



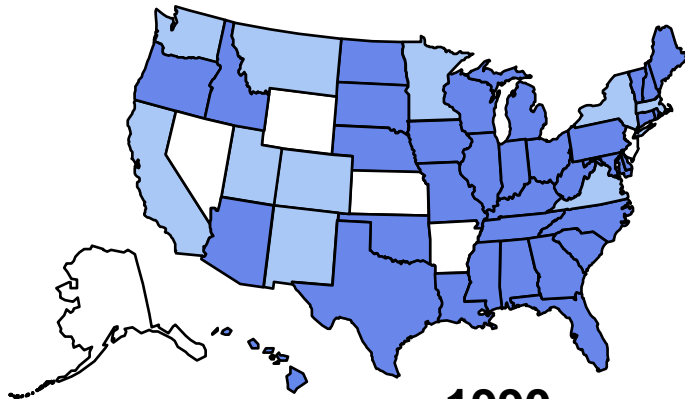
Physical Activity, the Brain, and Closing the Achievement Gap

Craig McKinley
Physical Education Coordinator
Alameda County Office of Education
cmckinley@acoe.org
510-670-7720

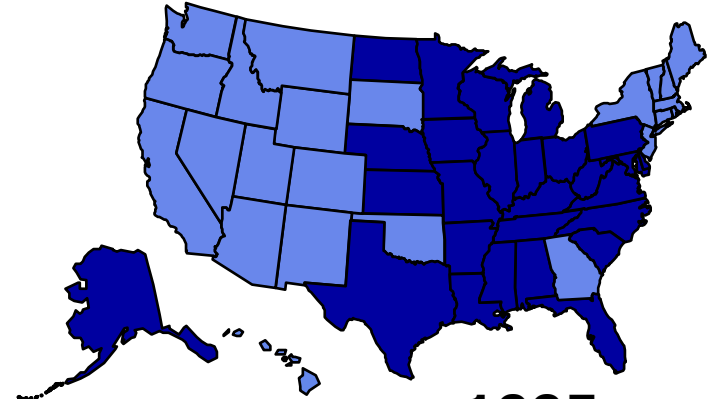
Obesity Trends* Among U.S. Adults

BRFSS, 1990, 1995, 2005

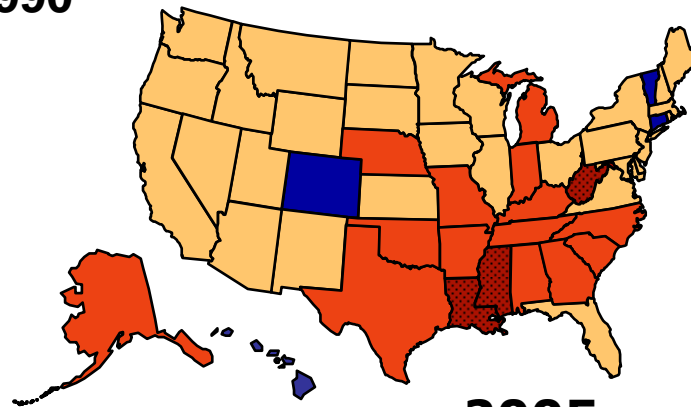
(*BMI ≥ 30 , or about 30 lbs overweight for 5'4" person)



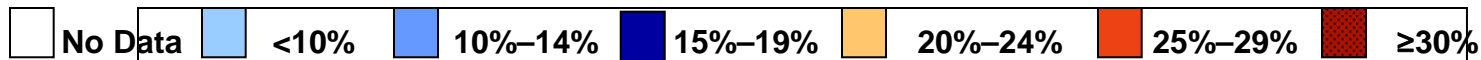
1990



1995



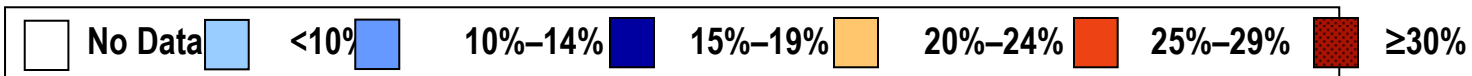
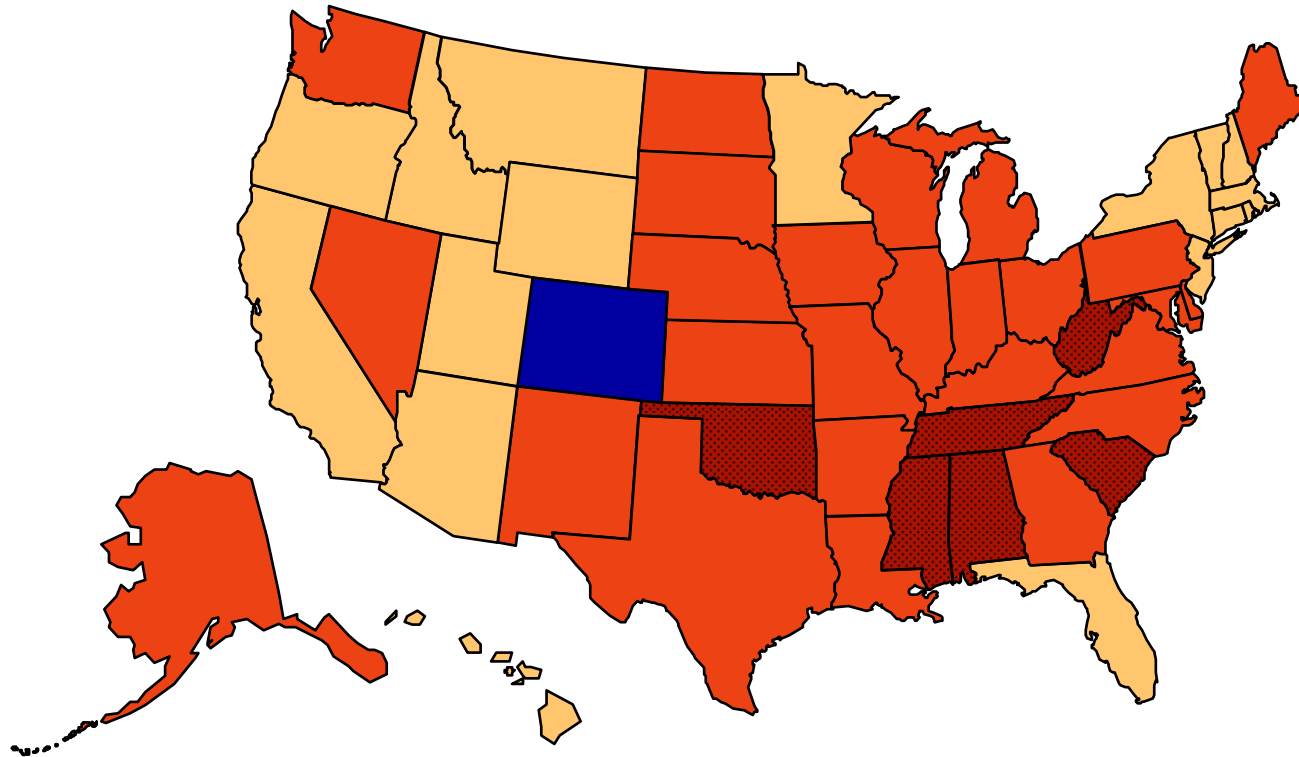
2005



Obesity Trends* Among U.S. Adults

BRFSS, 2008

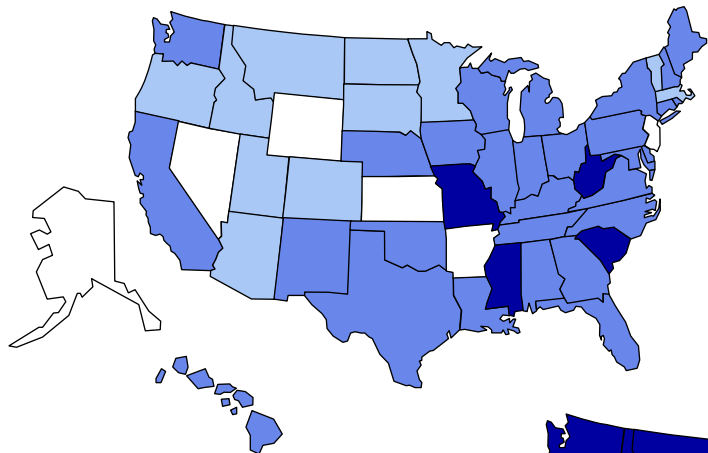
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



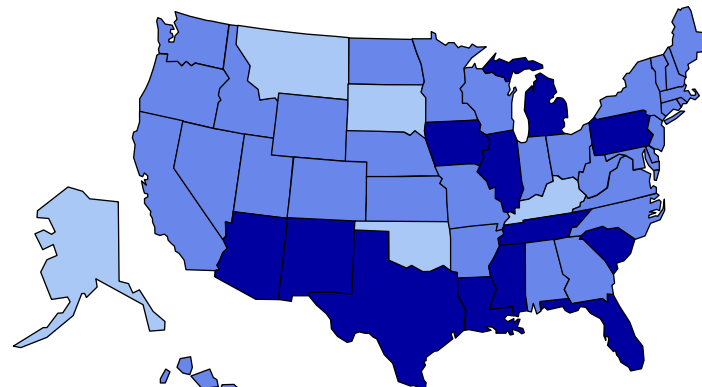
Diabetes Trends* Among Adults in the U.S., (Includes Gestational Diabetes)

BRFSS, 1990,1995 and 2001

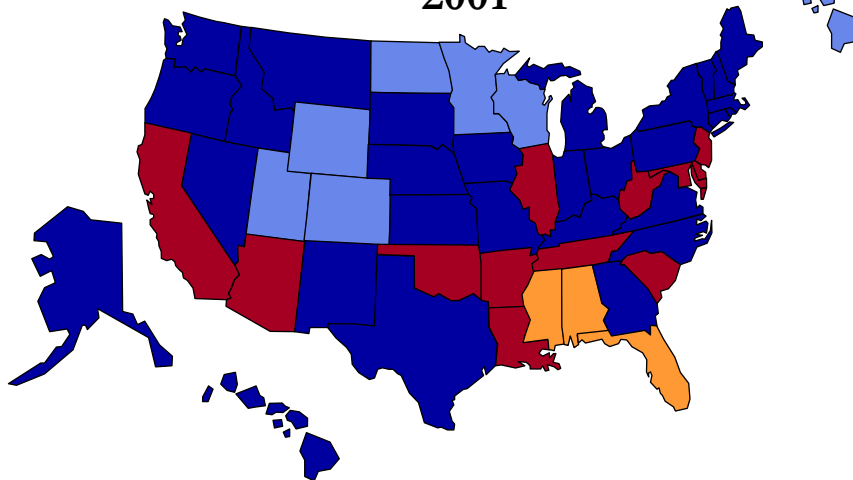
1990



1995



2001



Source: Mokdad et al., *Diabetes Care* 2000;23:1278-83; *J Am Med Assoc* 2001;286:10.



The Economic Cost of Overweight, Obesity and Physical Inactivity

- **Total Cost to California in 2011 is estimated to be \$52.7 billion**
- **If there was just a 5% reduction per year for each of the risk factors, we would save \$2.4 billion per year**
- **What if we could put that money towards reducing the Achievement Gap?**



The Economic Cost of Childhood Obesity and Physical Inactivity

- The national cost of childhood obesity is estimated at approximately \$14 billion per year.



Absenteeism = Loss of Funding

- **Very overweight students miss 4-6 times more school than normal weight students.** Schwimmer 2003; Action for Health Kids
- **Students with poor nutrition and fitness levels are more likely to be absent and tardy**

How Much????

Los Angeles Unified	\$ 15 million a year
Average Size District	\$100,000 or more

Cost of Students being out one day a month

A single-day absence by one student cost districts between \$9-\$20.

Figure out the impact to your district

<p>If all students were in school one extra day a year</p> <p>= Amount more \$</p>	<p># of students <u>x \$10</u></p>
<p>If even 25% more students were in school one extra day a year</p> <p>= Amount more \$</p>	<p>Amount \$ <u>Divided by 4</u></p>



The Unhealthy State of our Kids

- **No Child Left Behind has contributed to student inactivity by reducing the amount of time available for physical education and causing the elimination of recess in many schools, says the National Association for Sport and Physical Activity.**



The Unhealthy State of our Kids

- **Obesity rates are highest among low-income Californians of African American, Latino, American Indian, and Pacific Islander descent.**
- **Approximately 60 percent of obese children ages 5 to 10 years have at least one cardiovascular disease risk factor, such as elevated total cholesterol, triglycerides, insulin, or blood pressure, and 25 percent have two or more risk factors.**

Source: Children Now Advocacy Group 2007 Report



Causes of obesity

- Genetic
- Sedentary lifestyles
 - TV/video games
 - Lack of physical activity
- Nutritional
 - Decrease fiber, fruits and veggies
 - Junk food
 - Portion size/number of calories

Source: Paul Espinas, MD Kaiser Permanente



Complications of childhood obesity:

- Diabetes
- High blood pressure
- Sleep apnea
- Fatty liver
- Poor self esteem
- Lower quality of life

SOURCE: Paul Espinas, MD Kaiser Permanente



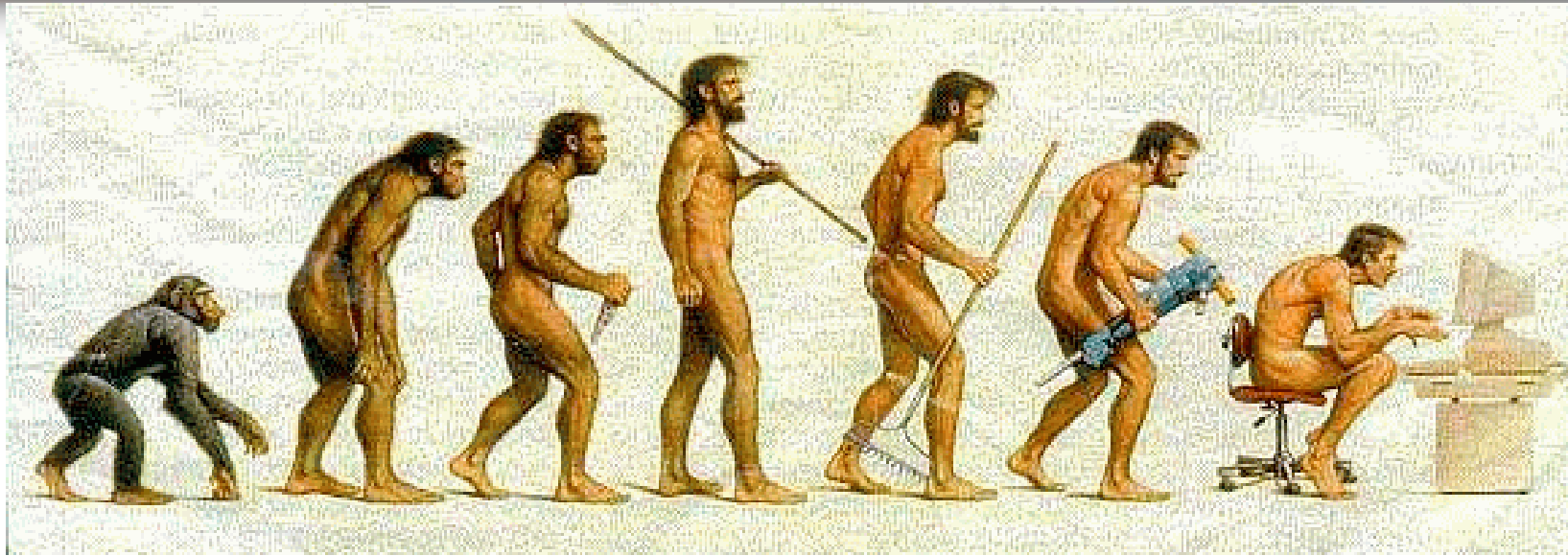
Physical Activity

- Physical Activity is **ANY BODILY MOVEMENT** that is produced by the contraction of skeletal muscle and that substantially increases energy expenditure, including exercise, sport, dance, and other movement forms.



Physical Education:

- Physical Education instructional programs provide students with the **SKILLS** and **KNOWLEDGE** they need to **ESTABLISH** and **SUSTAIN** physical activity as a key component of their lifestyle, as children, adolescents and adults.



- When we as humans first evolved, we were part of a hunter gatherer society that spent a great deal of our time walking around.
- Our brains developed to associate movement with cognition.
- Roldolfo Llinas proclaims:
“That which we call thinking is the evolutionary internalization of movement.”



- If you did not run you did not eat.
- Individuals who could outrun & out-plan their peers would survive.



How physical activity can stimulate brain growth, and lead to increases in academic achievement.



How the Human Brain Works: A brief overview.

- The brain is like a muscle: the more you use it, the stronger it gets.
- The brain is like play-doh: it can be shaped and molded by experience.
- Life experiences can lead to changes in cognition.



How do our Brains “Grow?”

- Our brains can become more effective, and cognition can be enhanced in several ways.
 - The brain needs oxygen to function properly. Increasing the amount of oxygen can increase brain function.
 - The brain can grow by strengthening existing neurons and also by building new neuron branches.



Oxygen and the Brain

- The brain is “fed” by the blood supply that delivers much needed oxygen.
- The blood also carries away toxins to promote healthy functioning.

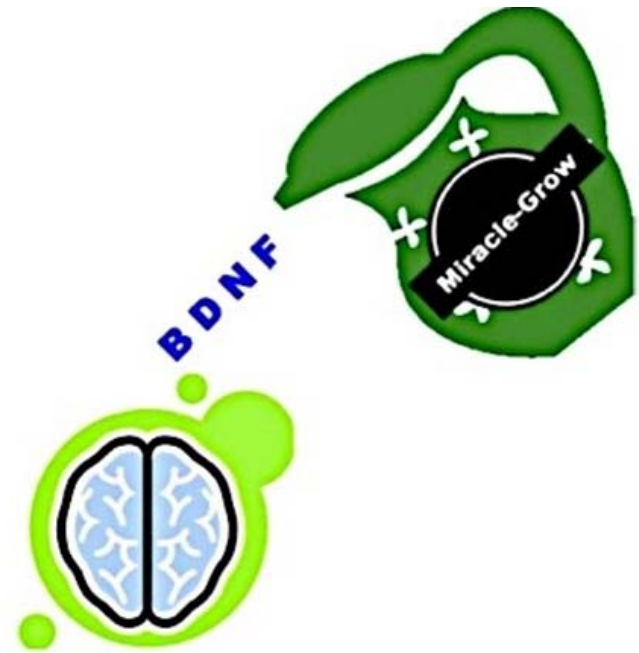


Oxygen, the Brain, and EXERCISE:

- When we exercise, we increase blood flow to all parts of our body, including the brain.
- This increases the oxygen and allows for more effective brain functioning
- **In essence, exercise FEEDS the brain by increasing OXYGEN!**

Brain Growth

- BDNF- Brain Derived Neurotrophic Factor: A protein produced inside nerve cells when they are active.
- BDNF is like a fertilizer, or Miracle-Gro for the brain.
- It keeps old brain cells functioning, and spurs the growth of new cells too!






Brain Growth and EXERCISE

- The correlation between BDNF and exercise is parallel:
 - As exercise increases, the body produces more BDNF.
 - More BDNF = Learning occurs at a faster rate.
 - Less exercise also means less production of BDNF.
 - Less BDNF = Learning slows down again.

Ratey, J. (2008) *SPARK: The Revolutionary New Science of Exercise and The Brain*.
New York, NY: Little Brown & Co.

How exercise affects the Brain

- 
- *Mood regulation*
 - *Self-esteem*
 - *Impulse control*
 - *Combats toxic effects of stress hormones*
 - *Improves neural arousal*
 - *Combats depression*
 - *Improves behavior*
 - *Memory retention – Better encodes information*
 - *Combats depression*

** Dr. John Ratey, Harvard**

The World of Brain Research

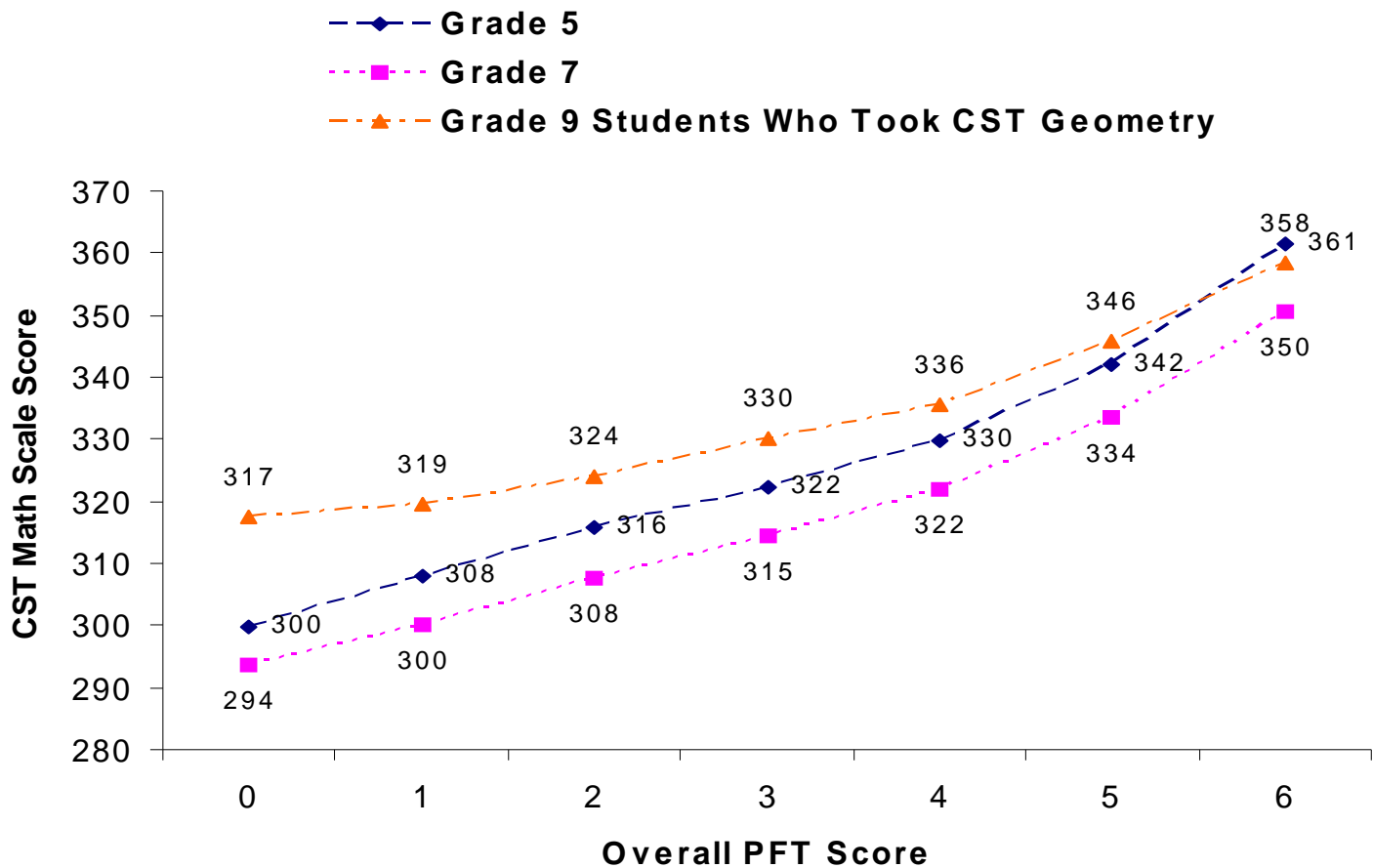
*A Sampling of Studies
Linking Movement and
Academic Success*

“School-based physical activity is positively linked to improved grades and standardized test scores.”

- *Hanson & Austen (2003)*
- *Robert Wood Johnson Foundation, 2007*
- *Maher, et. al., 2006*
- *NASPE, 2001*
- *Wang & Weugelers, 2008*
- *Trudeau & Shephard, 2008*
- *Coe, et. al, 2006*
- *Castelli, et. al., 2007*
- *Carlson, et. al., 2008*

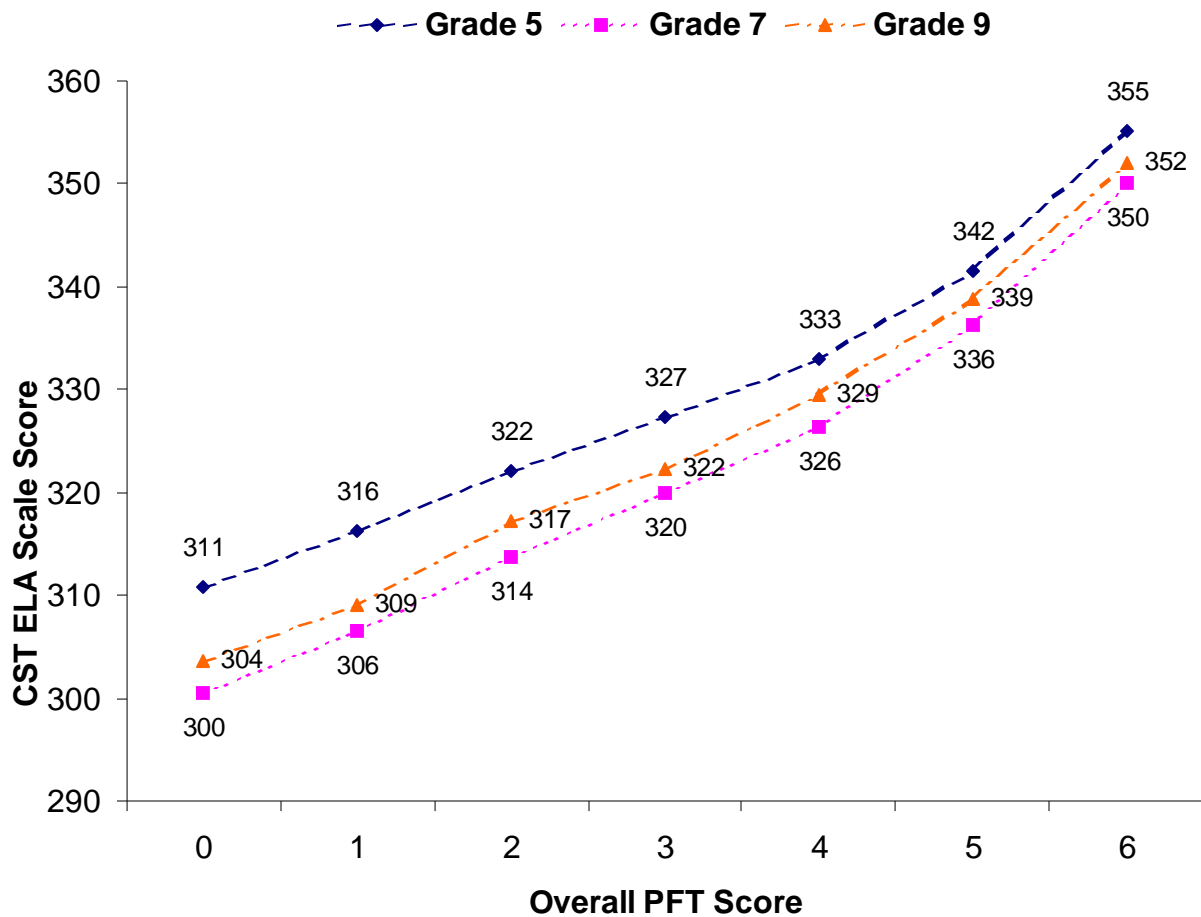
Relationship Between Physical Fitness and Academic Achievement in California


Source: California Department of Education 2005



Relationship Between Physical Fitness and Academic Achievement in California

Source: California Department of Education 2005





Examples of physical activity's effect on academic performance:

- In 2004, 13 researchers from various fields conducted a review of 850 studies on the effects of physical activity on school age children.
 - They determined that physical activity has a positive influence on memory, concentration, and classroom behavior.

The World of Brain Research

*A Sampling of Studies
Linking Movement and
Academic Success*

*Physical activity increases concentration, mental cognition,
and facilitates executive function.”*

- *Hansson & Austen, 2003*
- *Maher, 2006*
- *Robert Wood Johnson Foundation, 2007*
- *Caterino & Polak, 1999*
- *Etnler, et. al., 1997*
- *Trudeau & Shepard, 2008*
- *Tamporowski, et. al., 2008*



Texas Study

- Fitnessgram results of 2.4 million students were included in study
- Higher level of fitness are associated with better academic performance. High performing schools that earned the state's top rating of Exemplary, about 80% of the students have healthy levels of cardiovascular fitness

Texas Education Agency. (2009).



Texas Study

- Higher levels of fitness were associated with better school attendance
- Higher levels of fitness were also associated with fewer disciplinary incidents as it relates to drugs, alcohol, violence and truancy

Texas Education Agency. (2009).



The World of Brain Research

*A Sampling of Studies
Linking Movement and
Academic Success*

“There is NO evidence in the research literature that increased physical education negatively impacts student performance in the core academic subject areas.”

*Physical Education
Research for Kids
Literature Review, 2009*

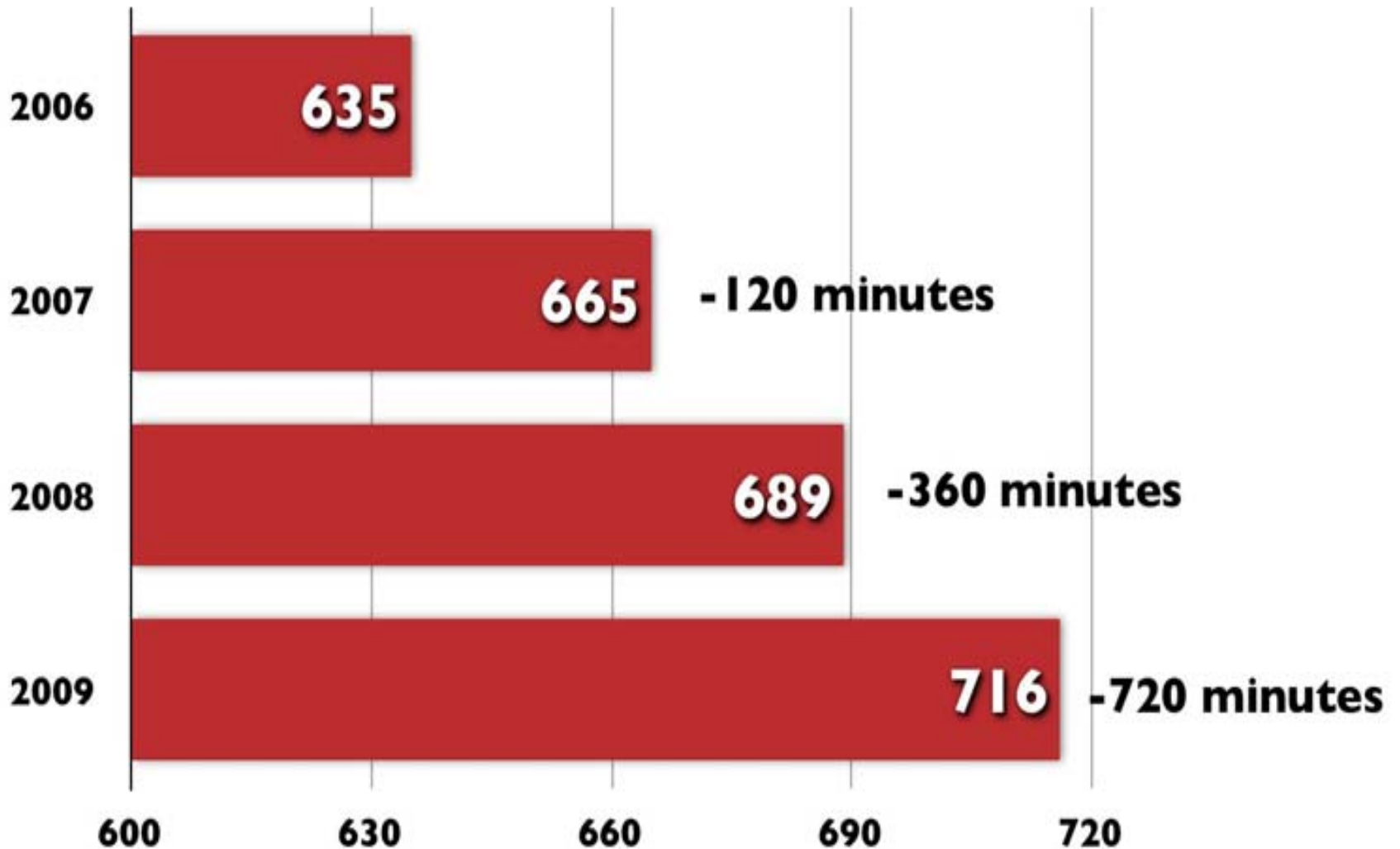


Titusville Study

- Restructured the school day, adding ten minutes to the schedule and shaved time from academic classes to carve out more time for daily physical education
- Since the program started in 2000, standardized test scores have risen from below the state average to 17% above it in reading and 18% above in math

Cecil Avenue Middle School

Ken Dyar Delano Union School District 2009





The World of Brain Research

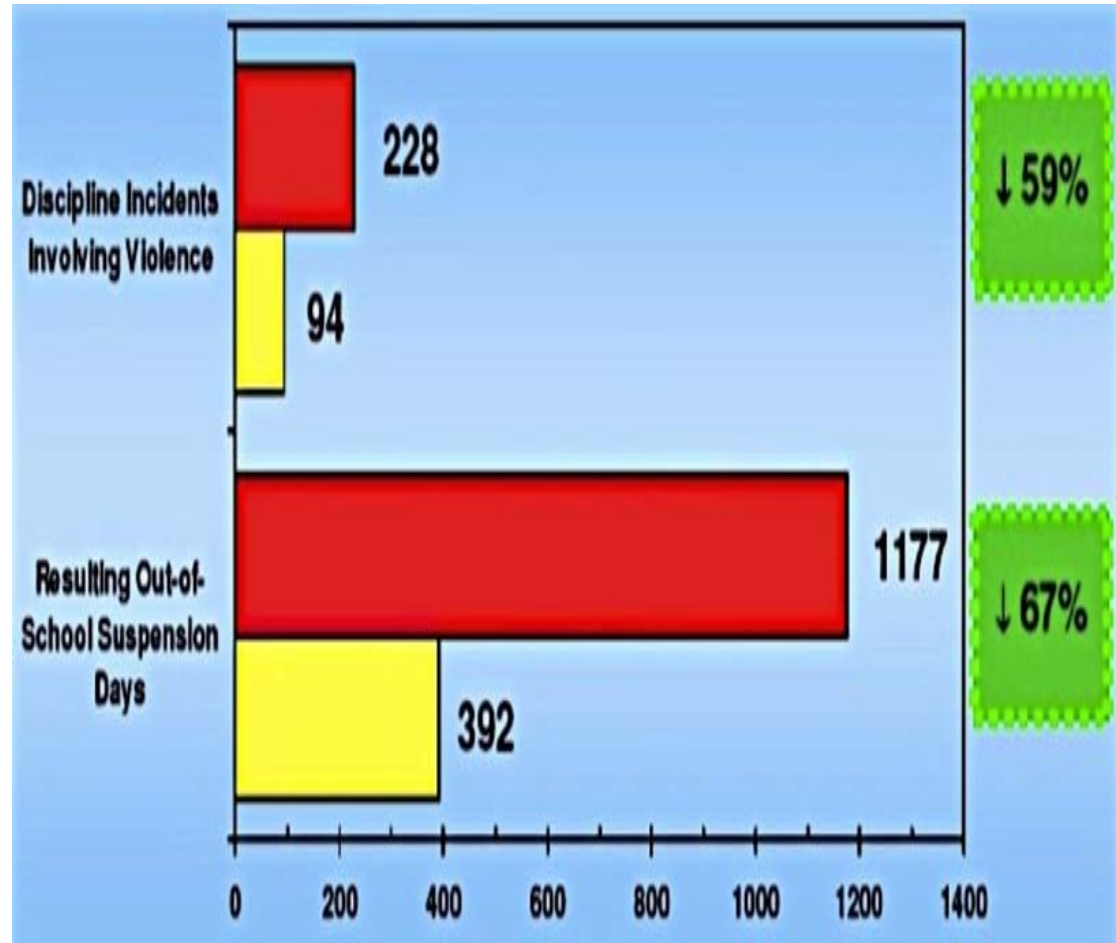
*A Sampling of Studies
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“Obesity is linked to a poor academic performance, including increased absenteeism, lower GPA, and fewer years of schooling. All students benefit from increased physical activity, but low-performing schools have more to gain due to student exposure to more academic risk factors, including: violence, low expectations, and lack of exposure to caring relationships.”

**Taras & Potts-Tatema, 2005*

Woodland Elementary School Kansas City, Missouri

- 2005 expanded physical education class from one class a week to 45 minutes a day
- In one school year counselors reported the number of incidents involving violence decreased from 228 to 95 for the year
- The number of out of school suspension days decreased from 1177 to 392 for the year.





The World of Brain Research

*A Sampling of Studies
Linking Movement and
Academic Success*

“Physical activity, when integrated into the curriculum, takes up little time, and improves on-task behavior.”

** North Carolina Department of Education*

** ncpe4me.com – Energizers - 85% of districts use them*

** 28,000 teachers trained*



The World of Brain Research

*A Sampling of Studies
Linking Movement and
Academic Success*

“Physical Activity in the classroom successfully increases student activity levels and reduces adiposity.”

- * Reed, et. al., 2008*
- * Naylor, et. al., 2008*
- * Taylor, et. al., 2009*
- * Economos, et. al., 2007*



References

- Ratey, J. (2008) ***SPARK: The Revolutionary New Science of Exercise and The Brain.*** New York, NY: Little Brown & Co.
- Medina, J. J., (2008). ***Brain Rules: 12 Principals for Surviving and Thriving at Work, Home and School.*** Seattle, WA: Pear Press.
- ***The Economic Costs of Overweight, Obesity, and Physical Inactivity Among Californian Adults_2006*** (July 2009) The California Center for Public Health Advocacy

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- Texas Education Agency. (2009). ***Physically fit students more likely to do well in school, less likely to be disciplinary problems.*** Austin, TX
- National Association for Sport and Physical Education. (2008). ***Comprehensive School Physical Activity Programs.*** Reston, VA
- California Project Lean. (2001) ***Nutrition, Physical Activity and Academic Achievement.*** Sacramento, CA
- CDC
 - <http://www.cdc.gov/nccdphp/dnpa/obesity/>