

Exercise and a Brain Health;

What's the Connection?



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

Exercise
is Medicine™

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Conflict of Interest Disclosure

Robert Sallis

- Has no actual or potential conflict of interest in relation to this presentation
- Will be discussing the use an off-label and unapproved drug called Exercise in this presentation

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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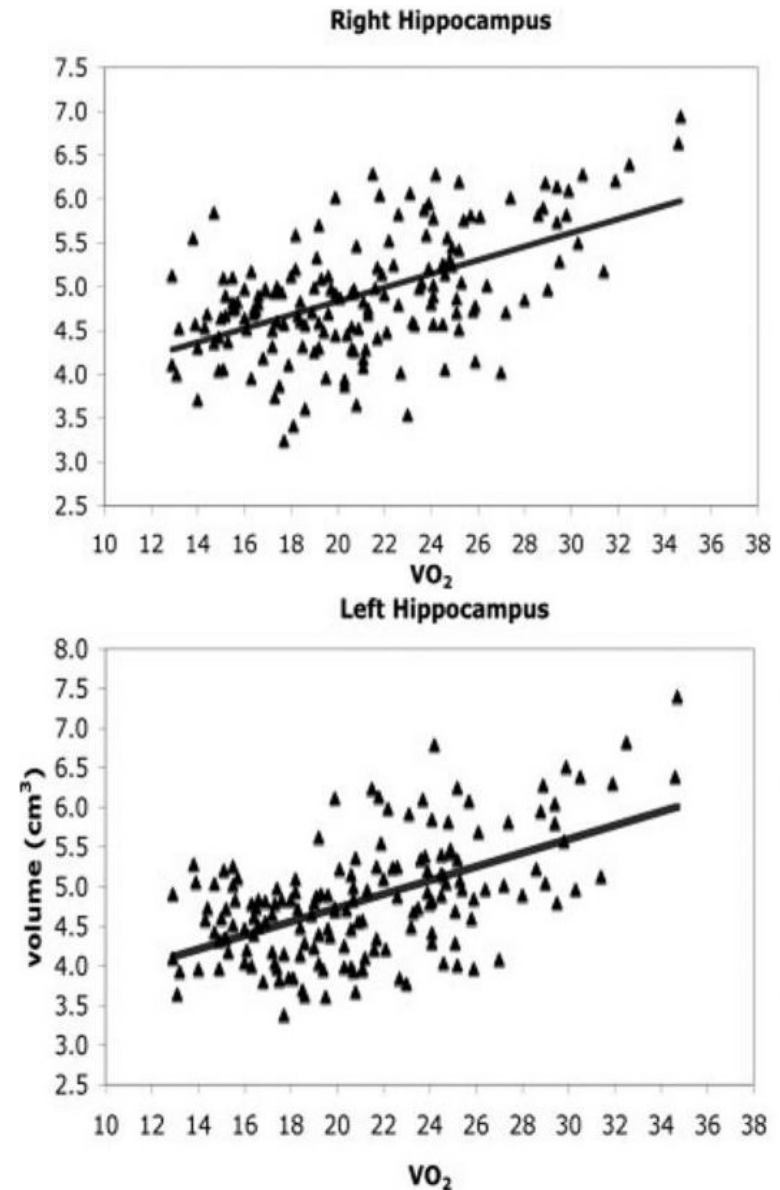
Most Powerful Effect of Exercise May be on the Brain!

- 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-aged adults.



Can Exercise Overcome Genetic Propensity?

Twins Study; One exercises, Other Does Not

- Finland twin's 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 MRI; 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.



Benefits of Physical Activity in Kids



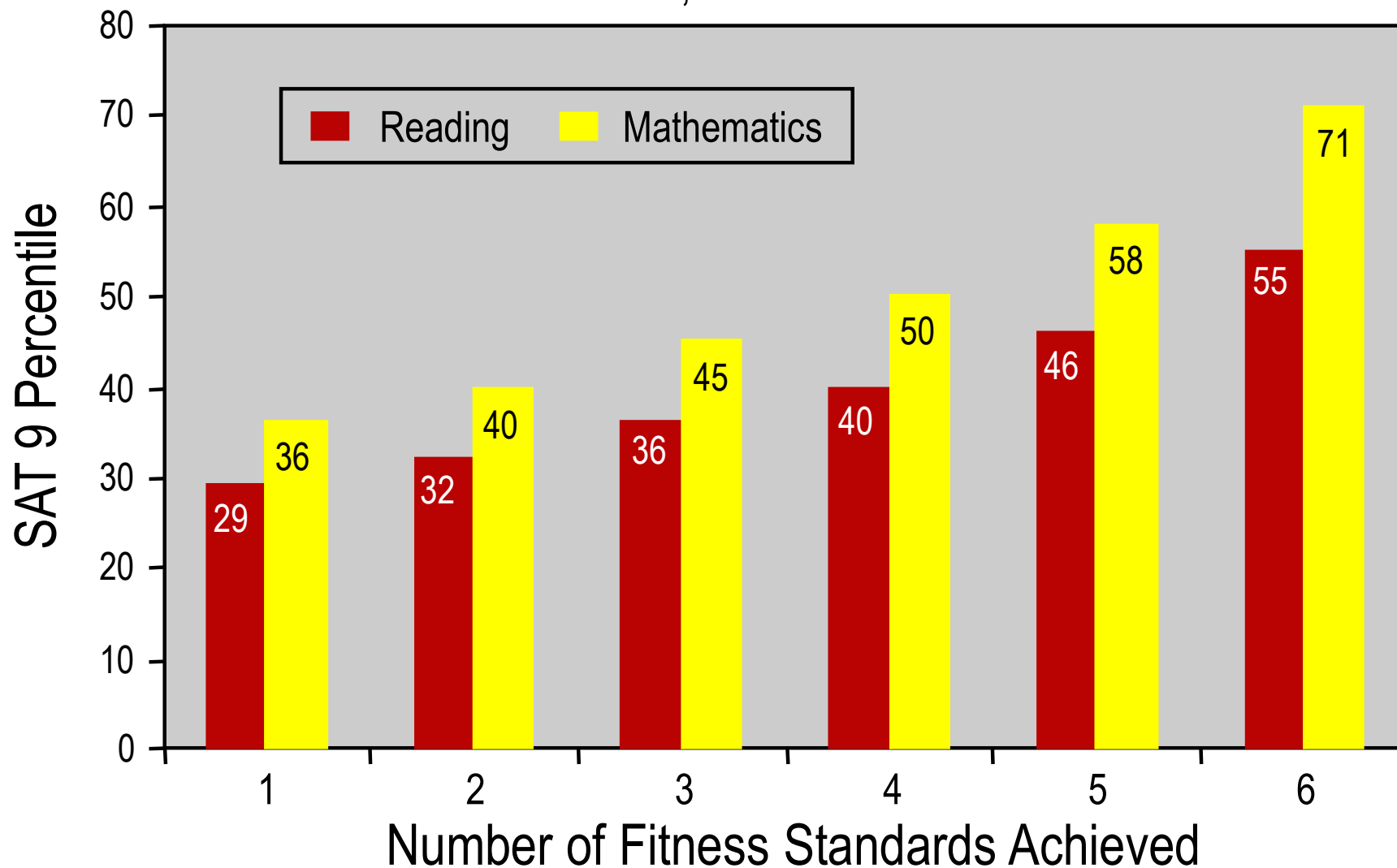
Fitness and Stanford Achievement Test 9th Ed

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

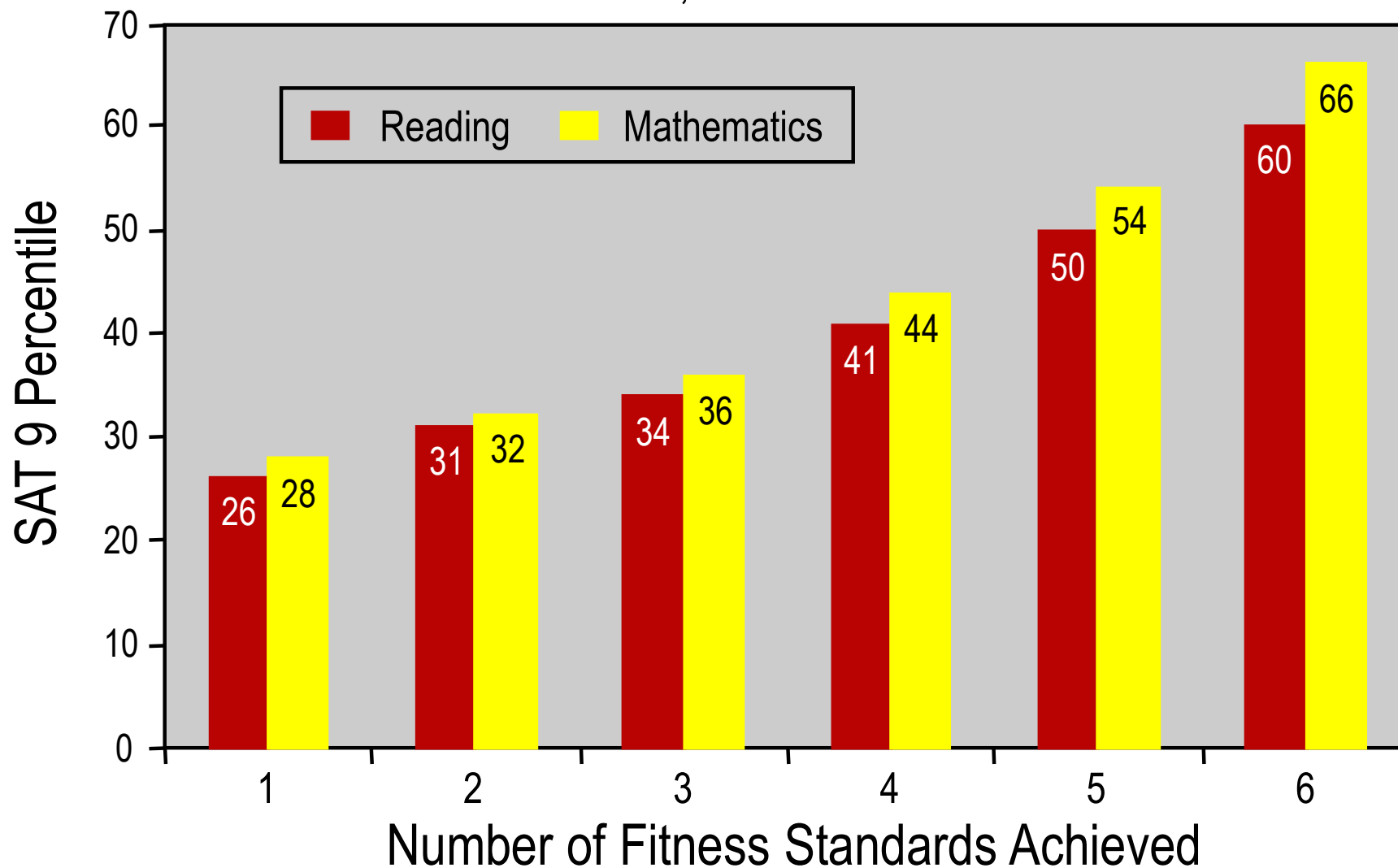


Source: California Dept. of Education Study, December 10, 2002

Grade 7

SAT 9 and Physical Fitness

322,000 Students

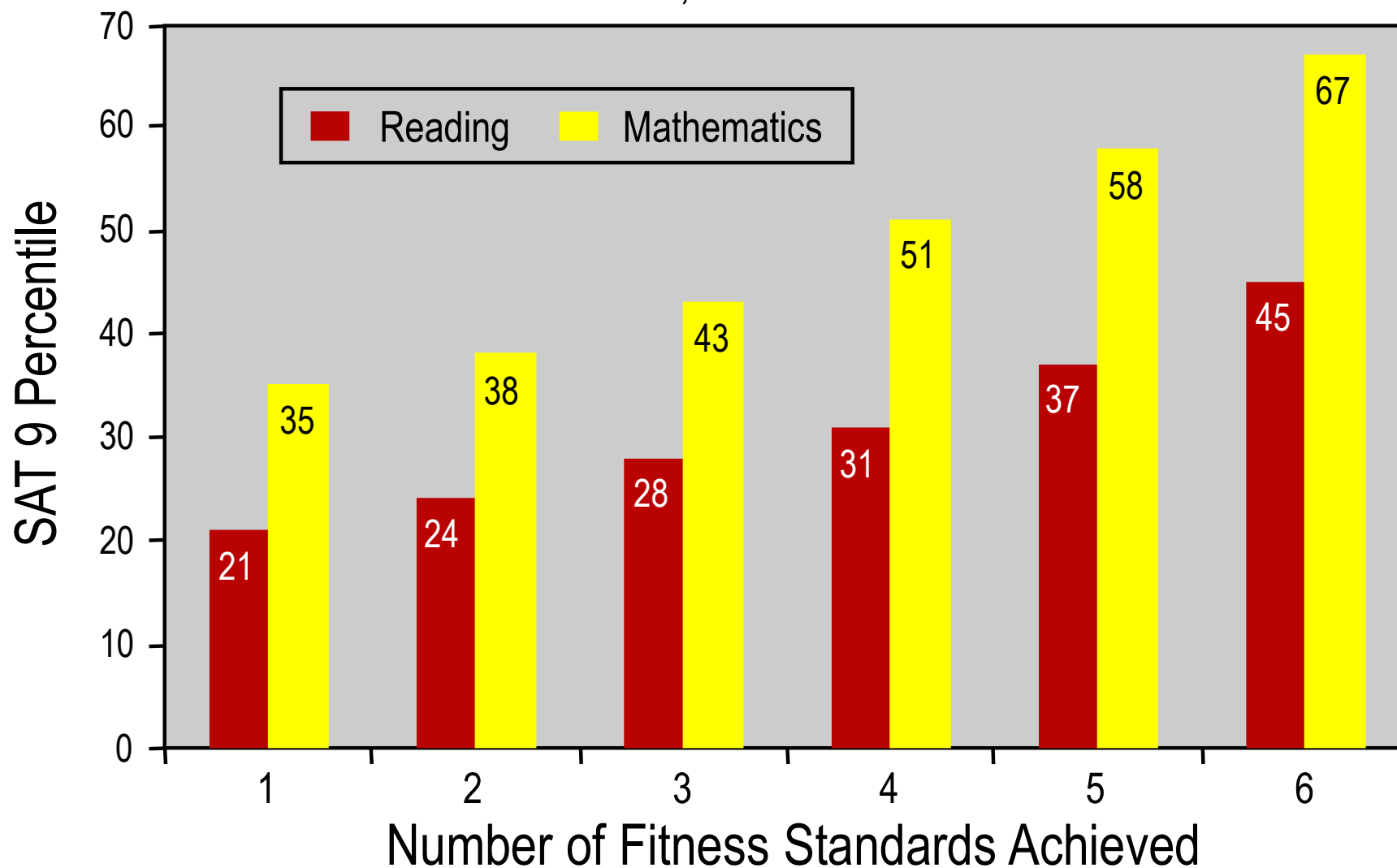


Source: California Dept. of Education Study, December 10, 2002

Grade 9

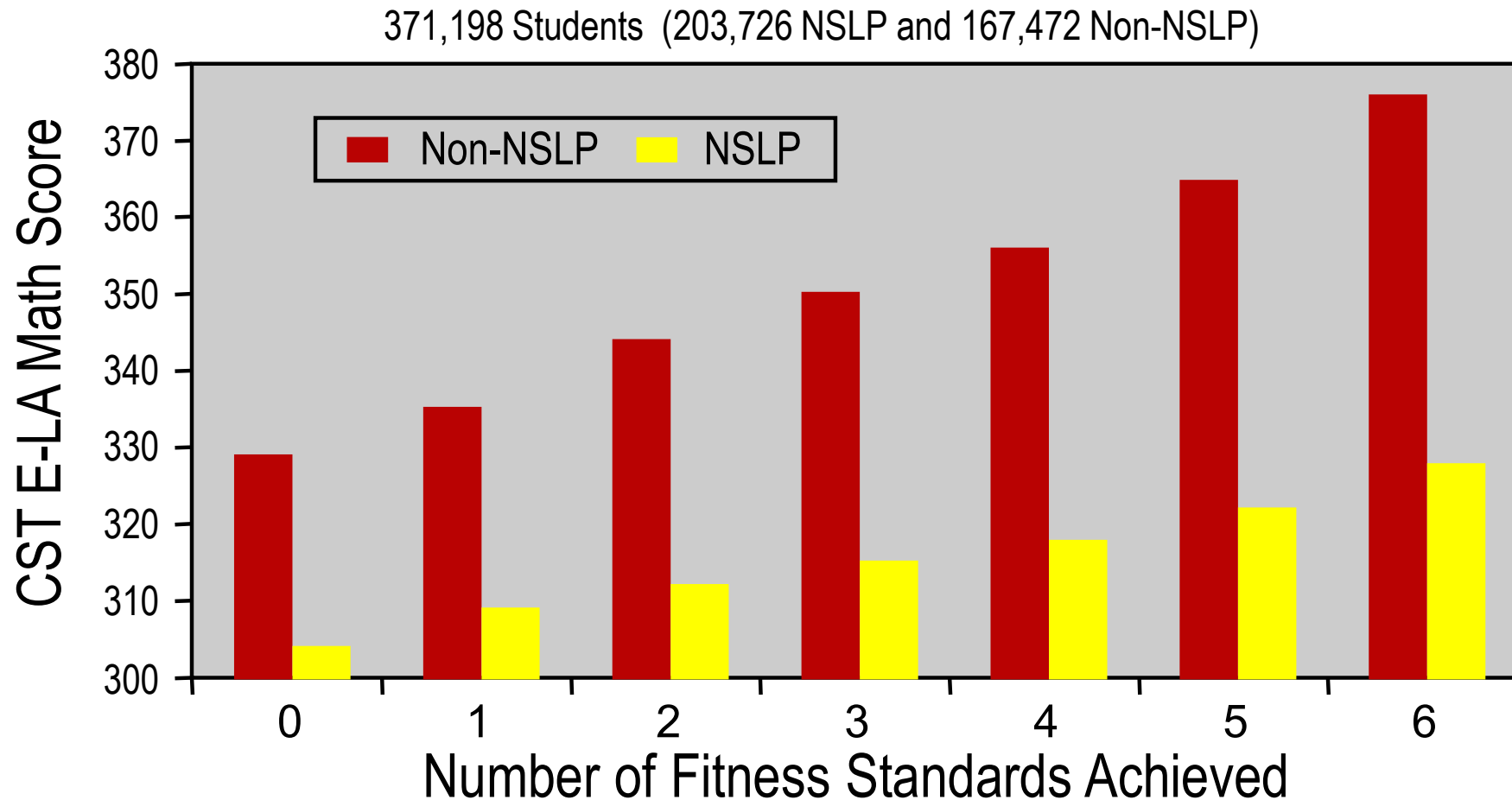
SAT 9 and Physical Fitness

279,000 Students



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

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.

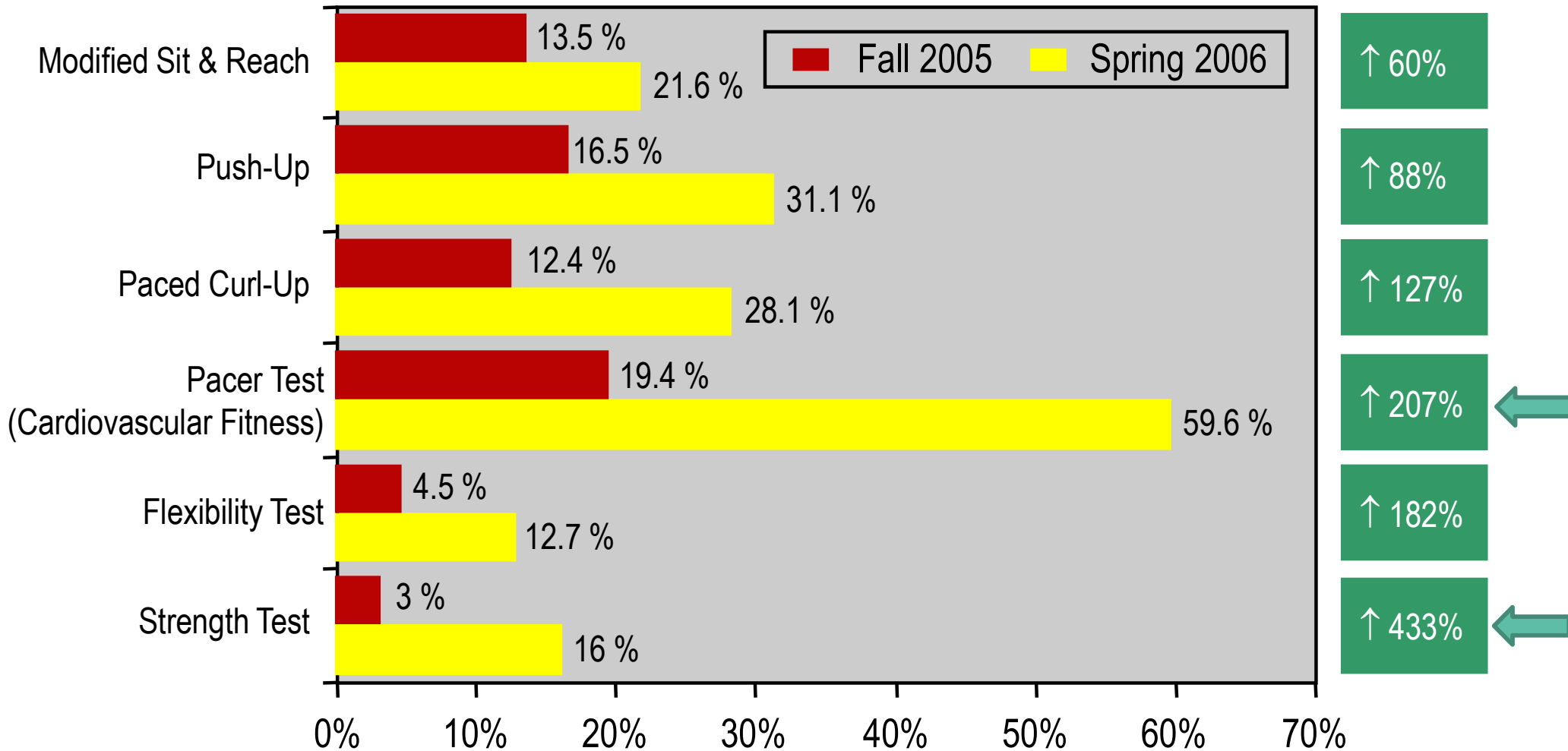
Results for seventh- and ninth-grade students were consistent with those for fifth graders.

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

Improvements in Fitnessgram Results

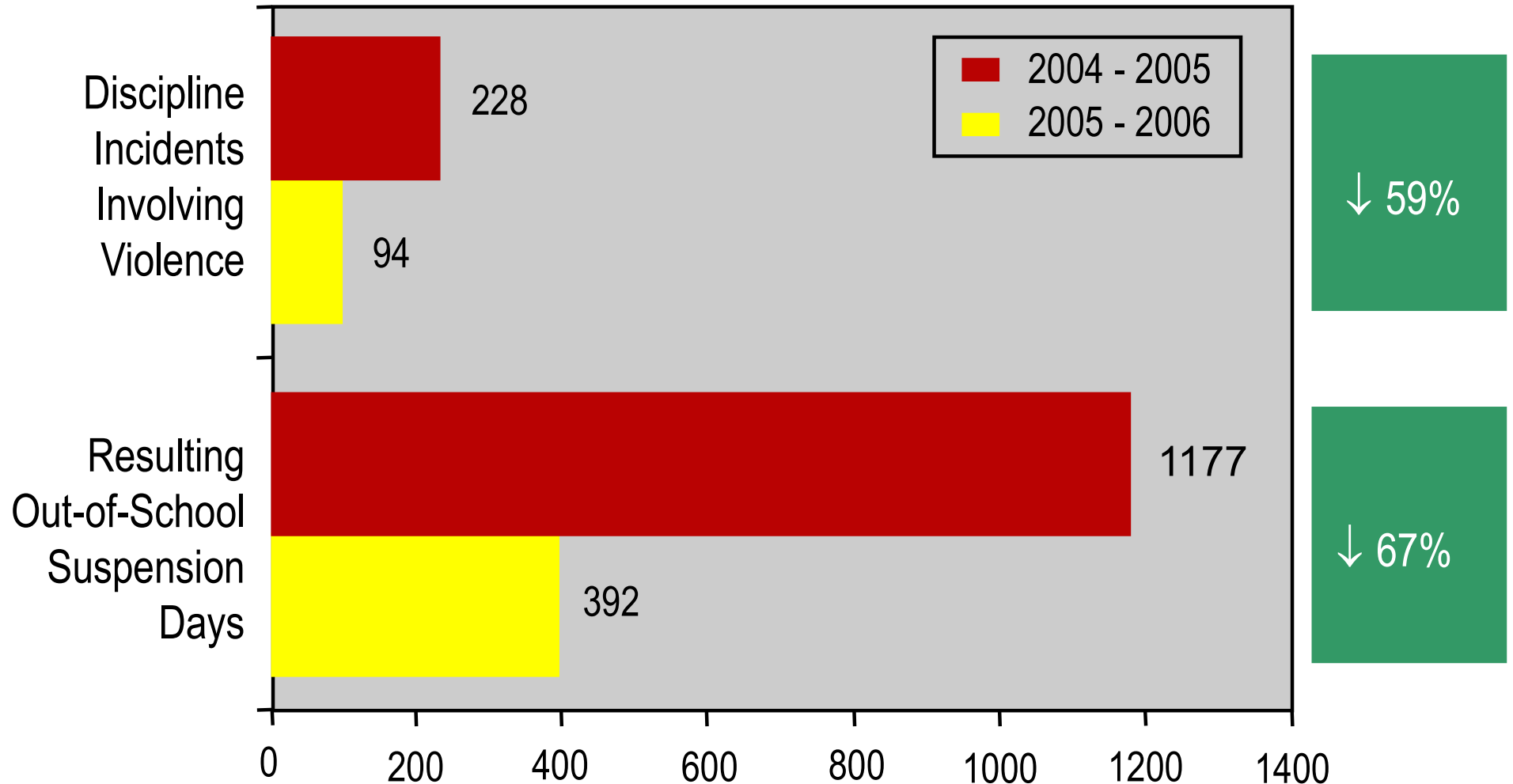
PE 4 Life Program at 6 months

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



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

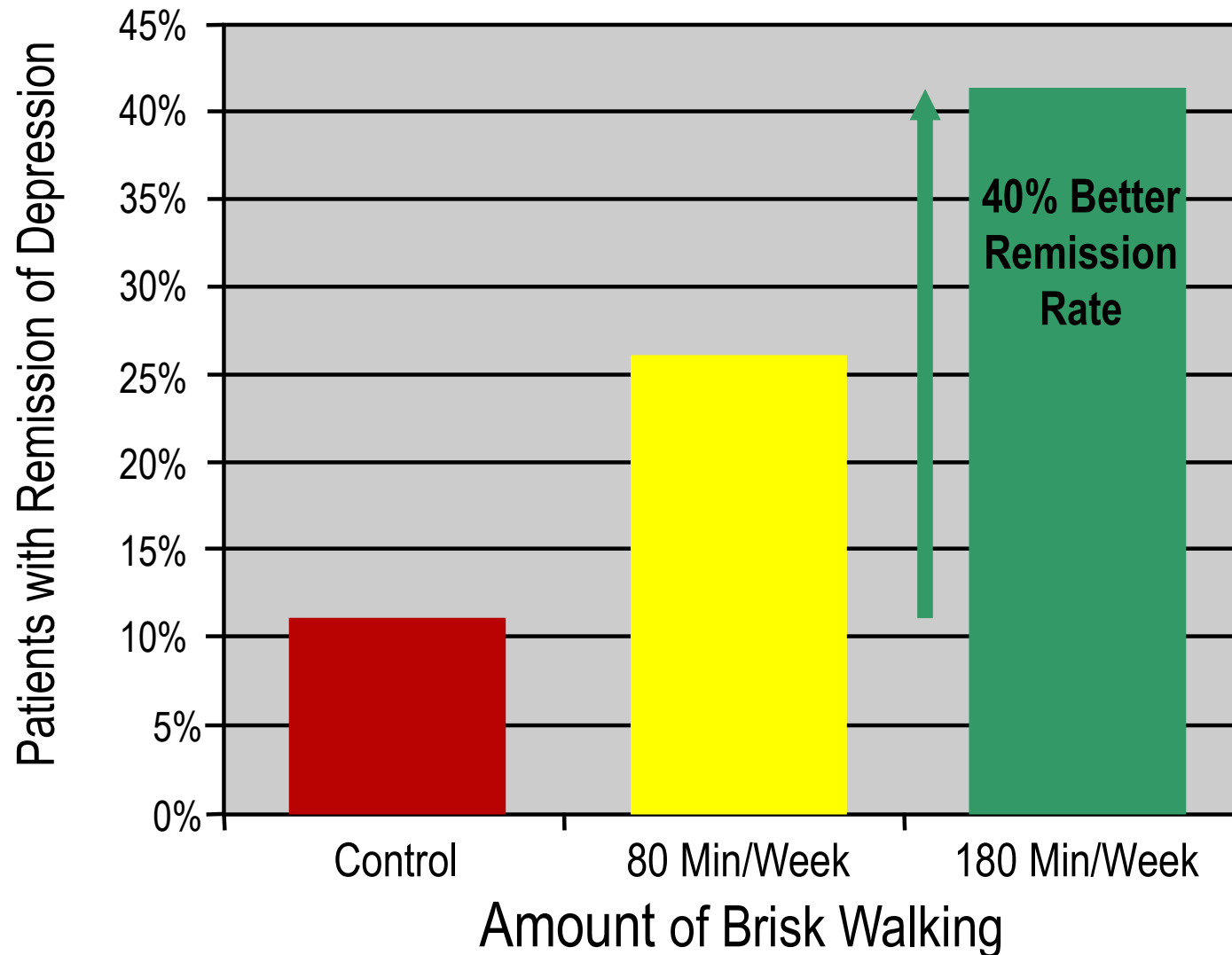


K.J. Calfas, W.C. Taylor. Ped Exerc Sci 1994. 6:406-423
Sabo et al. J Adolesc Health 1999;25:207-16

Brain Benefits of Physical Activity as We Age



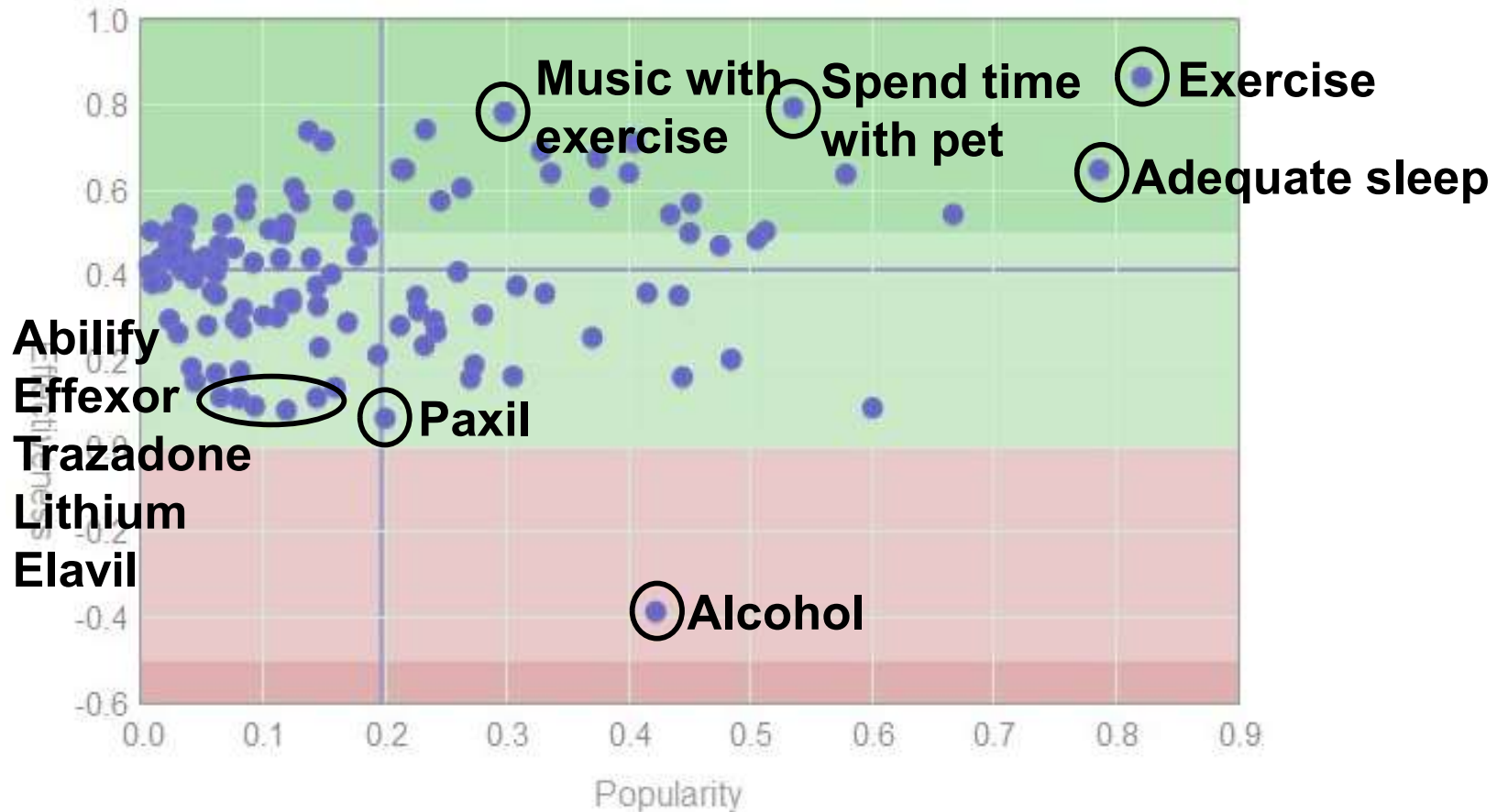
Exercise is a Treatment for *Depression*



<http://curetogether.com>

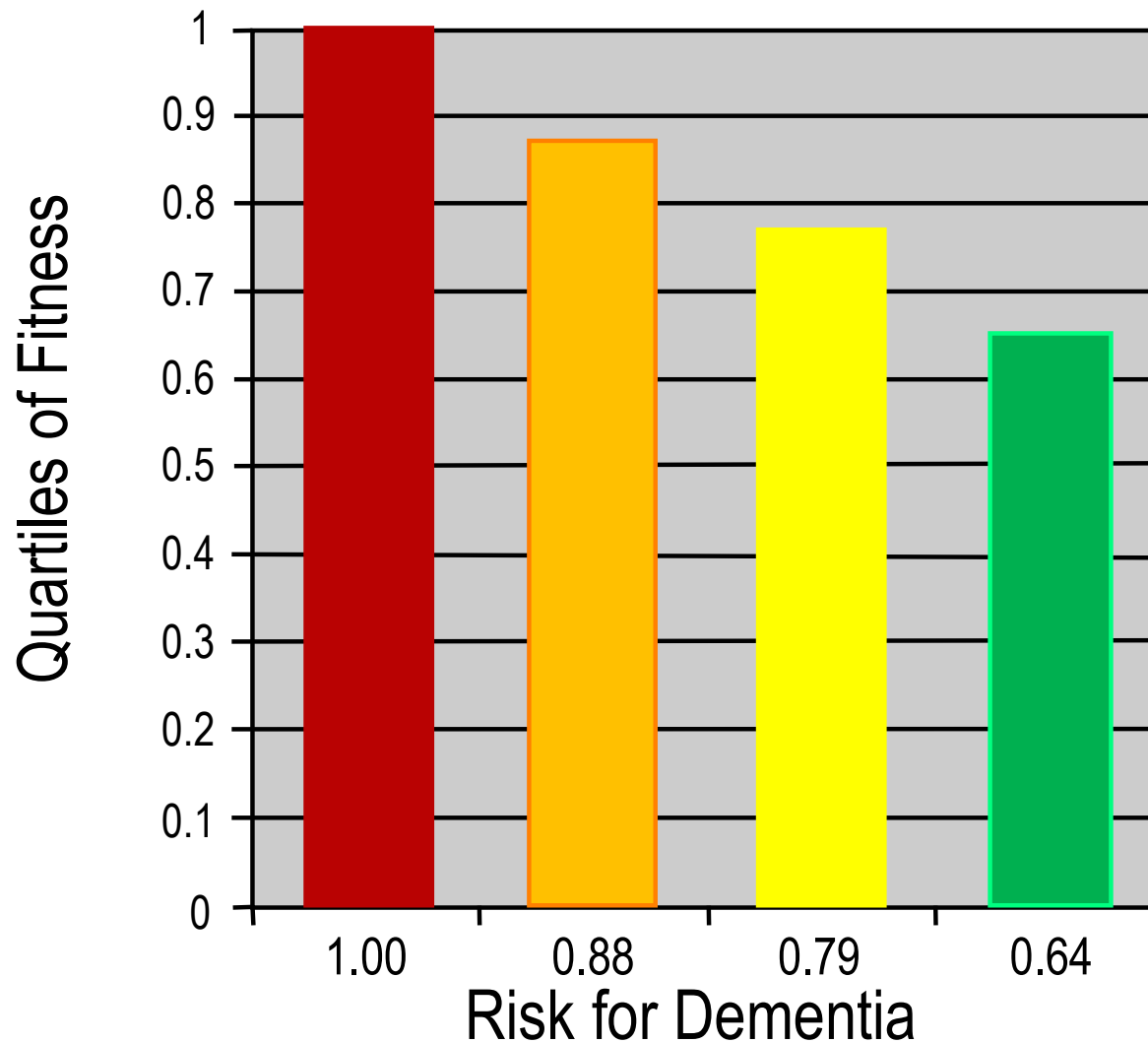


117 Depression Treatments Compared
Hover over each dot to see what treatment it represents.



This infographic is based on a total of 22,800 treatment effectiveness ratings.

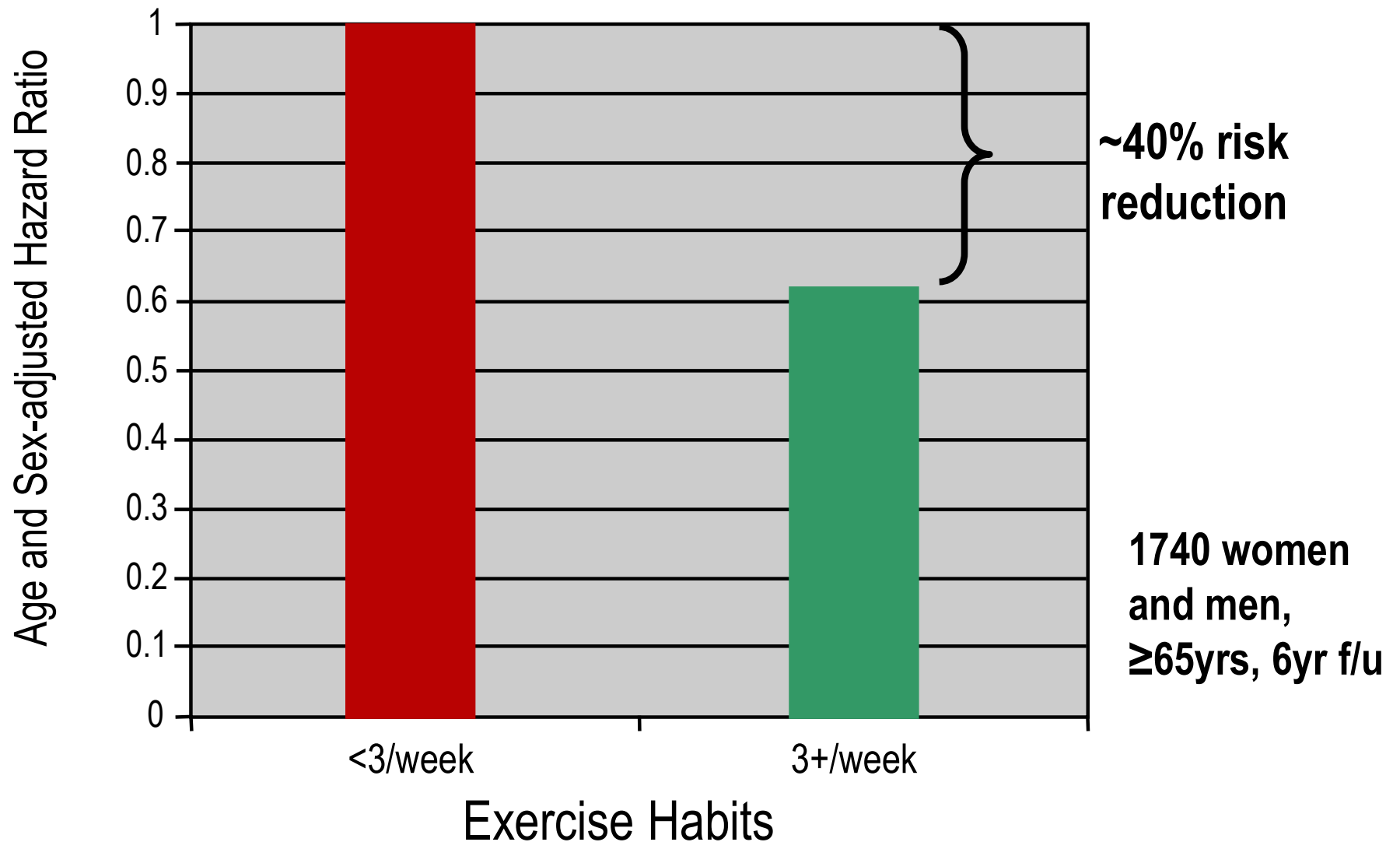
Middle Age Fitness and Dementia *Risk*



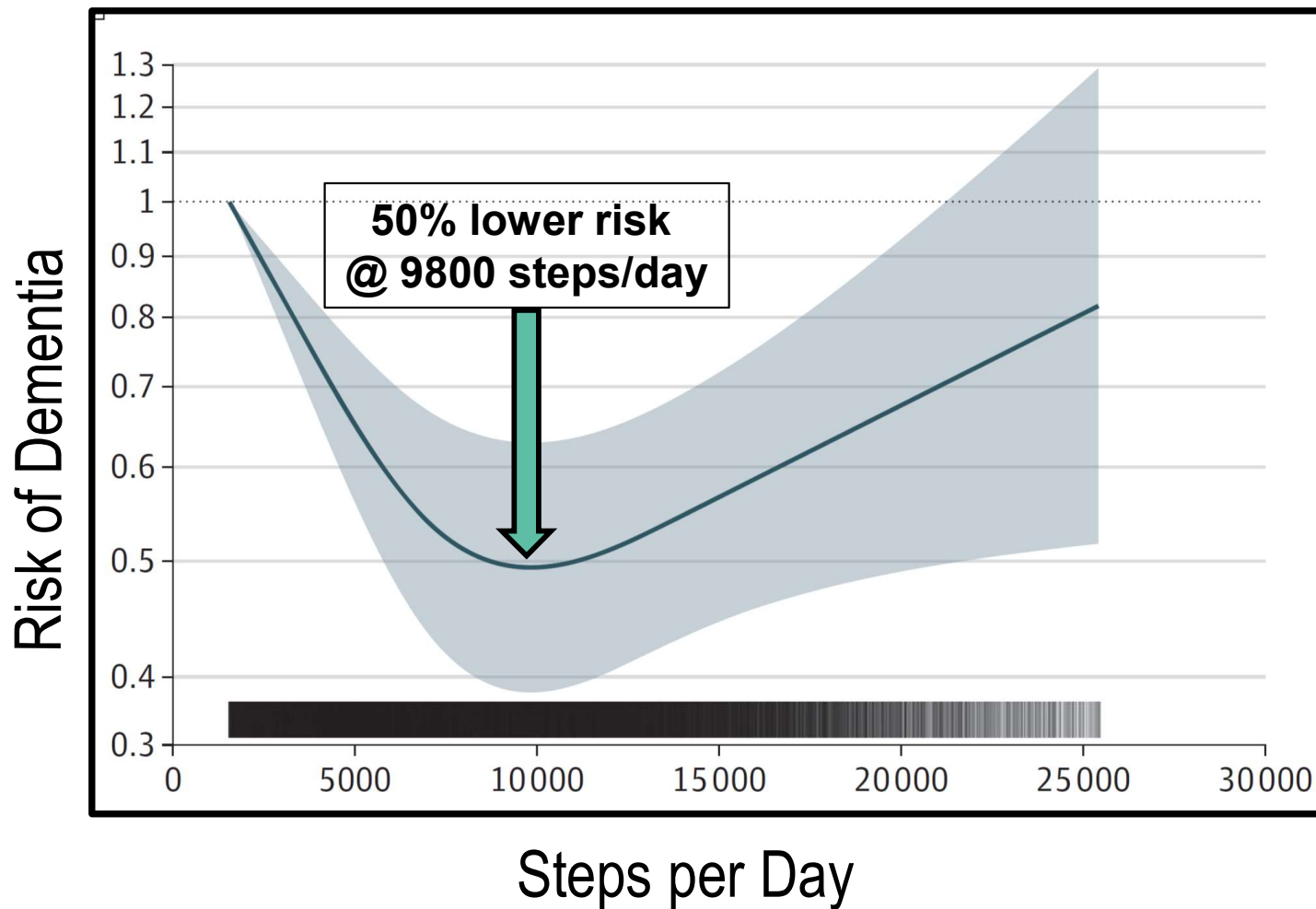
Most fit ~36% less likely have dementia

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

Exercise and *Dementia*

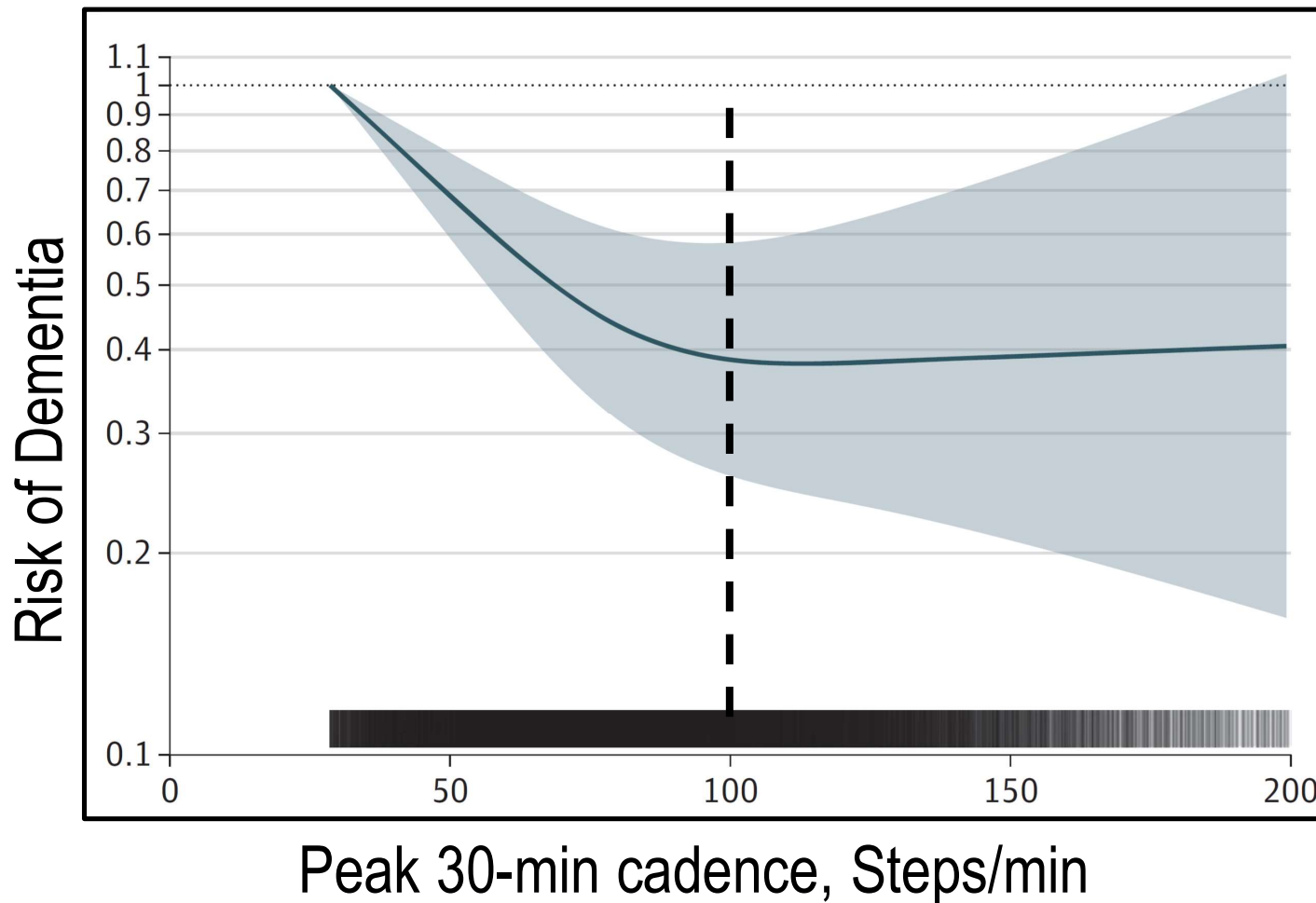


Steps per Day and Incidence of *Dementia*



- 78 430 adults
- UK Biobank Data
- Mean age 61.1
- Controlled for multiple risk factors

Step Intensity and Incidence of *Dementia*



- 78 430 adults
- UK Biobank Data
- Mean age 61.1
- Controlled for multiple risk factors

What Can Healthcare Providers Do?

- Include an Exercise Prescription in all treatment plans:
 - Every patient; Every visit; Every Specialty.
- Use an Exercise Vital sign to remind all patients to get 30 min of walking on 5 or more days per wk.
- Message should be the same from every healthcare provider.
- We must begin to merge fitness with healthcare.



Smith, John W MRN: 000017701887 Age: 30 year Sex: M PCP: Spero, Robert David (M.) Allergies: Sulfa Class, Acarbose, 5-alpha Reductas* Alert: N Spec Feat: Inactive

- Snapshot
- Chart Review
- Flowsheets
- Problem List
- History
- Letters
- Demographics
- Proactive Care
- Order Entry
- Imm/Injections
- Allergies
- Medications
- Activity Rx/Forms
- Forms
- Enter/Edit Results
- Doc Flowsheet
- Visit Navigator

4/22/2009 visit with TEST DUMMY MD

Images Questionnaires Admin Benefits Inquiry References SmartSets Open Orders Preview AVS Print AVS

Allergies: Sulfa Class, Acarbose, 5-alpha Reductase Inhibitors, Acetaminophen + Propoxyphene Napsylate Reviewed on 2/27/2009

Last Vitals: BP: 120/80 P: 60 T: T Src: Resp: 22 W: 190 lbs (86.183 kg) H: 5' 10" (1.778 m)
 BMI: 27.26 kg/m2, BSA: 2.06 m2 **Exercise Vitals: 180 mins/wk**

- Charting**
- Chief Complaint
 - Nursing Notes
 - Vitals
 - Exercise Vitals**
 - Review Exercise VS
 - Med. Document
 - BestPractice
 - History
 - Progress Note
 - SmartSets
 - Dx and Orders
 - Pt. Instructions
 - LOS
 - Follow-up
 - Close Encounter

Height 5' 10" (1.778 m)
Peak Flow

Exercise Vitals - Exercise Vitals (SHIFT+F6 to enter comments)

Instant Taken:
 Date: 4/30/2009
 Time: 1149

Exercise Level of Effort

Days per week of moderate to strenuous exercise (like a brisk walk): 0 1 2 3 4 5 6 7

On average, minutes per day of exercise at this level: 10 20 30 40 50 60 90 120 150 or greater

Restore Close F9 Cancel Previous F7 Next F8

Review Exercise Vitals

Mark as Reviewed Last Reviewed by SHARMA, PANKAJ on 4/24/2009 at 12:36:26 PM

Medication Documentation

Current Prescriptions	Taking?	Start Date	End Date
ATENOLOL 100 MG ORAL TAB TAKE 1 TABLET ORALLY DAILY		4/29/2009	
ATENOLOL 100 MG ORAL TAB 1 TAB PO DAILY		4/29/2009	5/29/2011

Provider: William Lewis (M.D.) Sperleng

The Walking Prescription for Brain Health!



Name: John W. Smith Age: 30

Walking **R_x**

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

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
 - To instruct and monitor patients



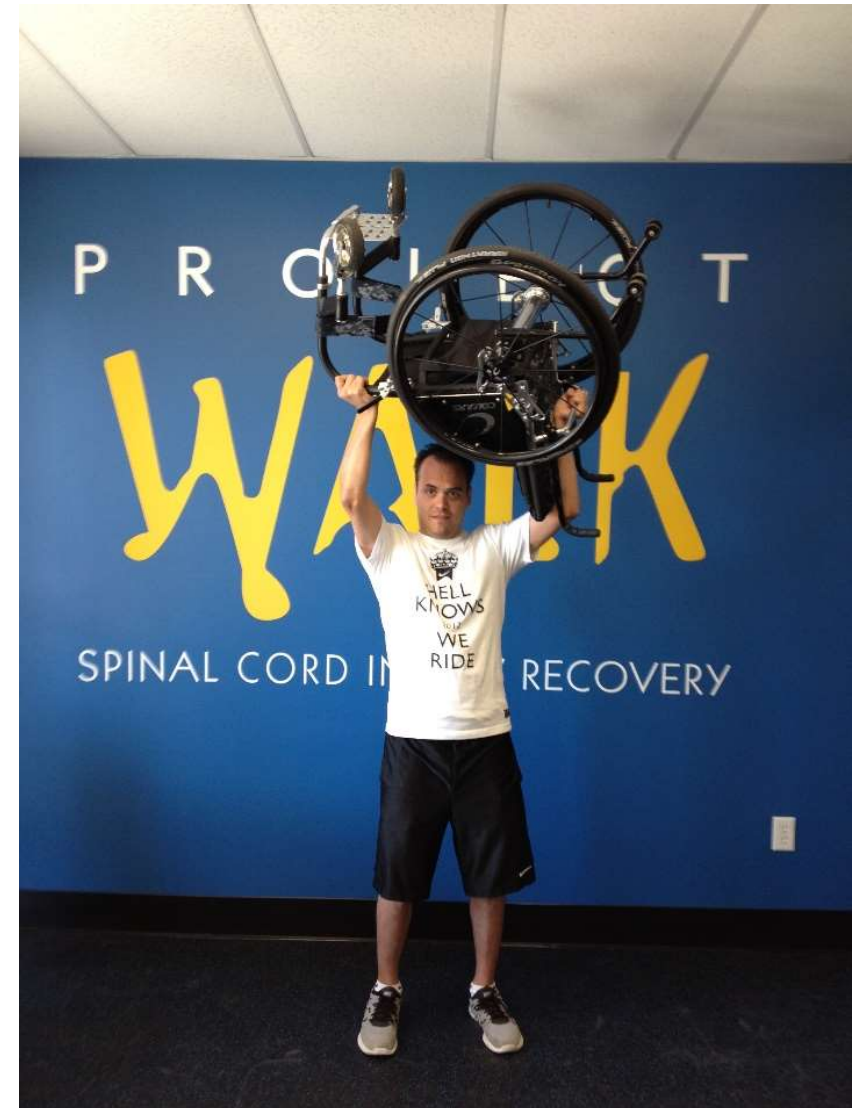
The Claremont Club

- 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 were amazing...

- Dramatic improvements in strength and endurance.
- Able to whisper to his wife for the first time in 8 years.
- His depression lifted and he felt 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

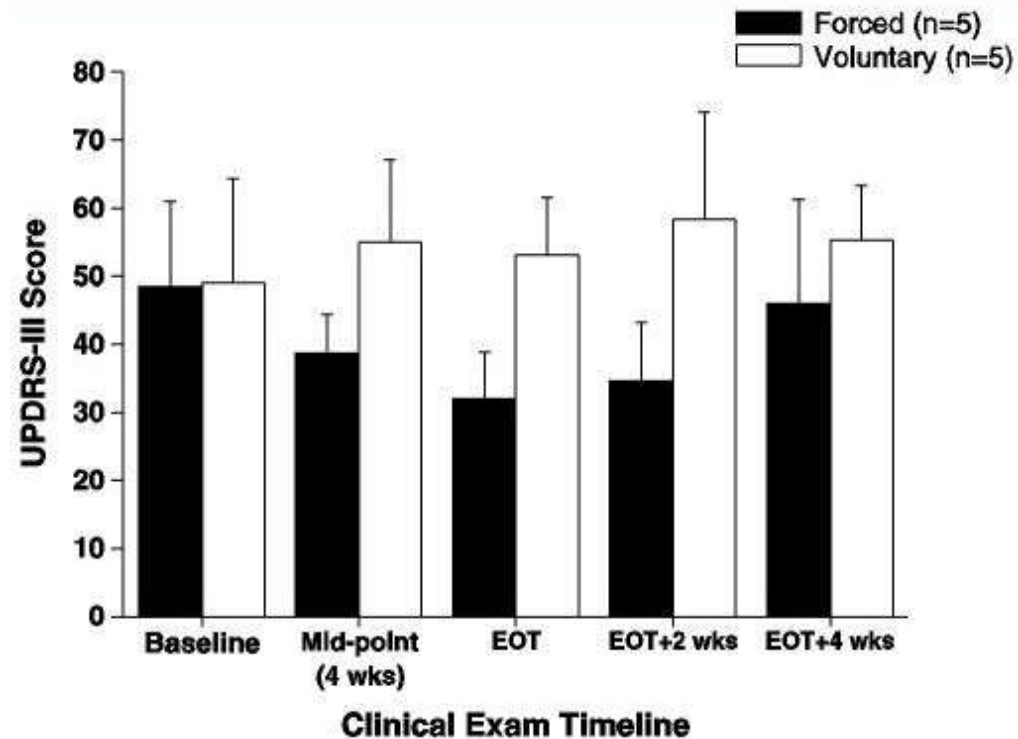
Dr. Jay Alberts

- 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.

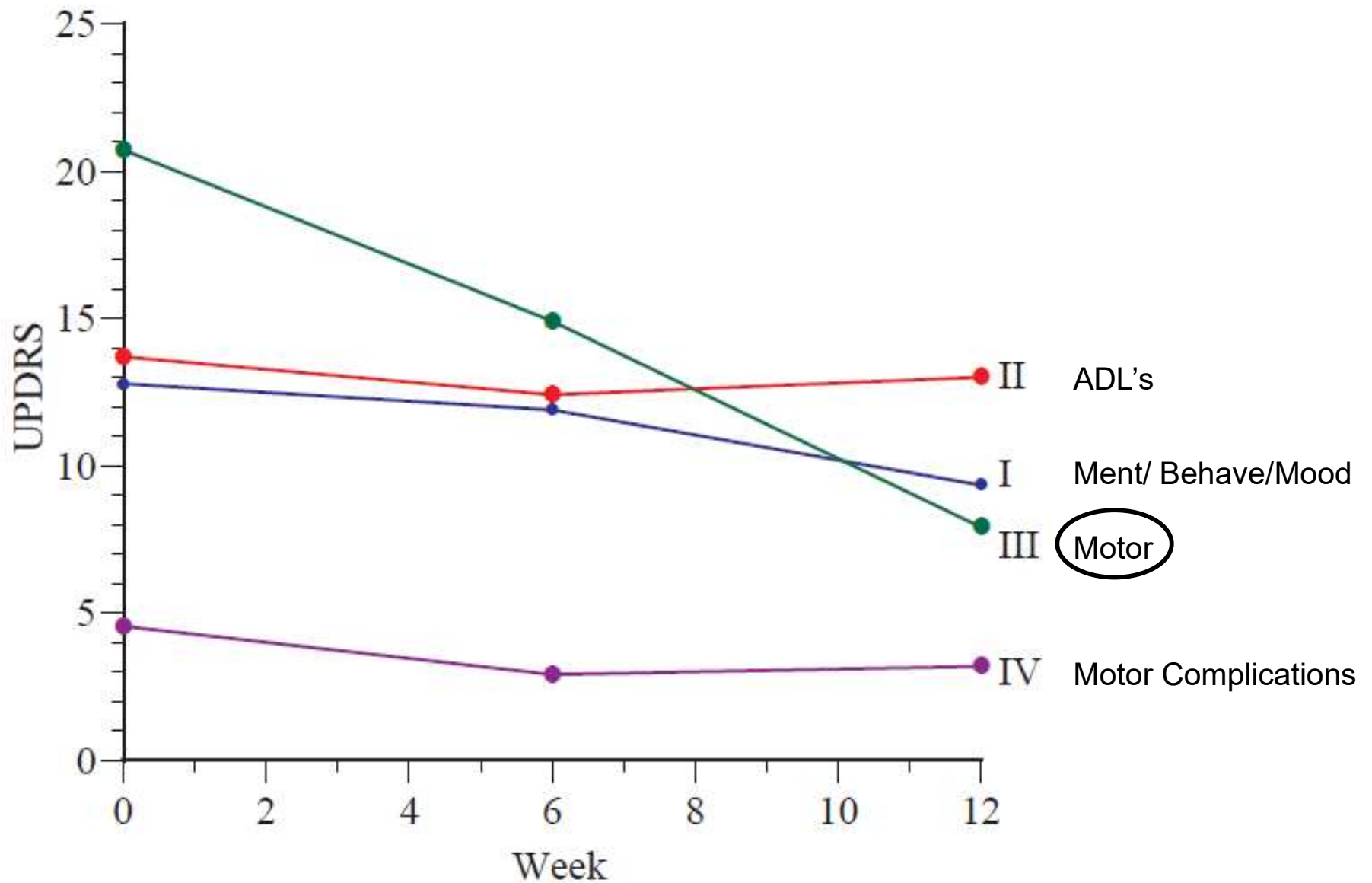
Spinning for Parkinson's Disease

- 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).

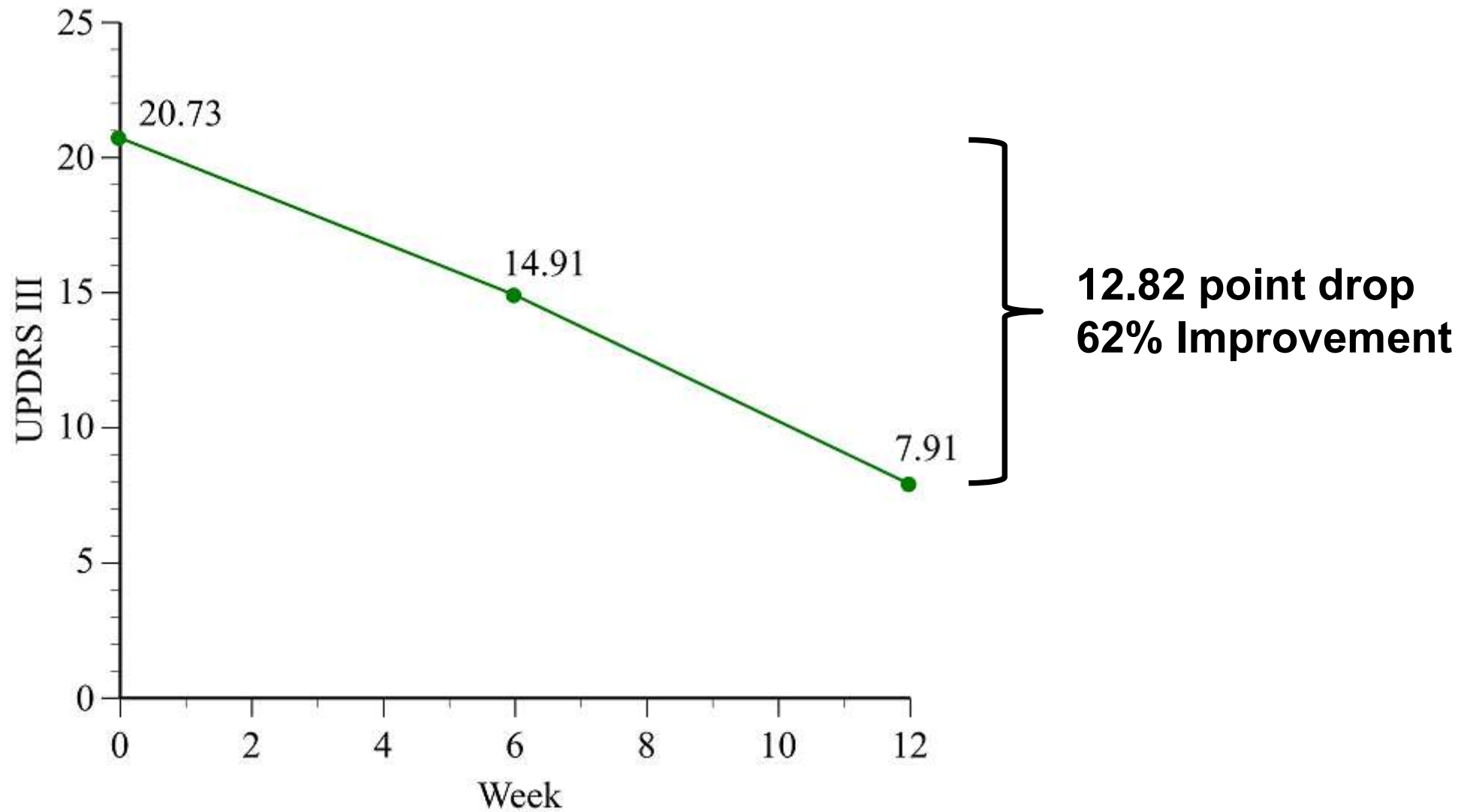
Unified Parkinson's Disease Rating Scale

- 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

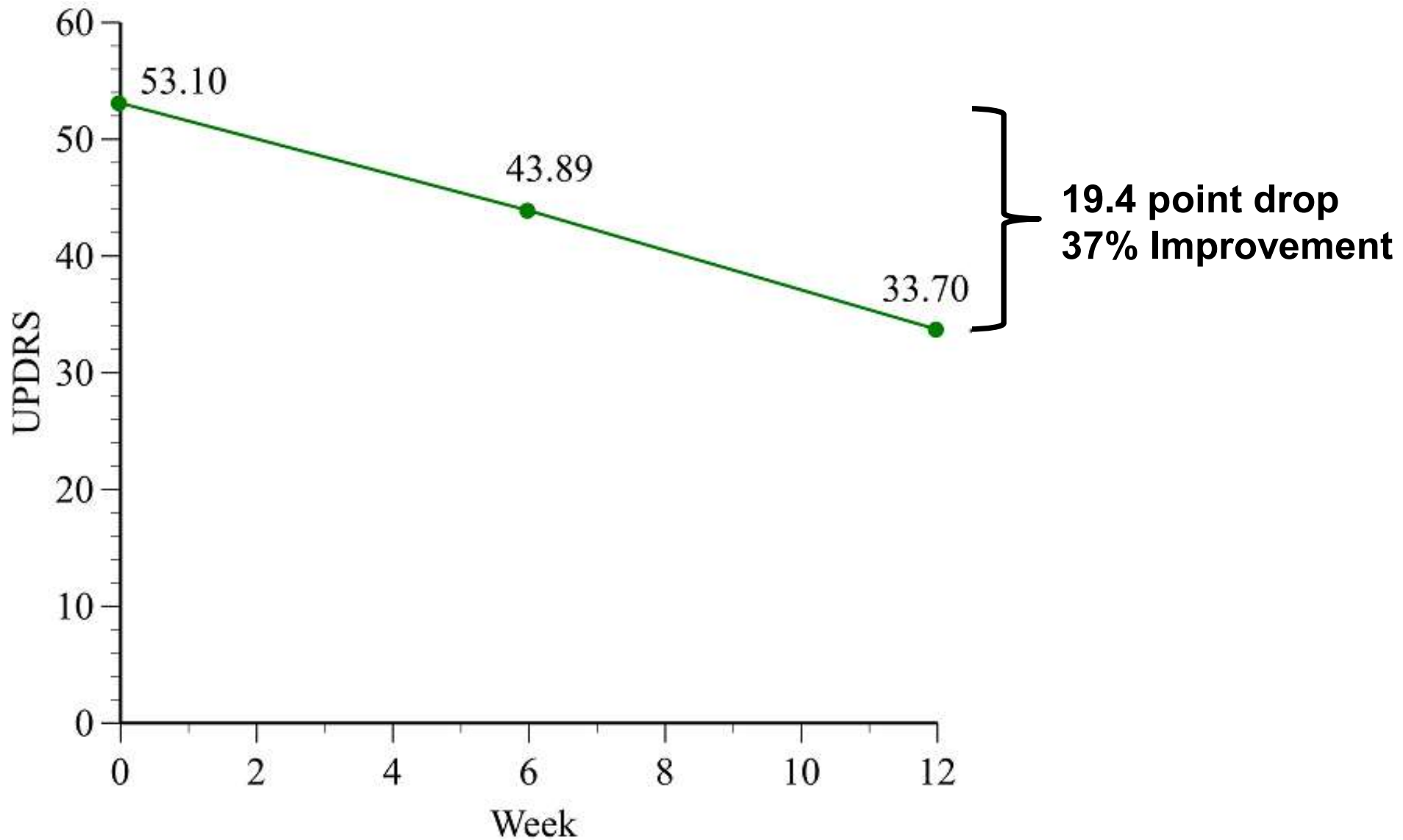


UPDRS III (Motor) Results



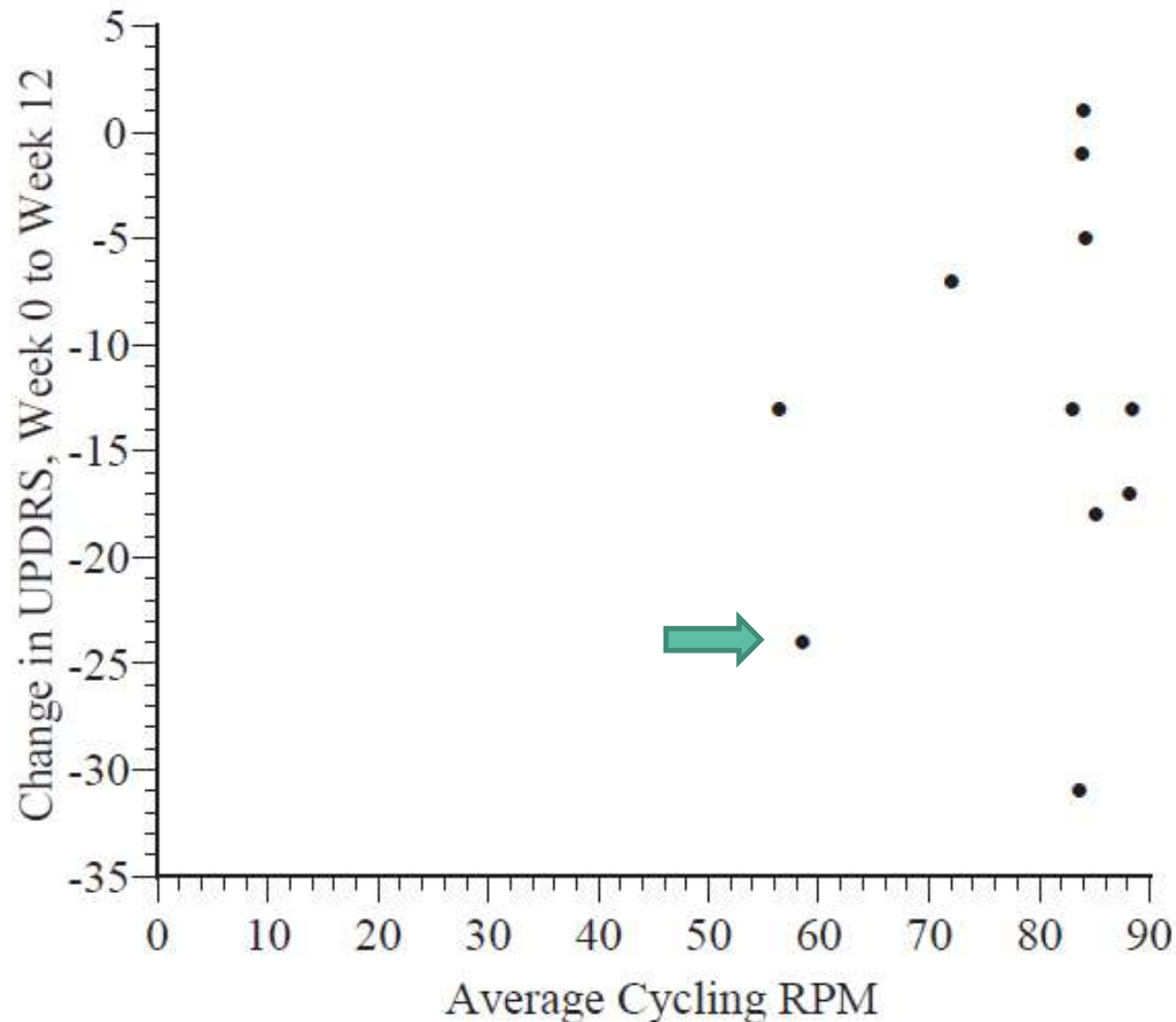
p = .0013

Total UPDRS Results



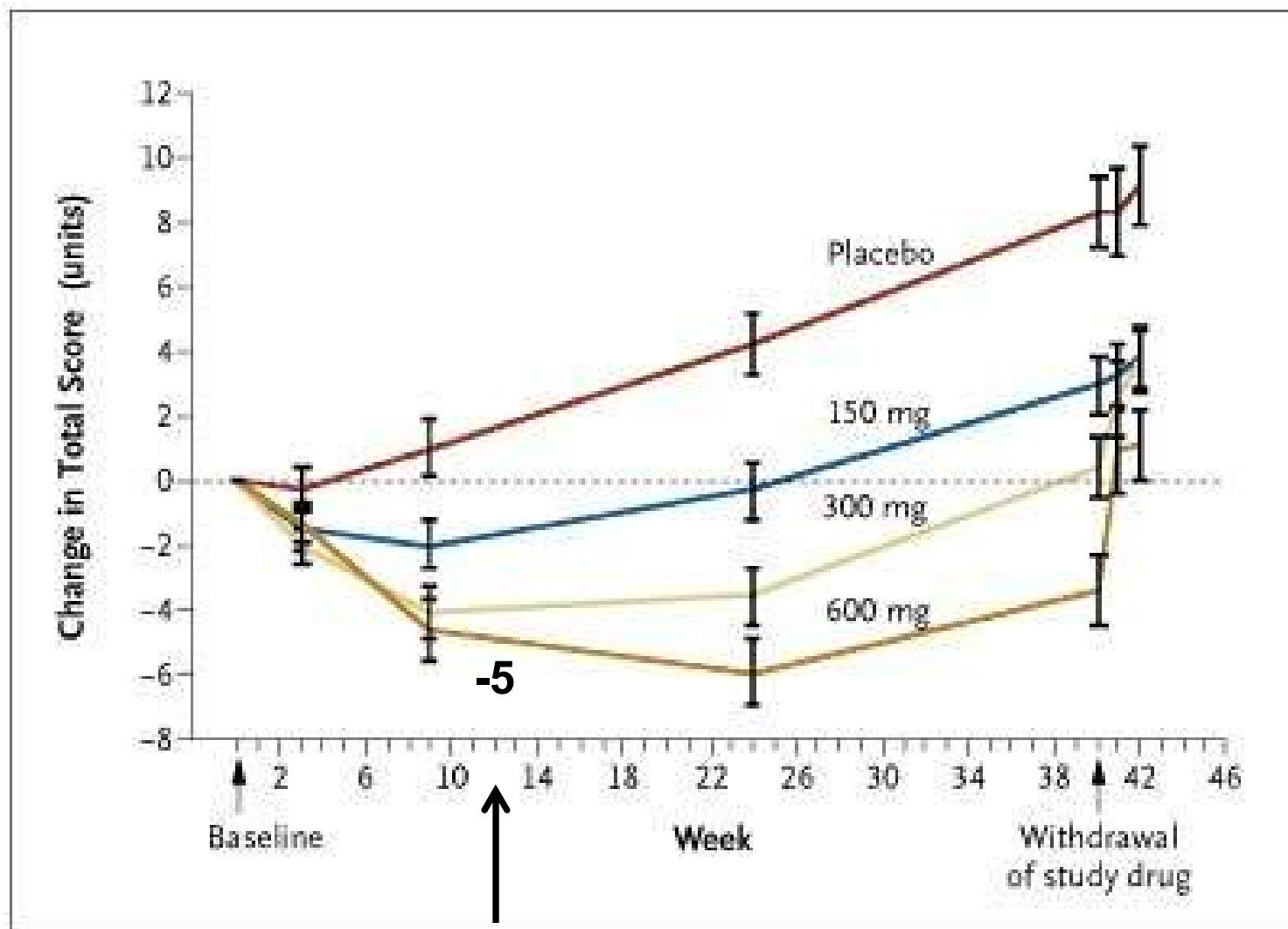
p = .00002

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



Parkinson's Study Group, NEJM, 2004

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!

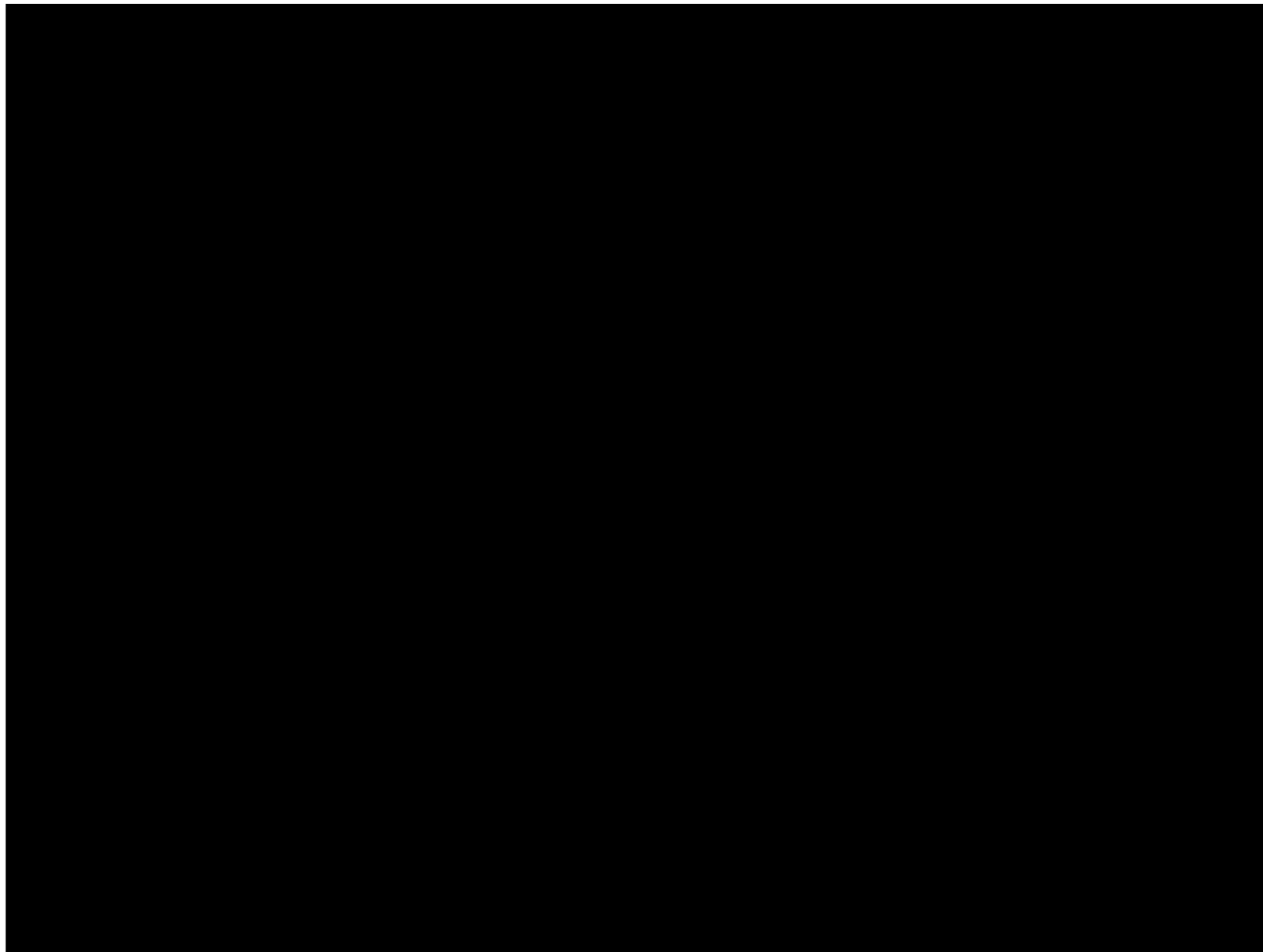


Summary

- 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...



Questions?

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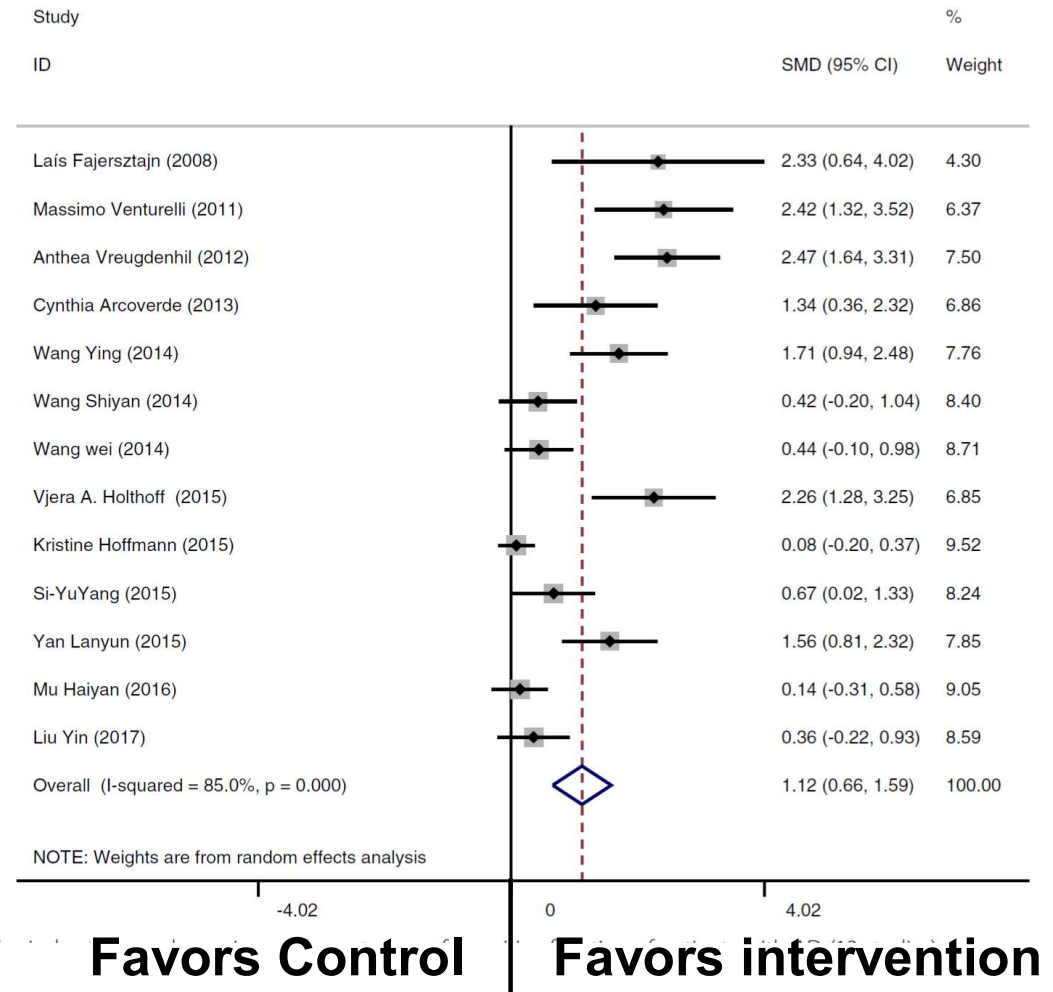


Treatment of Mild-Moderate Alzheimer's Dz with Donanemab

- Monoclonal antibody designed to clear amyloid plaque.
- RCT involving 1736 pts with early AD that got monthly infusions over 18 mo; Assessed with AD Rating Scale (0-144) for change in score (lower worse):
 - Tx Group -6.02; Placebo -9.27; Difference 3.25
 - Meaningful Within Pt Change is 5 points
 - Adverse events: 112 in Tx gp (3 died); 38 in Placebo (1 died)
- Cost for drug is \$26K per year and with monitoring (MRI) and infusion charges total \$90K per year

Treatment of Mild-Moderate Alzheimer's Dz with Exercise

- Metanalysis of 13 RCT comparing an exercise intervention to placebo on cognitive decline
- 673 AD patients
- All used MVPA
- Avg 40 min (30-60)
- Duration 2-24 wks



Total 673; SMD 1.12 (.66-1.59)