

Exercise as Medicine for Chronic Disease States (EBP)



Travis S. Gallagher, AT

2017 GLATA 49th Annual Meeting and Symposium



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

Presentation Sponsored by:



NATIONWIDE
CHILDREN'S

When your child needs a hospital, everything matters.SM

Presenter Conflict

No Conflict

- The views expressed in these slides and the today's discussion are mine
- My views may not be the same as the views of my company's clients or my colleagues
- Participants must use discretion when using the information contained in this presentation

Athletic Training Patients



Athletic Training Patients



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

Athletic Training Patients



Expanding Patient Population



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

Presentation Objectives

1. To summarize the **prevalence and trends** of physical inactivity.
2. To define the role of physical inactivity **as the cause** of chronic disease states, such as obesity and diabetes.
3. To identify the **psychosocial and cognitive** improvements as benefits of physical activity and exercise.
4. To evaluate the role of exercise and physical activity in the **treatment and recovery** from chronic disease states, such as obesity, diabetes, cancer, and arthritis.
5. To answer the question “**What is exercise?**”
6. To summarize unpublished data involving an existing program’s **intervention program** in behavior change involving physical activity

Abbreviations

PiA – Physical InActivity

PA – Physical Activity (exercise, sports, play)



Presentation Objectives

1. To summarize the prevalence and trends of physical inactivity.
2. To define the role of physical inactivity as the cause of chronic disease states, such as obesity, diabetes, and some cancers.
3. To identify the psychosocial and cognitive improvements as benefits of physical activity and exercise.
4. To evaluate the role of exercise and physical activity in the treatment and recovery from chronic disease states, such as arthritis, cancer, and diabetes.
5. To answer the question “What is exercise?”
6. To summarize unpublished data involving an existing program’s intervention program in behavior change involving physical activity.

PA Statistics

- About 1 in 5 (21%) adults meet the 2008 Physical Activity Guidelines.
- Less than 3 in 10 high school students get at least 60 min/day of PA
 - Centers for Disease Control and Prevention



PiA Statistics

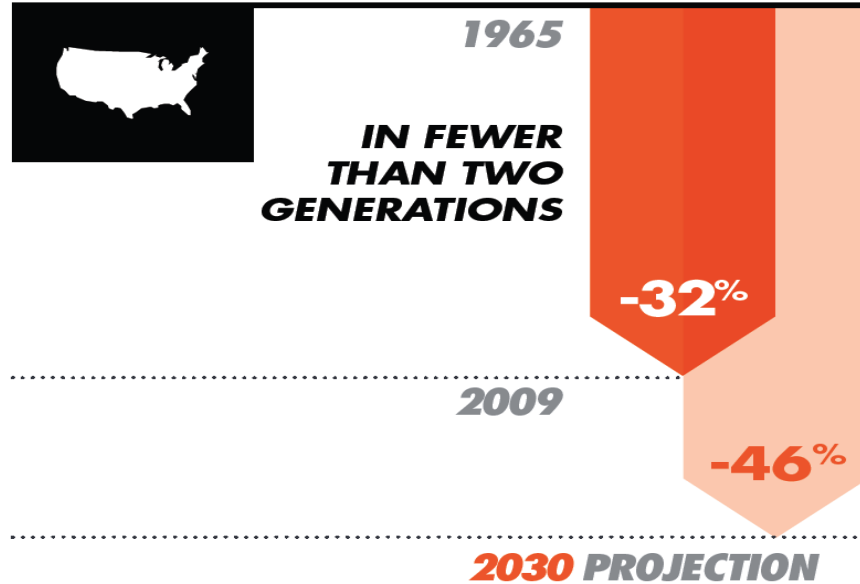
- Average American child watches 3-4 hrs/day T.V.
- 7.5 hrs/day all media for kids 8-18
- 60% of kids, 9-13, have no participation in any organized physical activity during non-school hours
- Females and 'older' youth (16-19) least active



Kaiser Family Foundation, CDC, and National Association for Sport and Physical Education

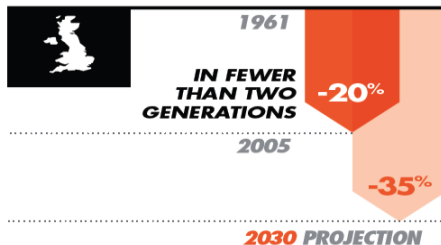
Total Decline in PA Levels

USA

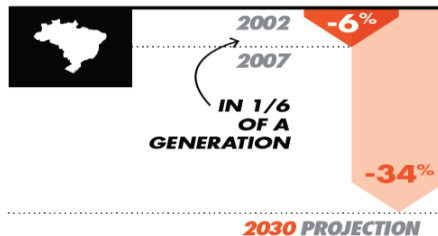


PA Levels Globally

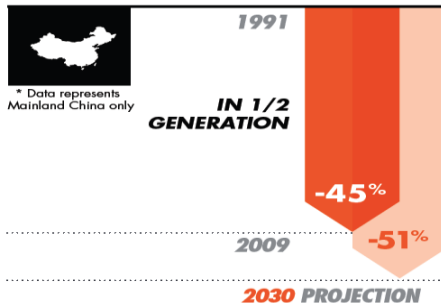
UK



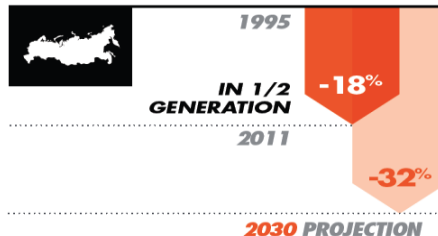
BRAZIL



GREATER CHINA*



RUSSIA



Ng, S.W. and Popkin, B.M. (2012). Time use and physical activity: a shift away from movement across the globe. Obesity Reviews.



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

Obesity Statistics

- Almost 70% of Americans are overweight or obese
- In the past 30 years, obesity has tripled among school-aged children and teens.
- About 1 in 6 American children, ages 2–19, are obese



Economic Costs of PiA

TOTAL SPEND (US\$) IN 2008

USA



\$147B

— OR —

~2x the federal budget for the Department of Education
(based on US\$77.4B 2012 budget)^C



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

Ng, S.W. and Popkin, B.M. (2012). Time use and physical activity: a shift away from movement across the globe. Obesity Reviews.

Economic Costs of PiA






	2008 Direct Costs (us\$)	2008 Indirect Costs (us\$)	2030 Direct Costs Projection (us\$)	% Increase in Direct Costs (us\$) 2008-2030
USA 	\$90.1B	\$56.5B	\$191.7B	↑113%



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

Ng, S.W. and Popkin, B.M. (2012). Time use and physical activity: a shift away from movement across the globe. Obesity Reviews.

Economic Costs Globally

TOTAL SPEND (US\$) IN 2008		2008 Direct Costs (US\$)	2008 Indirect Costs (US\$)	2030 Direct Costs Projection (US\$)	% Increase in Direct Costs (US\$) 2008-2030
UK 	\$33B	\$16.1B	\$16.7B	\$26.0B	↑61%
	— OR — Close to the National Health Service's annual efficiency target (based on £20B of annual efficiency savings over the next four years) ^d				
BRAZIL 	\$11.8B	\$2.2B	\$9.6B	\$6.2B	↑182%
	— OR — Almost 1/2 of Brazil's education budget for basic primary school (Based on R\$58B 2010 budget) ^e				
GREATER CHINA*  <small>*Data represents Mainland China only</small>	\$20B	\$12.2B	\$7.5B	\$67.5B	↑453%
	— OR — Almost 1/3 of China's total health care budget (based on 2011 planned investment of approx. US\$63B) ^f				
INDIA 	\$2B	\$1.3B	\$0.7B	\$7.5B	↑477%
	— OR — Equal to the total annual budget for secondary education (based on US\$1.9B/year for 2007-2012) ^g				
RUSSIA 	\$6.1B	\$1.7B	\$4.4B	\$3.4B	↑100%
	— OR — Close to the total health care cost of cardiovascular disease in 2009 ^h				



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

Ng, S.W. and Popkin, B.M. (2012). Time use and physical activity: a shift away from movement across the globe. Obesity Reviews.

Human Cost of PiA

PREMATURE DEATH

USA



300,000






Obesity related deaths^A



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

Ng, S.W. and Popkin, B.M. (2012). Time use and physical activity: a shift away from movement across the globe. Obesity Reviews.

Global Epidemic

PREMATURE DEATH		PHYSICAL AND MENTAL HEALTH & WELL-BEING	
UK 	1/5 MEN 1/8 WOMEN Die of premature deaths from coronary heart disease ^D	OVER 1/4 Adults overweight or obese ^E	More than any other country surveyed, British girls 15-17 say it's hard to feel beautiful when faced with ideals in the media ^F
BRAZIL 	250,000 Deaths from heart disease & diabetes ^G	1/2 Inactive ^H	3x Childhood obesity in last 20 years ^I
GREATER CHINA*  <small>*Data represents Mainland China only</small>	1,150,000 Deaths associated with hypertension ^J	1/4 Adults are diabetic or pre-diabetic ^K	30 million Children under age 17 with mental health issues ^L
INDIA 	1/4 Adult deaths attributed to heart disease, India's #1 killer ^M	62.4 million Diabetics in 2011 (23% increase over 2010) ^N	
RUSSIA 	55% Of deaths are from heart disease annually ^O	OVER 1/4 Adults are obese ^P	1/5 Teens suffer from depression ^Q

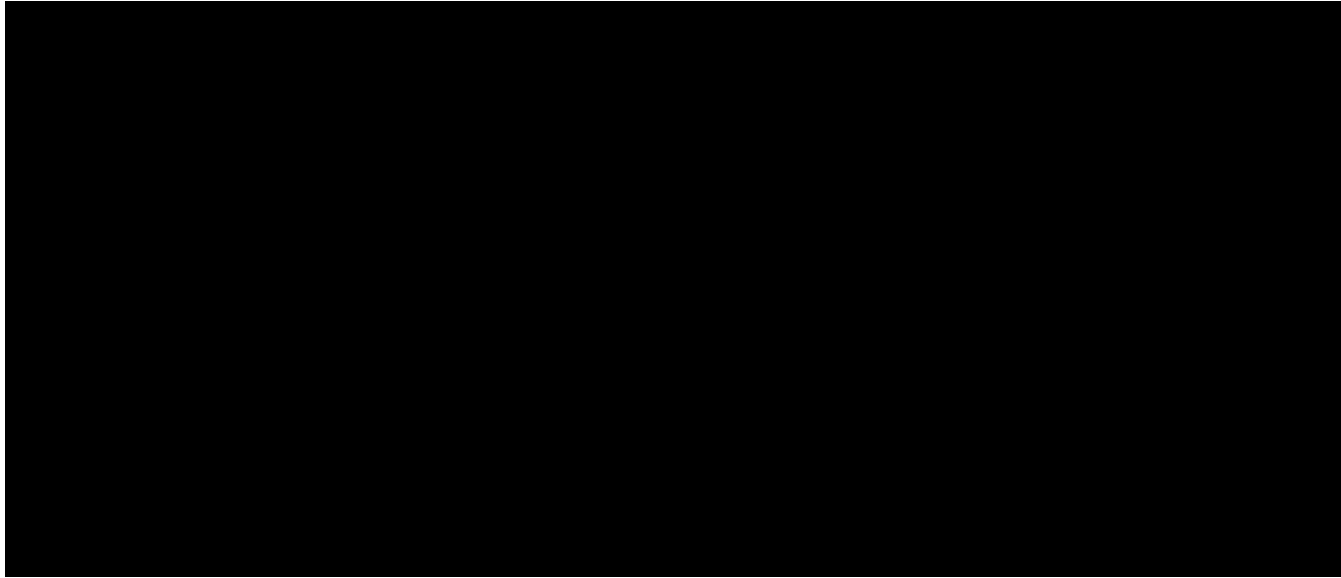


NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

Ng, S.W. and Popkin, B.M. (2012). Time use and physical activity: a shift away from movement across the globe. Obesity Reviews.

“About 3.2 million deaths annually
can be attributed to insufficient
physical activity.”
- World Health Organization

Designed to Move



Designed to Move

Sports Medicine Clinic Survey



Exercise Vital Sign (EVS)

Exercise Vital Sign Questionnaire

All patients:

1. Days per week of moderate to vigorous exercise?

0 1 2 3 4 5 6 7

2. On average, minutes per day of exercise at this level?

0 10 20 30 40 50 60 90 120 150+

3a. How many activities do you do per week to accomplish this exercise?

(e.g. sports practice, P.E. class, conditioning workout, playing at the park, skateboarding, etc.)

0 1 2 3 4 5+

3b. List the activities noted above.

☐ Sport _____ ☐ Sport _____ ☐ Sport _____ ☐ Other _____

☐ Team conditioning ☐ Personal workout ☐ P.E. gym class ☐ Other _____

Follow-up patients only:

4. Have you made any changes to your exercise behaviors since last visit?

☐ No ☐ Yes (explain) _____

For office use only:

Status: ☐ Pre-injury ☐ In-treatment ☐ Post-injury

Intervention: ☐ None ☐ Handout ☐ Discussion ☐ Goals ☐ Referral



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

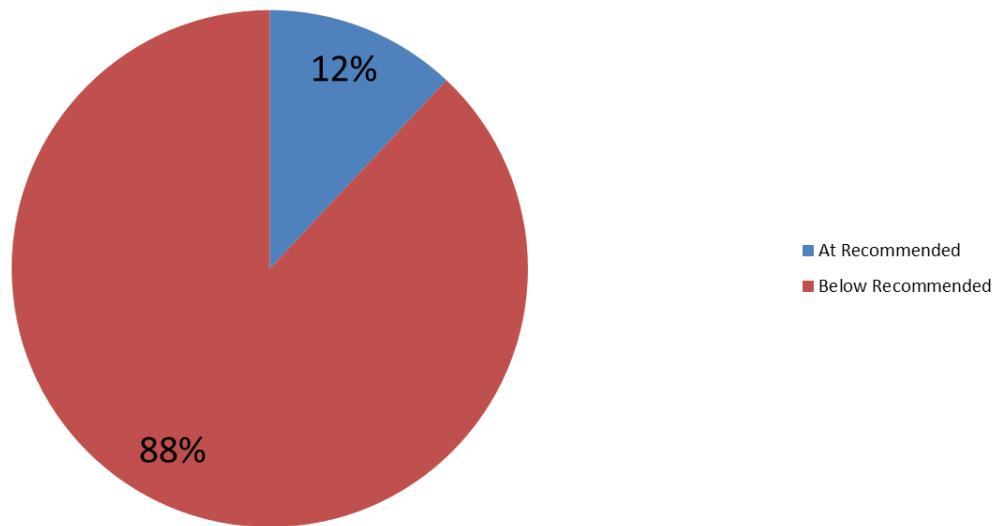


NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

AAP Recommendations

Children and adolescents engage in 60 minutes of moderate to vigorous physical activity on most, if not all days.

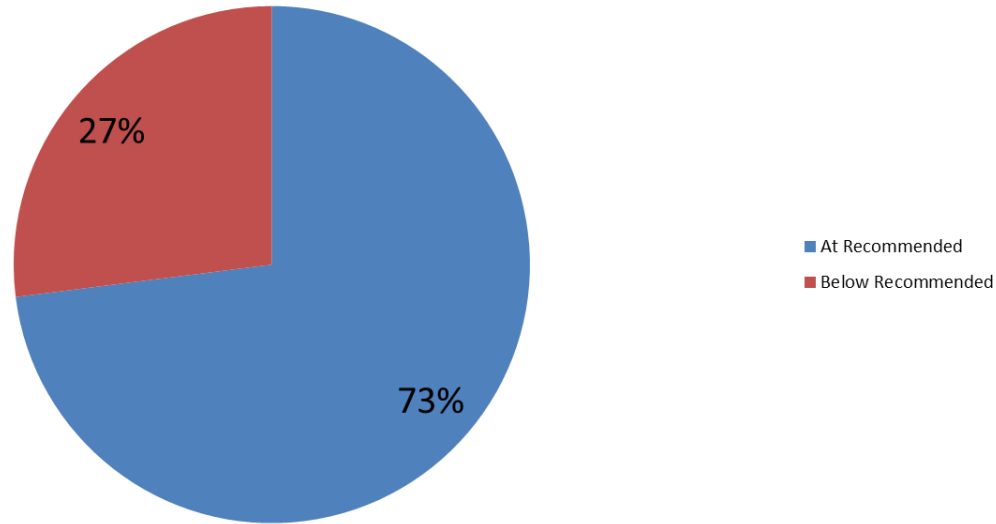
EVS: Days / Week



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

Valasek, A, Desrochers, J, Gallagher, T, Young, J. Poster Presentation. "Quantification of Moderate to Vigorous Physical Activity (MVPA) as an Exercise Vital Sign in a Pediatric Population." American College of Sports Medicine. Boston, Massachusetts. (2016)

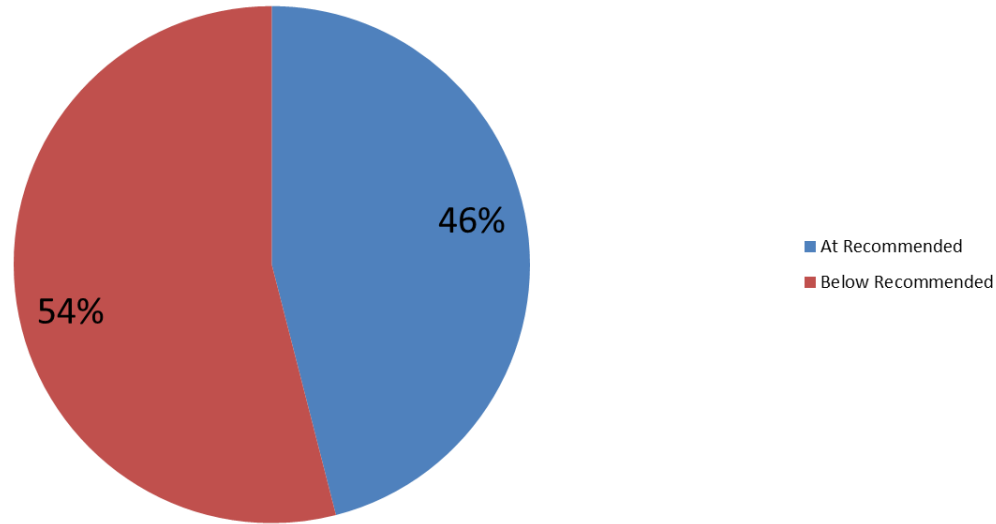
EVS: Mins / Day



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

Valasek, A, Desrochers, J, Gallagher, T, Young, J. Poster Presentation. "Quantification of Moderate to Vigorous Physical Activity (MVPA) as an Exercise Vital Sign in a Pediatric Population." American College of Sports Medicine. Boston, Massachusetts. (2016)

EVS: Mins / Week



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

Valasek, A, Desrochers, J, Gallagher, T, Young, J. Poster Presentation. "Quantification of Moderate to Vigorous Physical Activity (MVPA) as an Exercise Vital Sign in a Pediatric Population." American College of Sports Medicine. Boston, Massachusetts. (2016)

Presentation Objectives

1. To summarize the prevalence and trends of physical inactivity.
2. To define the role of physical inactivity **as the cause** of chronic disease states, such as obesity and diabetes.
3. To identify the psychosocial and cognitive improvements as benefits of physical activity and exercise.
4. To evaluate the role of exercise and physical activity in the treatment and recovery from chronic disease states, such as arthritis, cancer, and diabetes.
5. To answer the question “What is exercise?”
6. To summarize unpublished data involving an existing program’s intervention program in behavior change involving physical activity.

*Many Additional Causes

- Food, Diet
- Genetics
- Family History/Habits
- Health Conditions
- Medicines
- Emotional Factors
- Smoking
- Age
- Pregnancy
- Lack of Sleep



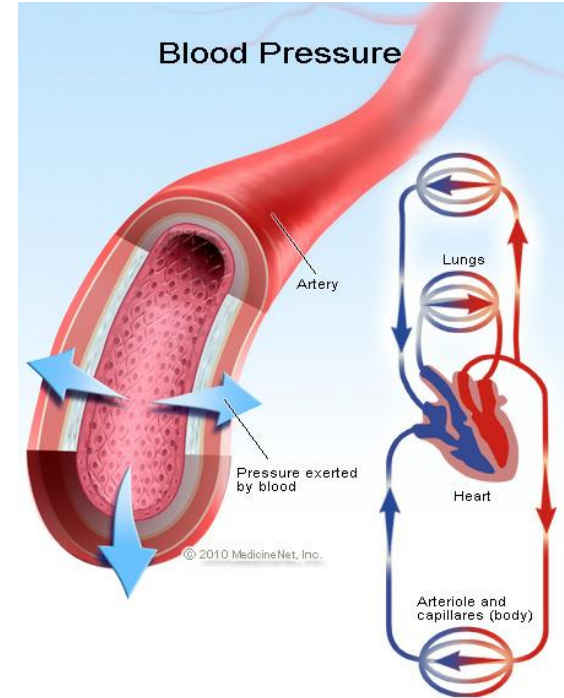
Obesity

- Lack of Energy Balance
 - Screens (entertainment, school, work)
 - Cars > Walking/Biking
 - Less physical demands bc technology
 - No school PE
 - Lack of neighborhood sidewalks
 - Lack of safe places for recreation



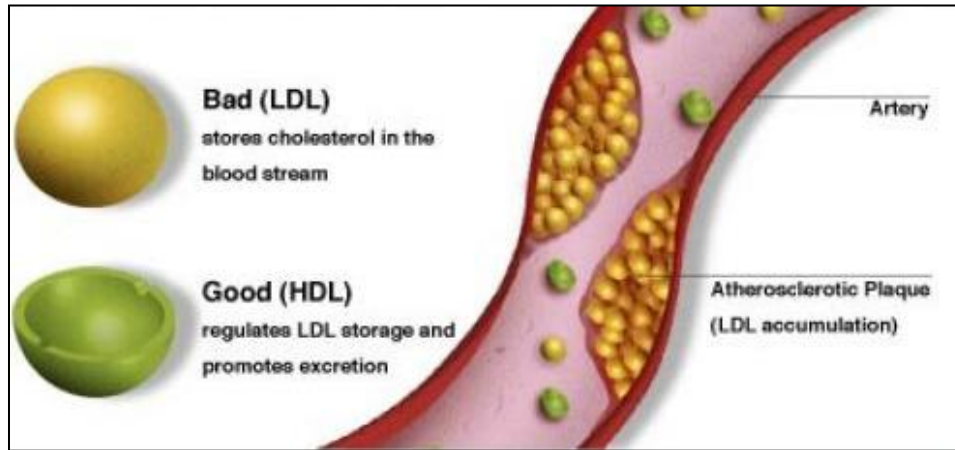
Hypertension

- PA makes heart stronger...
- Heart does not have to work as hard to pump blood...
- Less force on arteries...
- Lower blood pressure.



Cholesterol / Heart Disease

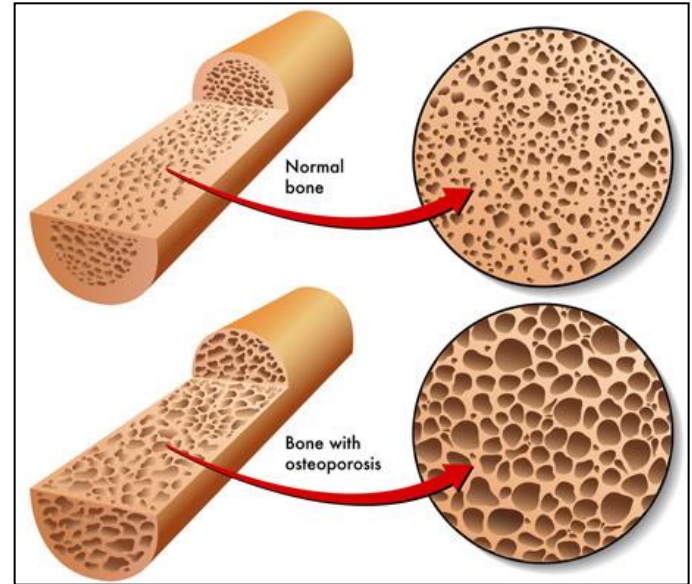
- PA lowers levels of LDL Cholesterol
- PA increases levels of HDL cholesterol



World Health Organization, Centers for Disease Control and Prevention

Osteoporosis

- PA strengthens bones; prevent osteoporosis from developing.



Breast Cancer

- PA influences the breakdown of estrogens and helps regulate hormones.



➤ *ACSM's CET course*

Type 2 Diabetes

- PA...
 - Higher glucose levels
 - Improves ability to use insulin
 - Reduces insulin requirement



Negative Effects of PiA

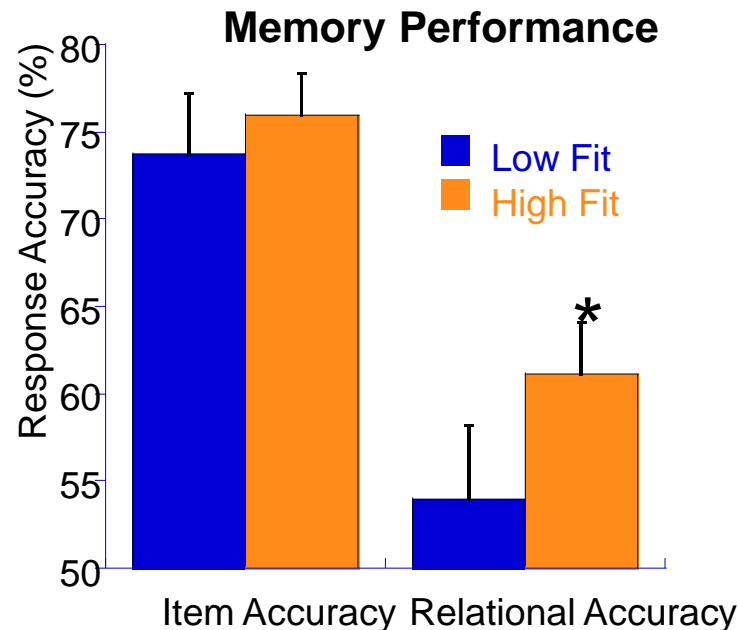
- Misses school 2 days higher on average.
 - Geier, A., Foster, G., Womble, L., McLaughlin, J., Borradaile, K., Nachmani, J., Sherman, S., Kumanyika, S. and Shults, J. (2007). The Relationship between Relative Weight and School Attendance among Elementary Schoolchildren. *Obesity*, 15, pp. 2157–2161, doi: 10.1038/oby.2007.256.
- Lower fitness associated with lower test scores
 - Grissom, J. (2005). Physical Fitness and Academic Achievement. *Journal of Exercise Physiology*, 8 (1), pp. 11-25.
- 51% more likely to be held back a year in school
 - Falkner, N., Neumark-Sztainer, D., Story, M., Jeffery, R., Beuhring, T. and Resnick, M. (2001). Social, Educational, and Psychological Correlates of Weight Status in Adolescents. *Obesity Research*, 9, pp. 32–42, doi: 10.1038/oby.2001.5.
- Boys 46% more likely to see themselves as poor students
 - Falkner, N., Neumark-Sztainer, D., Story, M., Jeffery, R., Beuhring, T. and Resnick, M. (2001). Social, Educational, and Psychological Correlates of Weight Status in Adolescents. *Obesity Research*, 9, pp. 32–42, doi: 10.1038/oby.2001.5.
- Earns less at work
 - Stevenson B. (2010). Beyond the Classroom: Using Title IX to Measure the Return to High School Sports. National Bureau of Economic Research
- 1 week/yr of extra sick days taken
 - Proper, K.I., Van den Heuvel, S.G., De Vroome, E.M., Hildebrandt, V.H., and Van der Beek, A.J. (2006). Dose-response relation between physical activity and sick leave. *British Journal of Sports Medicine*, 40 (2), pp. 173-178. doi: 10.1136/bjsm.2005.022327.
- Preschoolers with inactive parents are far less likely to be active
 - Moore, L.L., Lombardi, D.A., and White, M.J. (1991). Influence of parents' physical activity levels on activity levels of young children. *Journal of Pediatrics*, 118, pp. 215-219.

Presentation Objectives

1. To summarize the prevalence and trends of physical inactivity.
2. To define the role of physical inactivity as the cause of chronic disease states, such as obesity and diabetes.
3. To identify the psychosocial and cognitive improvements as benefits of physical activity and exercise.
4. To evaluate the role of exercise and physical activity in the treatment and recovery from chronic disease states, such as arthritis, cancer, and diabetes.
5. To answer the question “What is exercise?”
6. To summarize unpublished data involving an existing program’s intervention program in behavior change involving physical activity.

Memory, Cognitive Function

- Multiple cross-sectional studies
- Now: RCT in kids (7 – 9 years old); N = 221
- FITKids intervention
 - 2 hr. after school; 4500 steps; 70 mins MVPA
 - 9 month f/u
- Outcomes
 - VO_{2max}
 - Inhibition, cognitive flexibility, attention
- Improvements in intervention arm; none in control*
(*1% in VO_{2max})

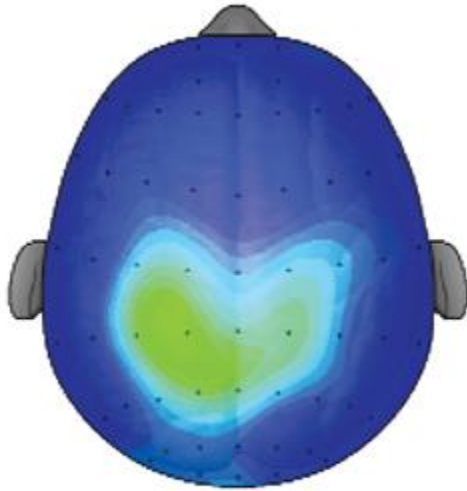


Hillman et al., Pediatrics 2014; 134; e1063

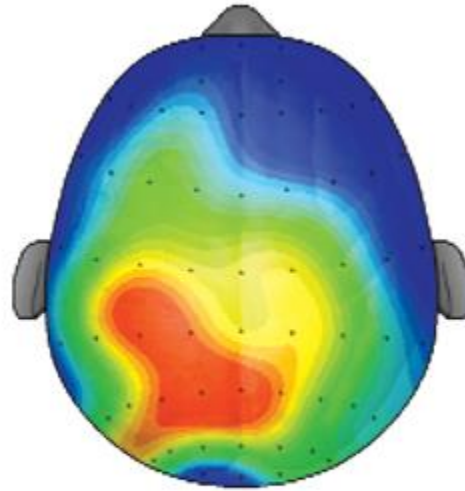


NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

PA Wakes Up the Brain



After 20 minutes of
Sitting Quietly



After 20 minutes of
Walking



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

Hillman et al., Pediatrics 2014; 134; e1063

PA and ADHD

- N = 202 kindergarteners - 2nd graders with/without ADHD; 12 weeks
 - Intervention group: 31 minutes aerobic activity prior to school
 - Control group: 31 minutes classroom/sedentary activity
 - Outcomes
 - Attention/Mood measures, greater improvement in intervention
 - Subgroup analysis: ADHD exercise intervention group did the best

Mood and Stress

- PA...
 - Decreases overall levels of tension
 - Elevate and stabilize mood
 - Improve sleep
 - Improve self-esteem.



“Even five minutes of aerobic exercise can stimulate anti-anxiety effects.”

- Anxiety and Depression Association of America



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

Physically Active Children...

- Up to 1/10th as likely to be obese.
 - Ratey, J. J., and Hagerman, E. (2008). Spark: The Revolutionary New Science of Exercise and the Brain; Little, Brown & Company.
- Fitness associated with 40% higher test scores
 - Grissom, J. (2005). Physical Fitness and Academic Achievement. Journal of Exercise Physiology, 8 (1), pp. 11-25.
- Less likely to smoke, become pregnant, engage in risky sexual behavior, or use drugs
 - Staurowsky, E.J., DeSousa, M.J., Ducher, G., Gentner, N., Miller, K.E., Shakib, S., Theberge, N., and Williams, N. (2009). Her Life Depends On It: Sport, Physical Activity and the Health and Well-Being of American Girls and Women. East Meadow, NY: Women's Sports Foundation.
 - E. Jones-Palm D H, Palm J. Physical Activity And Its Impact On Health Behavior Among Youth. World Health Organization, 2005.
- 15% more likely to go to college
 - Lleras, C. (2008). Do skills and behaviors in high school matter? The contribution of noncognitive factors in explaining differences in educational attainment and earnings. Social Science Research. 37, pp. 888-902.
- Earns 7-8% more throughout life
 - Stevenson, B. (2010). Beyond the Classroom: Using Title IX to Measure the Return to High School Sports. Review of Economics and Statistics. Vol. 92, pp. 284-301, doi:10.1162/rest.2010.11623.
- Kids of active moms are 2x as likely to be active
 - Moore, L.L., Lombardi, D.A., and White, M.J. (1991). Influence of parents' physical activity levels on activity levels of young children. Journal of Pediatrics, 118, pp. 215-219.

Presentation Objectives

1. To summarize the prevalence and trends of physical inactivity.
2. To define the role of physical inactivity as the cause of chronic disease states, such as obesity and diabetes.
3. To identify the psychosocial and cognitive improvements as benefits of physical activity and exercise.
4. To evaluate the role of exercise and physical activity in the **treatment and recovery** from chronic disease states, such as arthritis, cancer, diabetes.
5. To answer the question “What is exercise?”
6. To summarize unpublished data involving an existing program’s intervention program in behavior change involving physical activity.

Arthritis

- Fear and social isolation in chronic disease patients might lead to inactivity following diagnosis.

➤ *Puts a different perspective on the psychosocial benefits of PA*

Arthritis

- Exercise is the first choice treatment for juvenile arthritis.
- It is important to start, maintain, and improve ROM in effected joints in the early stages of juvenile arthritis.

– Omeri, C. H., Silva, C. A. A., Sallum, A. M. E., Rodrigues Pereira, R. M., Lúciade Sá Pinto, A., Roschel, H. and Gualano, B. (2012), Exercise training in juvenile dermatomyositis. Arthritis Care Res, 64: 1186–1194.

– Doğru Apti, M., Kasapçopur, Ö., Mengi, M., Öztürk, G., & Metin, G. (2014). Regular Aerobic Training Combined with Range of Motion Exercises in Juvenile Idiopathic Arthritis. BioMed Research International, 2014, 748972.

Arthritis

- Combination of ROM with regular aerobic exercises... may offer the best potential for benefits.

- Doğru Apti, M., Kasapçopur, Ö., Mengi, M., Öztürk, G., & Metin, G. (2014). Regular Aerobic Training Combined with Range of Motion Exercises in Juvenile Idiopathic Arthritis. BioMed Research International, 2014, 748972.

- Muscular strength and fitness are necessary for optimal growth.
- Weight bearing exercises are shown to improve muscle strength and bone mass.

- Sandstedt, E., Fasth, A., Eek, M. N., & Beckung, E. (2013). Muscle strength, physical fitness and well-being in children and adolescents with juvenile idiopathic arthritis and the effect of an exercise programme: a randomized controlled trial. Pediatric Rheumatology Online Journal, 11, 7.

Arthritis

- Children with juvenile arthritis show less physical impairment or discomfort after exercise interventions occur.
- Studies show that during exercise regime, pain is not an obstacle for performing the fitness programs.

Arthritis

- Physical Benefits
 - Decrease pain and functional limitations
 - Affects metabolism by improving glucose tolerance
 - Promotes healthy body weight
 - Decreases inflammation
 - Lowers impairments such as muscle weakness and atrophy, joint stiffness and pain, poor balance and mobility
 - Improves cardiovascular health
 - Decreases falls

Arthritis

- Psychosocial Benefits
 - Improves mood and quality of life
 - Set and meet physical activity goals
 - Overcome barriers
 - Improves adherence
 - Incorporates flexible, fun activity

Cancer

Physical Late-Effects

- Early mortality
- Abnormal growth and maturation (i.e. growth hormone deficiency)
- Heart problems (i.e. heart failure, heart attacks, inflammation of the heart, and heart valve abnormalities)
- Muscle weakness and fatigue
- Balance deficits
- Overweight and obesity (Olshefski EVS)
- Bone disorders (i.e. low mineral bone density, osteoporosis, and avascular necrosis)

Psychosocial Late-Effects

- Difficulties with social adjustment (i.e. bullying and social isolation)
- Concerns about risk of relapses, dying, additional treatments, potential problems with sexuality and fertility, body image, school and work performance, and social and family relationships
- Post-traumatic stress disorder
- Depression
- Poorer emotional health
- Neurocognitive impairment (i.e. learning disabilities)



Cancer

Benefits of Physical Activity for Childhood Cancer Survivors

- Promotes healing of tissues and organs damaged by cancer and its treatment.
- Builds strength and endurance.
- Reduces the risk of certain types of adult cancers and other diseases.
- Decreases stress and provides a feeling of well-being.



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

Children's Oncology Group. Staying healthy through diet and physical activity, version 4.0. 2013. Available from: http://www-survivorshipguidelines.org/pdf/healthlinks/English/diet_and_physical_activity_Eng.pdf.

Cancer

- Regular exercise proves effective in reducing cancer-related fatigue and increases functional mobility and muscular strength, thereby improving the overall quality of life (QOL) for cancer survivors.

Cancer

- No specific PA guidelines for the pediatric or adult oncology population, evidence suggests that mild to moderate exercise is safe, beneficial, and feasible for both cancer patients and survivors.

Cancer

- Functional Movement Skills are greatly impacted due to cancer treatment.
- Childhood cancer patients should participate in programming during/after treatment to reduce deficits in FMS development.

Cancer

Warning Signs of Reoccurrence

- Change in appearance, size, shape, feel or original cancer site
- Abnormality in routine blood tests
- Loss of appetite, fatigue
- Bone pain, headaches
- Bloating, cramping, pressure, difficulty urinating

If patients report any of the above symptoms,
direct them to see their oncologist for evaluation



Diabetes

- American Association of Diabetes Educators' Self-Care Behaviors
 1. Healthy Eating
 2. **Being Active**
 3. Monitoring
 4. Taking Medication
 5. Problem Solving
 6. Reducing Risks
 7. Healthy Coping



American Association
of Diabetes Educators



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

Diabetes

Exercise benefits for kids with T1DM

- Improves fitness in patients with type I diabetes
- Improves insulin requirements, lowers HgA1C, but shows a limited effect on glycemic control
- Improves lipid levels, endothelial function and insulin resistance, but not blood pressure
- Associated with reduced cardiovascular disease and mortality in patients with type 1 diabetes

Diabetes

Attitudes to exercise and diabetes in young people with T1DM

- Good news:
 - Young patients with T1DM understand the benefits of exercise
 - Tended to be optimistic about treatment with participation
 - “You CAN do anything!”
 - Kids from more supportive families tend to have better control
- Bad news:
 - Teachers, coaches, schools may be apprehensive to allow participation due to risk of event (typically due to misinformation/understanding)
 - Health professionals must be actively involved in planning for management during activity

Diabetes

Different types of exercise?

- Moderate to vigorous physical activity (MVPA) is associated with better glycemic control (HgA1C) while fitness is not (8-16yo)
- MVPA is associated with decreases in total cholesterol, LDL-c and triglycerides, as well as HgA1C (12-17yo)
- High Intensity Interval Training and moderate continuous exercise have both been shown to be well tolerated if glucose control is anticipated based on duration and intensity of exercise (no age reported)

Diabetes

Pre-participation concerns for patients with T1DM

- Peripheral neuropathy
 - Risk for foot problems
- Autonomic neuropathy
 - Risk for cardiac issues when exercising
- Retinopathy
 - Risk for worsening dz with static exercise
- Nephropathy
 - Volume/electrolyte abnormalities
- **Annual Screening T1DM > 5 yrs**

Diabetes

Game Time = Snack Time

- 3 - 6 hours before exercise easily digested meal, low glycemic index, 4g/kg of body weight of CHO
- Check sugars before, during and after
- Should have a log
- Practice does **not** equal game
 - If BG < 120 mg/dL
 - 15 g carb + 30g/60 mins expected exercise and re-check
 - If 120 < BG < 180 mg/dL
 - 30g carb/60 mins mod exercise
 - If 180 < BG < 250 mg/dL
 - No food before exercise
 - If BG > 250 mg/dL
 - Shift into “hyperglycemic” mode and check for ketones

Diabetes

Overnight hypoglycemia

- Nocturnal hypoglycemia is common even without exercise
- A single bout of exercise can increase glucose transport into skeletal muscle for at least 16 hours
- May need a higher bedtime glucose level than on sedentary days (>130)
- May be due to increased expression of GLUT4 with training
- Patients/families should be prepared to be flexible in management regimens that adjust food intake and insulin dosing on evenings after exercise

Presentation Objectives

1. To summarize the prevalence and trends of physical inactivity.
2. To define the role of physical inactivity as the cause of chronic disease states, such as obesity and diabetes.
3. To identify the psychosocial and cognitive improvements as benefits of physical activity and exercise.
4. To evaluate the role of exercise and physical activity in the treatment and recovery from chronic disease states, such as arthritis, cancer, and diabetes.
5. To answer the question “What is exercise?”
6. To summarize unpublished data involving an existing program’s intervention program in behavior change involving physical activity.

Health.gov

Key Guidelines for Children and Adolescents

- Children and adolescents should do 60 minutes (1 hour) or more of physical activity daily.
 - **Aerobic:** Most of the 60 or more minutes a day should be either moderate- or vigorous-intensity aerobic physical activity, and should include vigorous-intensity physical activity at least 3 days a week.
 - **Muscle-strengthening:** As part of their 60 or more minutes of daily physical activity, children and adolescents should include muscle-strengthening physical activity on at least 3 days of the week.
 - **Bone-strengthening:** As part of their 60 or more minutes of daily physical activity, children and adolescents should include bone-strengthening physical activity on at least 3 days of the week.
- It is important to encourage young people to participate in physical activities that are appropriate for their age, that are enjoyable, and that offer variety.



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

2008 Physical Activity Guidelines for Americans. Retrieved from
<http://www.health.gov/paguidelines>

Health.gov

Type of Physical Activity	Age Group: Children & Adolescents
A. Moderate–intensity aerobic	Active recreation, such as hiking, skateboarding, rollerblading Bicycle riding Brisk walking
B. Vigorous–intensity aerobic	Active games involving running and chasing, such as tag Bicycle riding Jumping rope Martial arts, such as karate Running Sports such as soccer, basketball, swimming, tennis Cross-country skiing
C. Muscle-strengthening	Games such as tug-of-war Modified push-ups (with knees on the floor) Resistance exercises using body weight or resistance bands Rope or tree climbing Sit-ups (curl-ups or crunches) Swinging on playground equipment/bars
D. Bone-strengthening	Games such as hopscotch Hopping, skipping, jumping Jumping rope Running Sports such as gymnastics, basketball, volleyball, tennis

2008 Physical Activity Guidelines for Americans. Retrieved from <http://www.health.gov/paguidelines>



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

2008 Physical Activity Guidelines for Americans. Retrieved from
<http://www.healthy.gov/paguidelines>

Health.gov

Key Guidelines for Adults

- **Avoid Inactivity**
 - Some physical activity is better than none — and any amount has health benefits.
- **Do Aerobic Activity**
 - For substantial health benefits, do one of the following:
 - 150 minutes (2 hours and 30 minutes) each week of moderate-intensity aerobic physical activity (such as brisk walking or tennis)
 - 75 minutes (1 hour and 15 minutes) each week of vigorous-intensity aerobic physical activity (such as jogging or swimming laps)
 - An equivalent combination of moderate- and vigorous-intensity aerobic physical activity
- **Strengthen Muscles**
 - Do muscle-strengthening activities (such as lifting weights or using resistance bands) that are moderate or high intensity and involve all major muscle groups on 2 or more days a week.



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

2008 Physical Activity Guidelines for Americans. Retrieved from
<http://www.health.gov/paguidelines>

Nature Rx



Is Nature Right For You?

Nature

- Leave No Child Inside
- KidsAndNature.org
 - Programs
 - Camps
 - Natural Playscapes
 - Tips
- Metro Parks



Predictors for Outdoor Play



- Children's time spent outdoors tends to decline over time.
- Article on predictors of time spent outdoors among children
 - Strongest predictors were parental encouragement and supervision
 - So sit outside with them and even better, go play

(Journal of Epidemiology and Clinical Health 2010)



Sports



“Team sports no guarantee of exercise”

- One study looked at how much exercise 200 kids, age 7 to 14, got while playing team soccer, baseball or softball.
- The children wore accelerometers that tracked movement and intensity during team practice time
 - 40 to 130 minutes for soccer
 - 35 to 217 minutes for baseball and softball
 - Average was 45 minutes

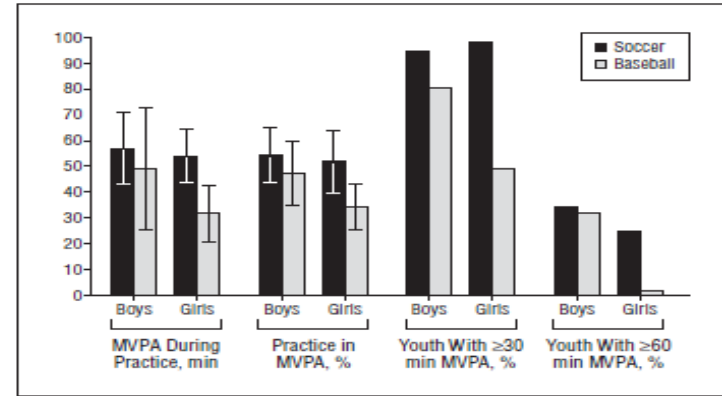


Figure 2. Mean moderate to vigorous physical activity (MVPA) during practice and percentage of participants meeting PA guidelines by sex. Means were calculated at the participant level; error bars represent standard deviation.

Resistance/Weight Training

- Weight lifting vs. strength training
- Preseason strength training can decrease sports-related injuries in adolescents
- Both safe and effective



Faigenbaum et al. in Pediatric Exercise Science



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

Importance of NEPA

- NEPA = “non-exercise physical activity”
- > 4000 Swedish individuals, 60 years old
- > 12 years follow up
- NEPA from questionnaire, low/mod/high
- Assessed other healthy habits (e.g. regular exercise, diet, non-smoking, low-alcohol)
- Measured waist circum, BMI, triglycerides, etc., etc.
- Regardless of exercise, High NEPA associated with longevity, favorable CV health



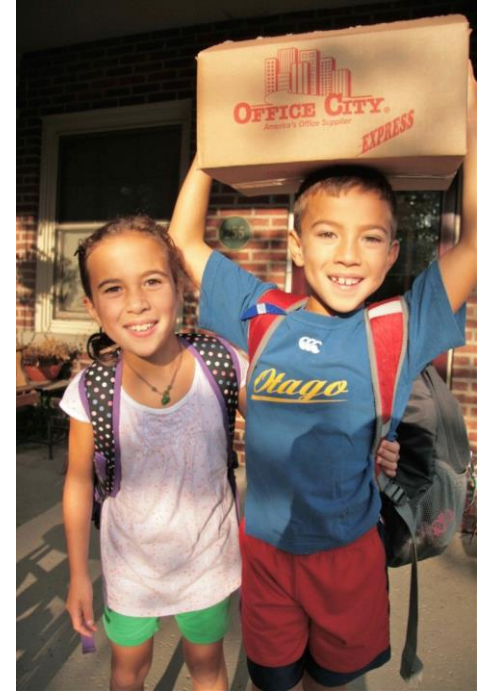
Non-Exercise Physical Activity

- Play
- Chores
- Turn it into a game
- Make life... harder



Safe Routes to School

- 1969: 42% of kids active commute to school
- 2001: 15%
- 219 5th graders, convenience sample
- 24 more minutes MVPA/d in active commuters



Technology

- Classrooms
 - TimeFor10.org, GoNoodle.com
- Wearables
 - Apple Watch, Fitbit, Nike Fuelband, Jawbone Up
- Gaming Systems
 - Xbox Kinect, PlayStation Move
- Campaign websites
 - Let's Move, Fuel Up to Play 60



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

US Play Coalition



A partnership to promote the VALUE OF PLAY throughout life

Presentation Objectives

1. To summarize the prevalence and trends of physical inactivity.
2. To define the role of physical inactivity as the cause of chronic disease states, such as obesity and diabetes.
3. To identify the psychosocial and cognitive improvements as benefits of physical activity and exercise.
4. To evaluate the role of exercise and physical activity in the treatment and recovery from chronic disease states, such as arthritis, cancer, and diabetes.
5. To answer the question “What is exercise?”
6. To summarize unpublished data involving an existing program’s **intervention program** in behavior change involving physical activity.

Play Strong

- Sports Medicine at Nationwide Children's Hospital
- Exercise as Medicine
 1. Recovering from disease
 - Cancer survivors
 2. Living with conditions
 - Diabetes
 - Arthritis
 - Overweight / Obese
 3. "Healthy" but Physically Inactive
 4. Generic pain



Expanding Patient Population

- Cardiology
- Center for Health Weight and Nutrition
- Endocrinology, Metabolism & Diabetes
- Gastroenterology
- Genetics
- Hematology/Oncology/BMT
- Metabolic Bone Clinic
- Orthopedics
- Primary Care Physicians
- Rheumatology
- Sports Medicine



Play Strong

- Logistics
 - Referral from physician
 - AT evaluations
 - Billed to insurance
- Class format
 - Individual rehabilitation
 - Physically Unable
 - Sports Performance
 - Group classes
 - Play / Exercise
 - PA101: Intro to Physical Activity



Program Goals

- Improve Thoughts
- Improve Habits
- Identify Motivations
- Expand Experiences
- Positive Outcomes
- Improve Confidence



Play Strong Research

PLAY

VS.

HIIT

Heart Rate

VS.

RPE



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

Exercise vs. Play

- Obese patients only.
- Once weekly x 11 weeks
- Half Exercise
 - 45s “on”, 15s “off”
 - x8 exercises
 - Repeat after break
- Half Play
 - 22 games from previous study
 - 8min games
 - Repeat after break
- Activities swapped each week



Questions for Participants

How <u>HARD</u> were you working?	How much <u>FUN</u> were you having?
0 - rest	
1 - really easy	A - 😊
2 - easy	B - 😊
3 - moderate	C - 😊
4 - sort of hard	D - 😊
5 - hard	E - 😊
6	F - 😊
7 - really hard	G - 😊
8	H - 😊
9 - really, really hard	I - 😊
10 - maximal	



Heart Rate Monitors



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

Hypothesis / Results

1. Do obese youth have more fun in Play vs. HIIT training in an exercise class?

– Yes.

– Comparing Fun between global average in Play and HIIT sessions:

- p-value: $<.001$

Hypothesis / Results

2. Do obese youth work harder during Play than HIIT?

– Yes.

– Paired t test comparing max HR (bpm) global average in HIIT and Play sessions:

- HIIT mean: 174.58 +/- 14.9
- Play mean: 186.31 +/- 10.98
- P-value: <.001

Hypothesis / Results

3. Do obese youth believe they are working harder in HIIT vs Play?

– Yes.

– Comparing RPE between global average in HIIT and Play sessions:

- HIIT mean: 4.894 +/- 2.03
- Play mean: 4.501 +/- 2.22
- p-value: .042

Exercise is really good.



Play is better.



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

My Soapbox

Sitting is the New Smoking

- We need to treat inactive youth with the same energy and resolve that we treat a child with hypertension before these kids become resistant to our interventions.
- In short, it is easier to *activate* a normal 8 year old than *treat* an obese 16 year old.
- Dr. Avery Faigenbaum
Exercise Deficit Disorder (EDD)



Discuss it. Promote it.

- Be a role model
 - Assess patient motivation
 - Assess patient goals
 - Assess patient risks
- Testifying at city council meetings
- Talk with School Boards
- Talk to PTAs
- Writing an editorial
- Start a program
- Your voice as a clinician is powerful



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

Free the Kids



[Persil: Free the Kids](#)

Contact Information



- **Travis S. Gallagher, AT**
Clinical Lead Athletic Trainer
Nationwide Children's Sports Medicine
- Phone: 614-355-6019
- Email: Travis.Gallagher@NationwideChildrens.org
- Web: NationwideChildrens.org/Sports-Medicine
- Facebook/[SportsMedicineNationwideChildrens](https://www.facebook.com/SportsMedicineNationwideChildrens)
- Twitter [@NCHSportsMed](https://twitter.com/NCHSportsMed)
- NationwideChildrens.org/Play-Strong

Thank You!

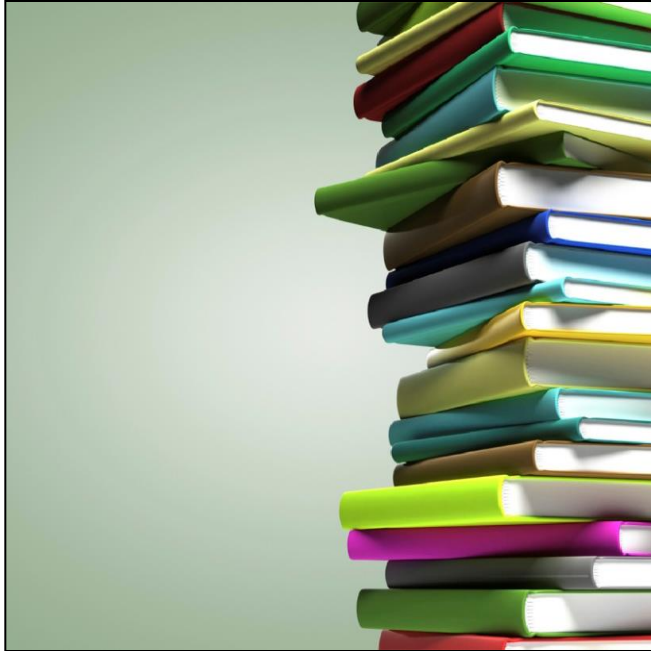


Steps to Start a Program

1. Pick a Specialty
2. Literature Review
3. Program Design
4. Logistics
5. Physician-to-Physician Contact
6. Tour and Proposal
7. Overcoming Stereotypes
8. Referrals
9. Feedback
10. Marketing



Be Prepared



1. **Pick a Specialty**
 - Passionate staff
 - Referral source
2. **Literature Review**
 - Organizations
 - Studies
3. **Program Design**
 - Objectives & Goals
 - Frequency & Duration
4. **Logistics**
 - Staff & Facilities
 - Billing & Documentation

Making Contact

5. Physician-to-Physician Contact

- Decision makers

6. Tour and Proposal

- Demonstrate knowledge,
 - desire, capacity

7. Overcoming Stereotypes

- ATs known for athletes

8. Referrals

- Need one patient to have a program



Success & Growth

9. Feedback

- Note to Physician
- Testimonials

10. Marketing

- Flyers
- Media

