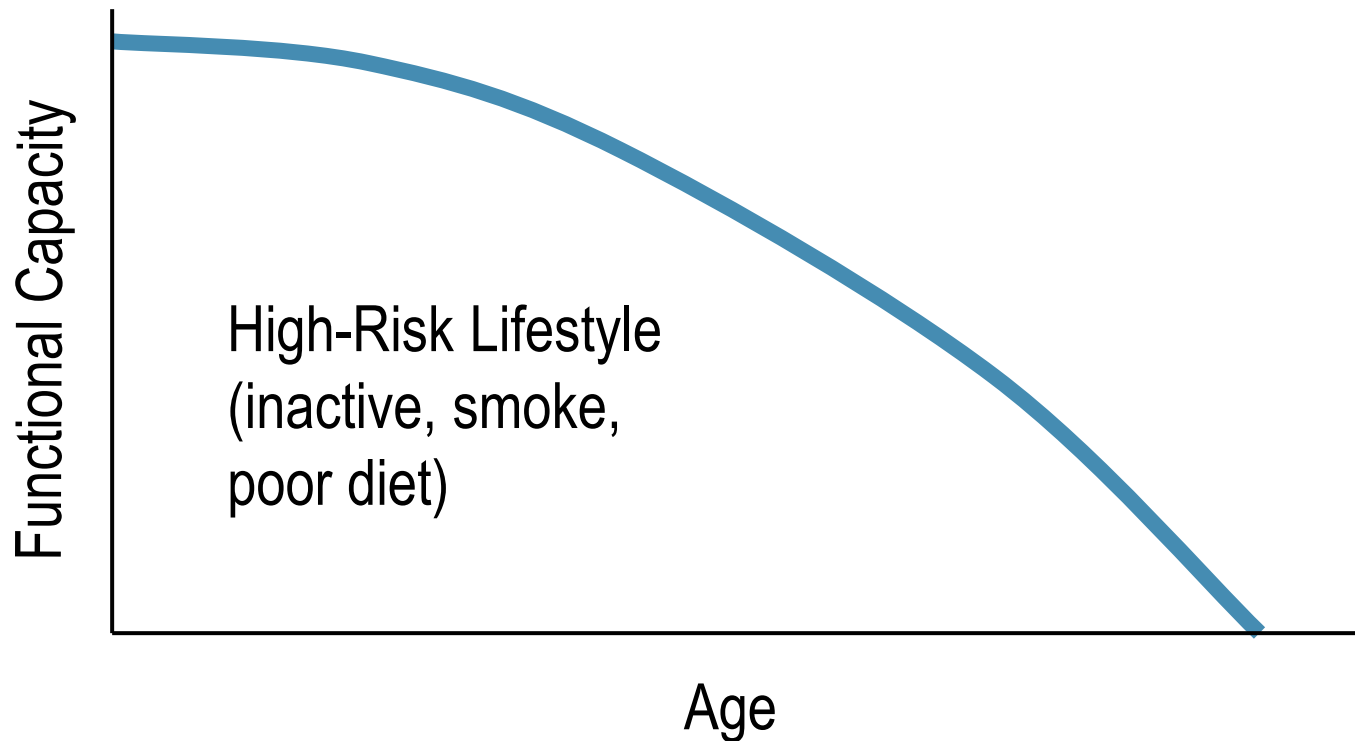
# Exercise and *Dementia*



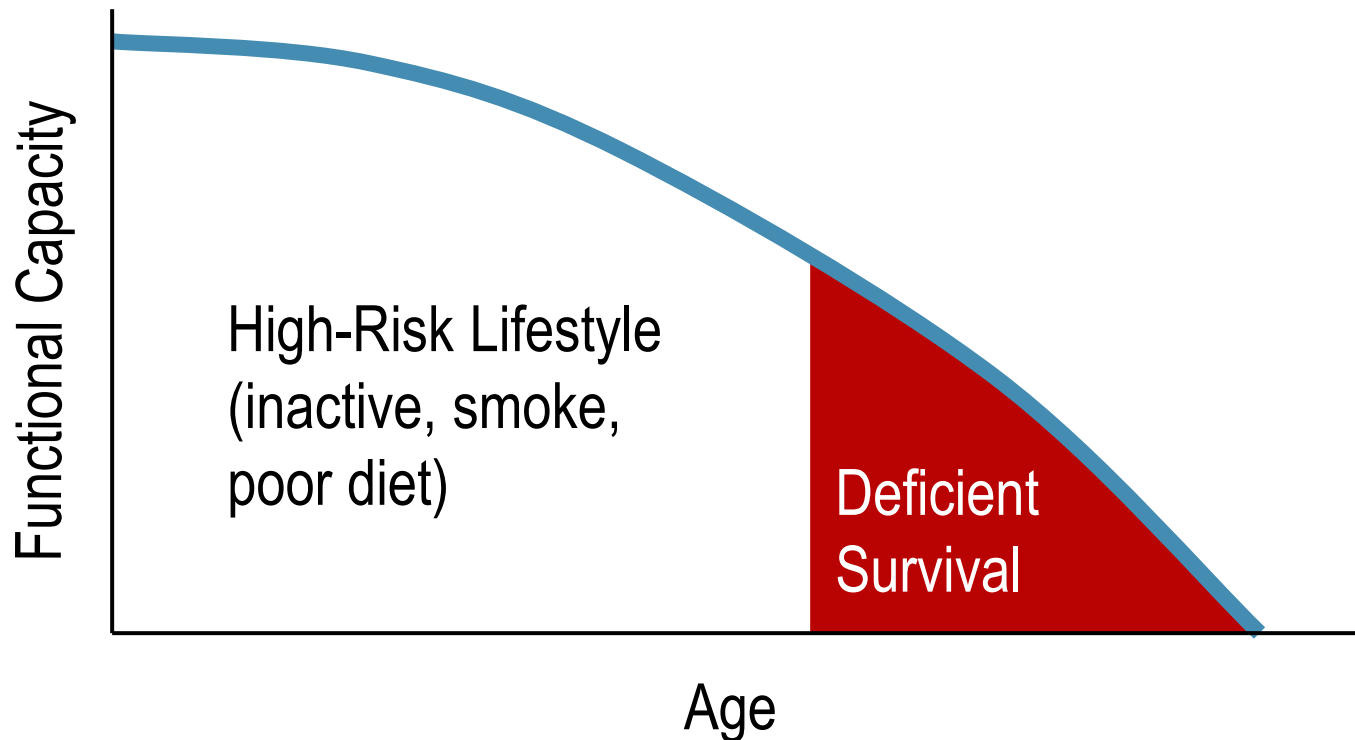
# Exercise and Quality of Life



# Quality of Life; The Geriatric Curve

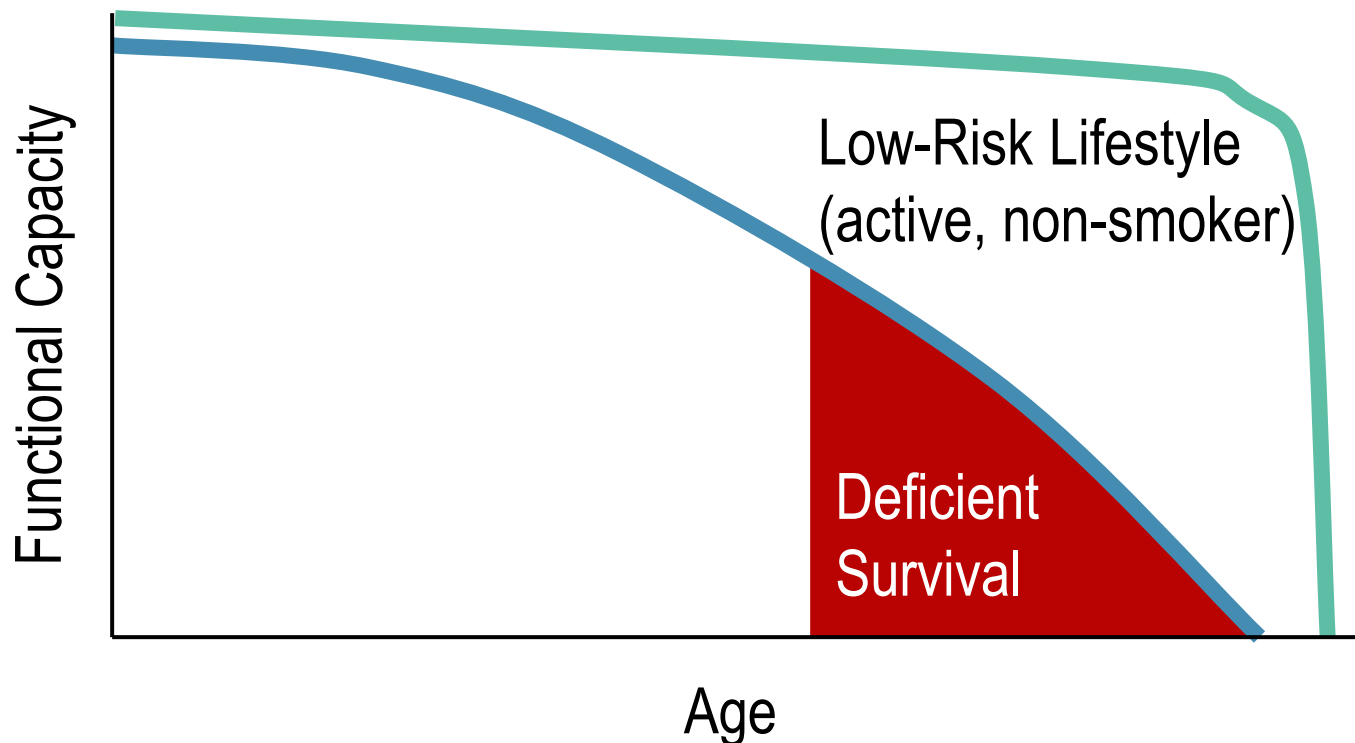


# The Effect of an Unhealthy Lifestyle “Deficient Survival”





# The Effect of a Healthy Lifestyle “Squaring off” the Geriatric Curve



“The idea is to die young as late as possible”

**Ashley Montagu**

# The Exercise Prescription

## “Think FITT”

### **F = Frequency**

Most days of the week; 5 or more.

### **I = Intensity**

Moderate; 50-70% of max HR or use “sing-talk” test.

### **T = Type**

Use large muscle groups; something enjoyable.

### **T = Time**

30 minutes.

# The Walking Prescription for Brain Health!



Name: John W. Smith Age: 30

Walking **R<sub>x</sub>**

Date: \_\_\_\_\_

Recommended activity level: Moderate

Minutes per day: 30 minutes

Number of days per week: 5 or more

**Intensity:** Hard enough that you can't sing,  
but not so hard you can't talk during exercise.

**Stop:** If you experience chest pain,  
excessive shortness of breath or feel ill.

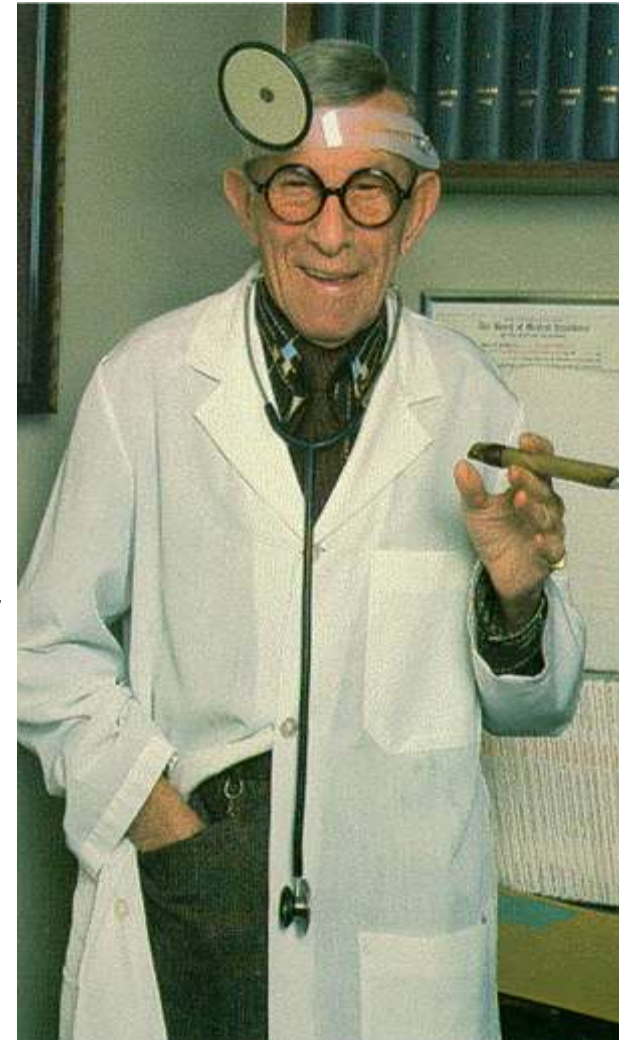
Signature: Robert Sallis, MD

**Every Body**  
**WALK!**  
www.everybodywalk.org



# Why Choose Walking as the Default Exercise Prescription?

- Walking is accessible
  - All ages, fitness level, ability, alone or in groups
- Walking is low cost
  - No gym, no equipment
- Walking is measureable
  - Pedometer, stop watch, distance
- Walking is the most common adult activity
  - Good long term adherence
- Walking is proven
  - Multiple studies prove benefit
- Walking is cost saving
  - Health costs lower, its “Green”



# Clinicians need help!

## How do we integrate fitness into healthcare?

- I need something beyond telling my patient to go walk!
- Components of fitness
  - CV fitness
  - Strength
  - Flexibility
- Need to be able to refer
  - Health Club and Fitness professional
  - Exercise is Medicine Solution



# A Challenge to the Fitness Community

- Role of the fitness professional;  
Merging fitness with healthcare
  - Change focus from clients to patients.
  - Change focus from abs and buns to hearts and lungs.
  - **How do we engage them?!**
- Role of Health Clubs;  
Place emphasis on **health**
  - Reach out to new demographic.
  - Target the population that really needs your services.
  - **Why aren't more clubs interested?!**



# The Claremont Club

- Founded in 1973
  - Primarily as tennis club.
  - Small fitness component.
- *Mike Alpert* joined the club in August of 1997.
- Vision to Transform the Club
  - Actively promote health & wellness.
  - Helping people struggling with injury and illness.



# Created Programs for Patients

- Breast cancer
- Parkinson's and MS
- Stroke
- Cerebral Palsy
- Prostate and other cancers
- Pediatric Cancer
- Diabetes
- Spinal Cord Injury (Project Walk)





# The Augie Nieto Story

- Icon in the fitness world.
- Founder and former owner of Life Fitness.
- Former owner of Hammer Strength.
- Sold companies in 1999 to Brunswick Corp for \$325 Million.



# Augie Diagnosed with ALS 2005

- Started with weakness in legs and stumbling.
- Rapidly progressed despite all medical treatments.
- Saw countless specialists.
- No good treatment and little hope.
- Depression and suicide attempt.



# Can Exercise Help ALS?

- Heard about Project Walk at The Claremont Club.
- No good studies to prove it.
- There were concerns:
  - Respirator & feeding tube.
  - Might injure Augie.
  - Communication issue.
- Give it a try.



# Augie back in the gym at The Claremont Club

# The results have been amazing...

- Dramatic improvements in strength and endurance.
- Able to whisper to his wife for the first time in 8 years.
- Depression has lifted – feels hopeful again.
- Was able to walk his daughter down the aisle at her wedding using a standing frame.



# Augie out for a bike ride...



# Cycling with Parkinson's Disease (Snidjers, NEJM 2010)

## Video 1

# Dr. Jay Alberts

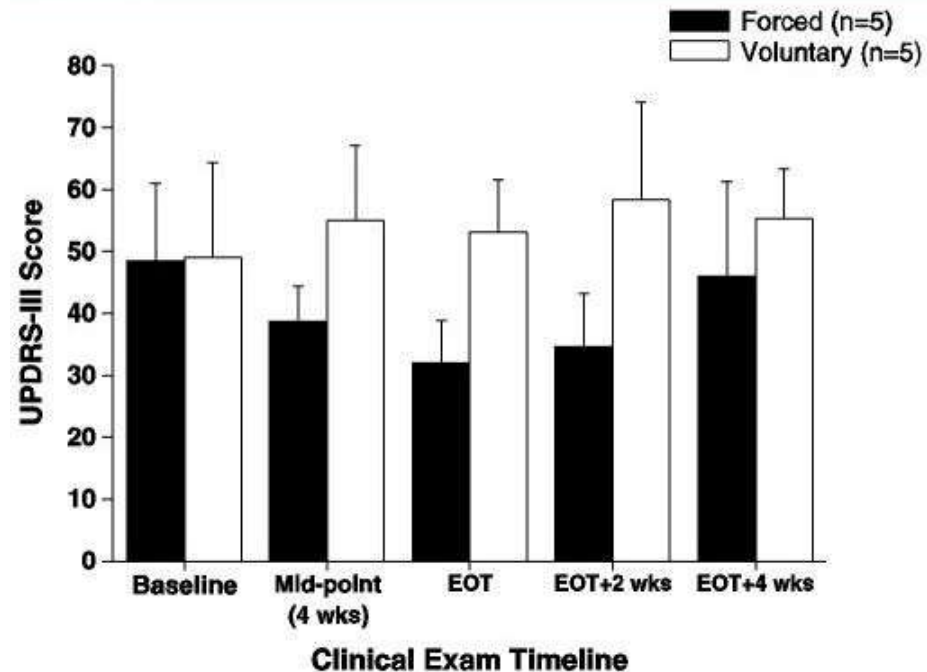
- Cleveland Clinic scientist who studies Parkinson's Disease.
- In 2003 rode a tandem bike across Iowa with friend who has PD.
- Saw dramatic improvements in his symptoms with less tremor and improved writing.
- Led to studies using cycling to treat PD.





# High Cadence Cycling improves Parkinson's Disease Symptoms

- 10 mild to moderate PD pts did 8 wks (three 1-hr sessions at Forced (~85 rpm) or Voluntary (~60 rpm) intensity.
- Used blinded Unified Parkinson's Disease Rating Scale III (UPDRS III).
- Forced group **improved 35% from baseline**; No change seen in Voluntary Group.



*Theracycle*

# Spin Class for Parkinson's Patients at the Claremont Club



# Spinning for Parkinson's Disease

- Enrolled 13 patients with Parkinson's disease in a 12 week long spin class.
  - 9 Men and 4 Women.
  - Age ranged from 47-89 yr.; Mean age 69.8 yr.
- Met 3 days per week (Mon-Wed-Fri) at 11 AM at the Claremont Club spin studio with an instructor.
- Each session lasted 45 min and subjects were encouraged to spin at a pace of 85-90 RPM.

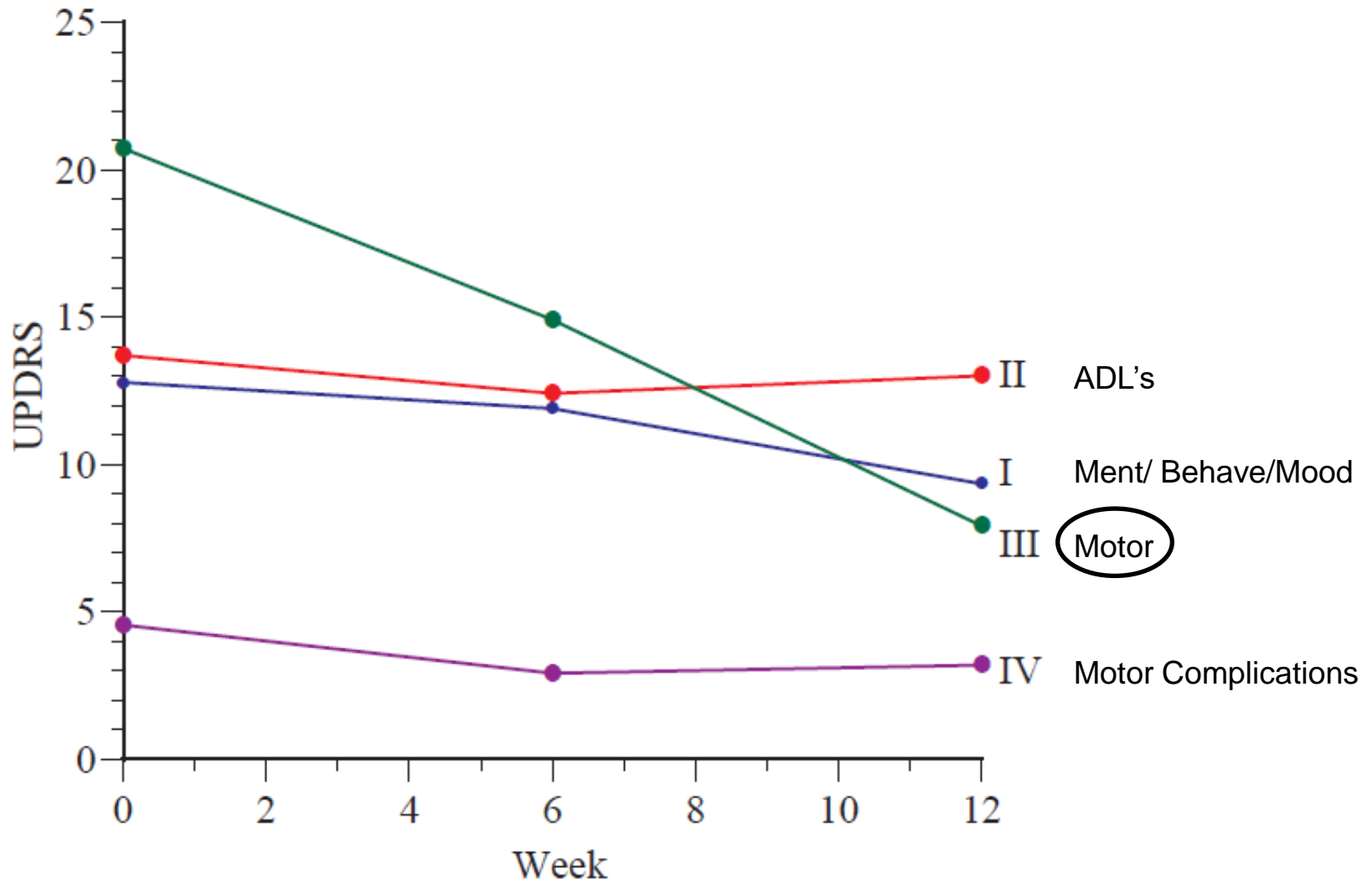
# Spinning for Parkinson's Disease

- All patients had mild to moderate PD and all but one were on Levodopa.
- 11 of 13 subjects completed the full 12 week spinning trial.
- Subjects were assessed using the Unified Parkinson's Disease Rating Scale (UPDRS) at the start of the trial, at 6 weeks and again at 12 weeks.
- All assessments were done by the same physician (sports medicine fellow).

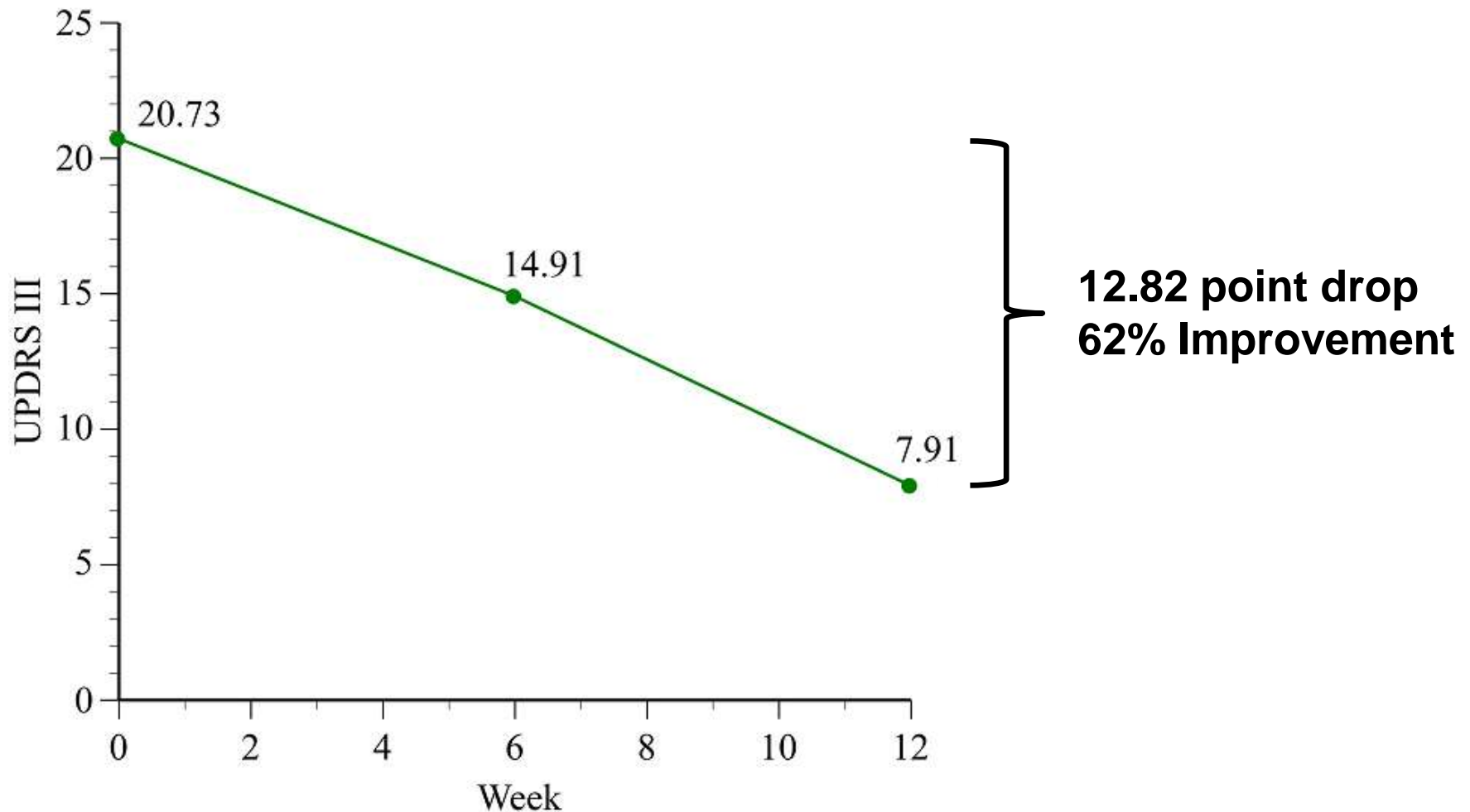
# Unified Parkinson's Disease Rating Scale

- Validated rating tool used to gauge the course of Parkinson's disease in patients to evaluate progression of disease, treatment and for research.
- Consists of 4 segments evaluated by medical pro:
  - 1. Mentation, Behavior and Mood.
  - 2. Activities of Daily Living.
  - 3. Motor Examination.
  - 4. Motor Complications
- Max score is 199 (worst disability) and lowest score is 0 (no disability)

# UPDRS I-IV Results

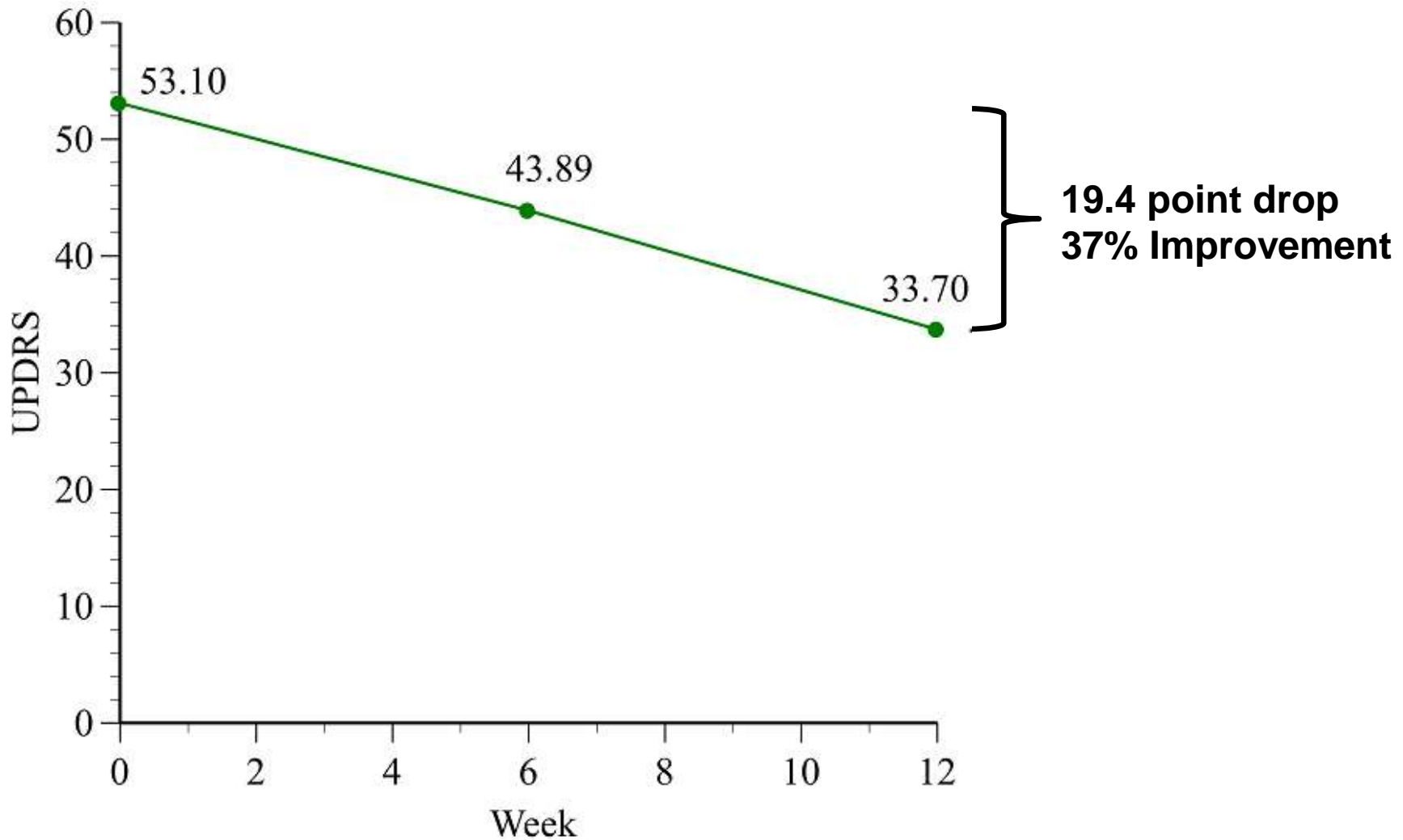


# UPDRS III (Motor) Results



**p = .0013**

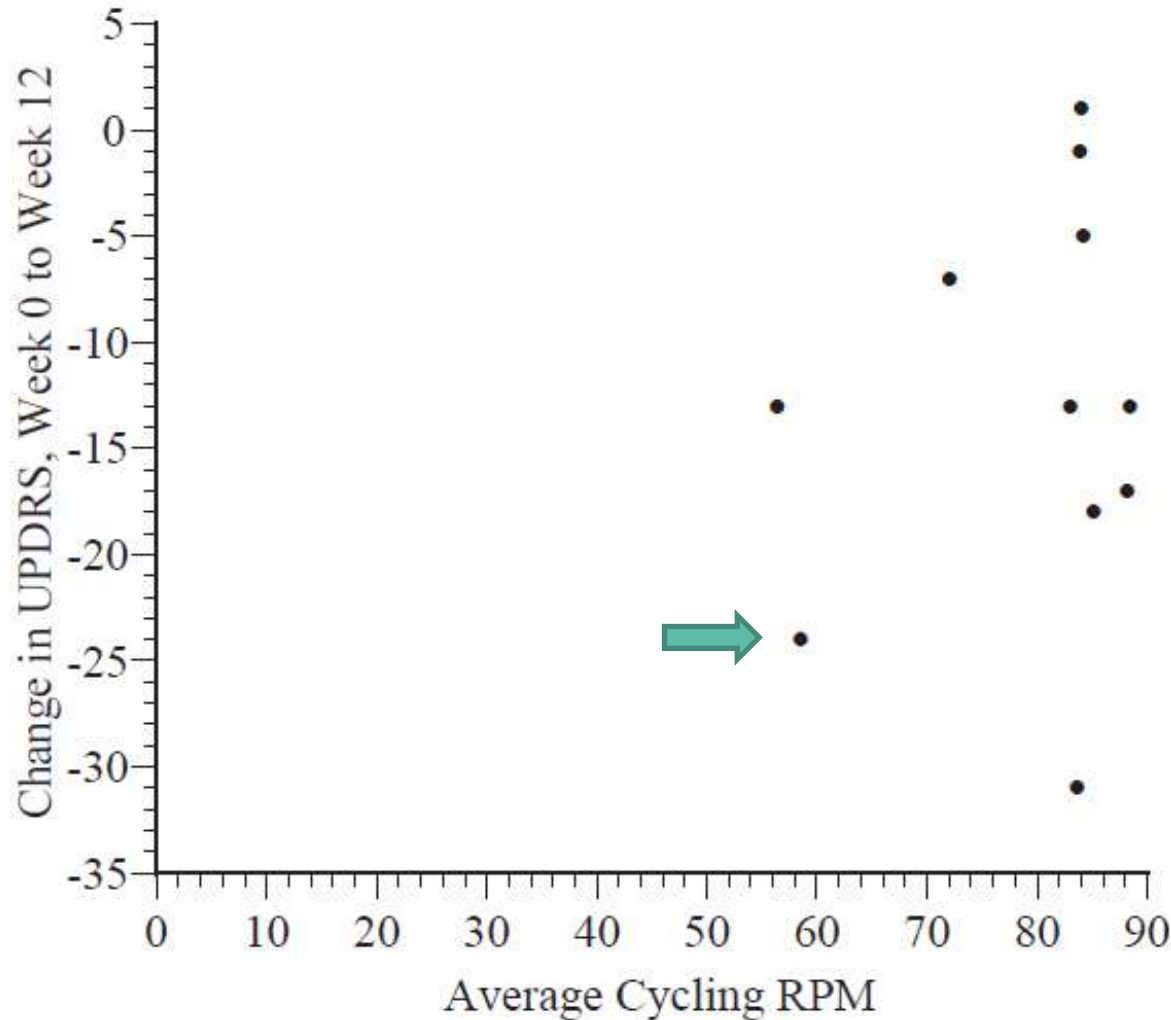
# Total UPDRS Results



**p = .00002**

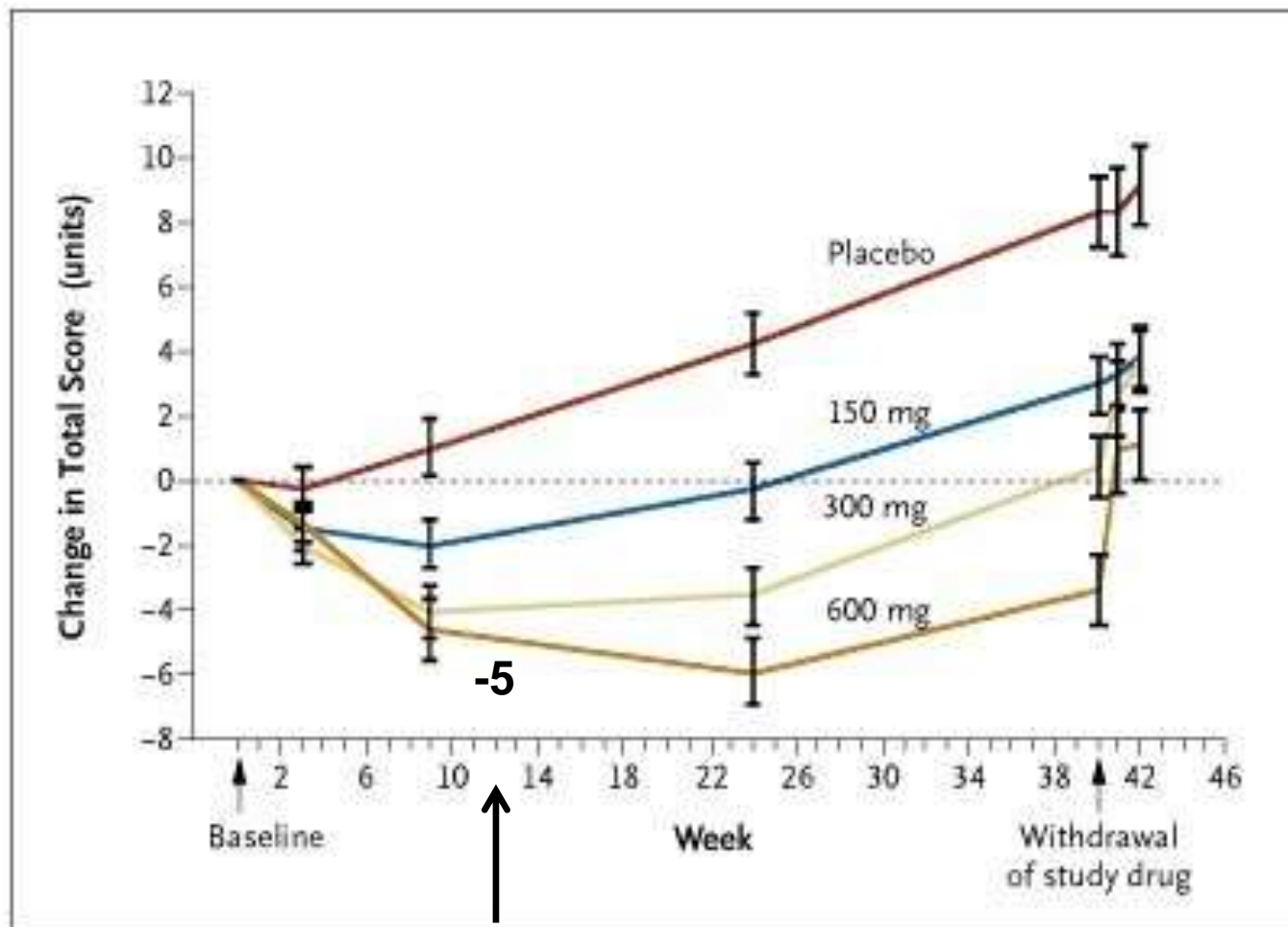


# Average Spin RPM and Change in UPDRS from Week 0-12; No Significant *Relationship*



- Mean Avg RPM 78  
- Ranged 56-89

# Change in UPDRS Scores with Varying Doses of Levodopa



# Study Conclusions

- Results limited by small sample size.
- ALL the UPDRS average scores improved in this study, but some did not reach statistical significance at 5% level.
- Over the 12-week period, the average subject's score improved in 39 of the 50 categories of the UPDRS.  
( $p = .000100$ )
- The average diastolic BP decreased by 11.09 mmhg.
- All 11 subjects wish to continue these workouts.

# Benefits went well beyond improved PD symptoms!

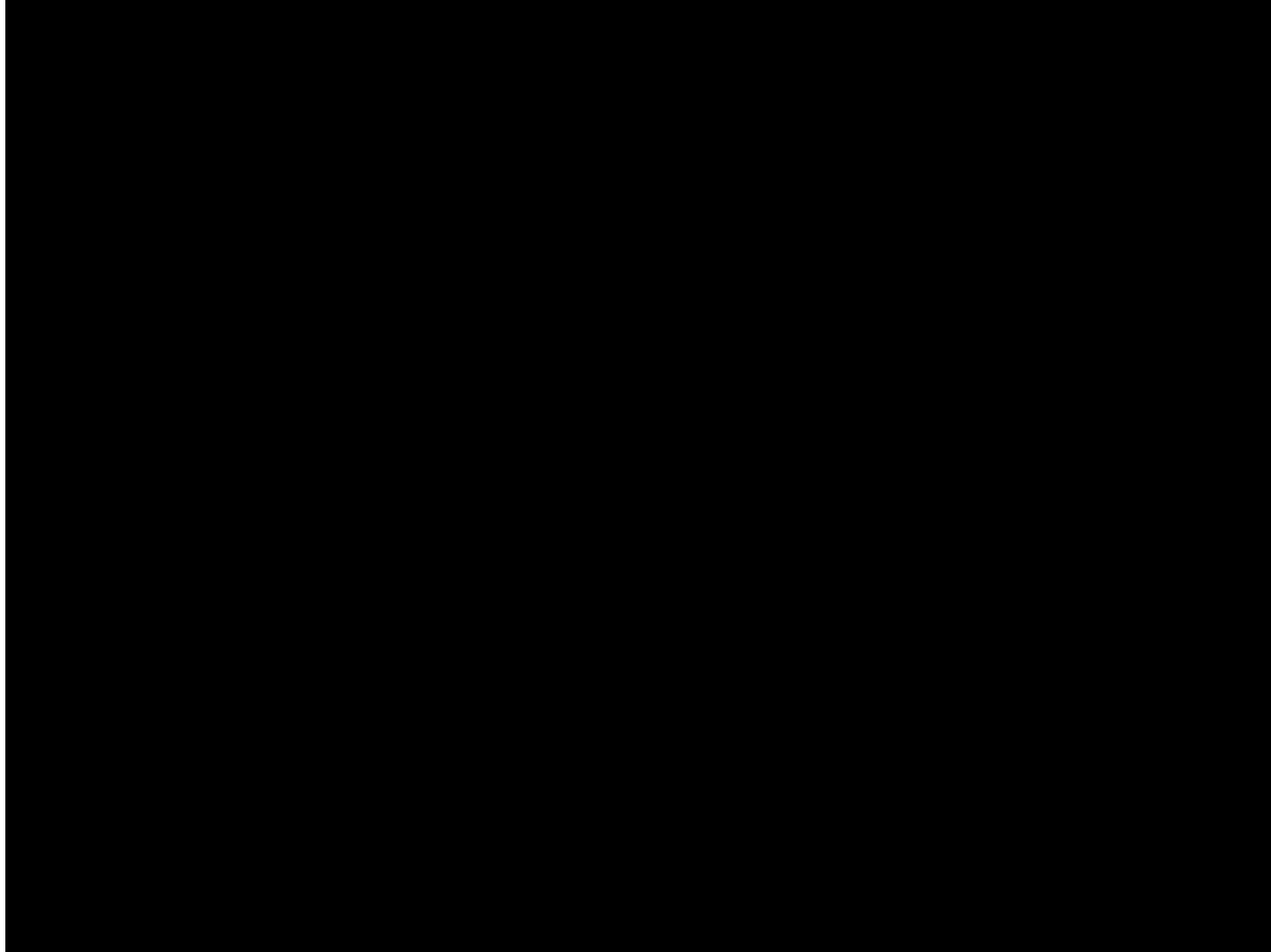


# Summary

- Studies suggest the most powerful effect of exercise may be on the brain.
- Exercise has a positive effect at every age and results in better school performance and improvements in neuro and psych disease as we age.
  - Studies show improved neurologic function at all ages with regular exercise.
  - MRI evidence of brain growth in those who exercise.
  - Results in better test scores in kids and lower rates of cognitive decline and Alzheimer's as we age.
- Exercise is Medicine to keep your brain healthy – you need to take it daily!



# Exercise is Medicine for Life's Journey...



# My Upcoming Presentations

## **Robert Sallis, MD**

- **Thursday @ 3 PM;** *“Fitness Vs Weight: What’s More Important to Your Health?”*
- **Friday @ 3 PM;** *“Managing Chronic Musculoskeletal Pain: What are the Best Non-Drug Options?”*

Thank You!



RANCHO LA PUERTA

*Tecate • Baja California • Mexico*

Questions?