ACHIEVING A HEALTHY FUTURE
FOR OUR STATE, OUR SCHOOLS
& OUR CHILDREN:
Intros. — State Leadership Team

• **Jason Gillette**
  - Chief, Office of Tobacco Prevention, Cessation & Secondhand Smoke, ADHS
  - Former School Health Director, ADE (3 years); Former Health Educator, CIGNA (3½ years)
  - Board of Directors, Arizona Public Health Association; Co-Chair, Arizona Cancer Coalition
  - Advisory Board, ASU Southwest Interdisciplinary Center & Mayo Clinic Health Equity Research

• **Jen Reeves**
  - Associate Research Scientist, UofA (18 years); >$200M in grants; hundreds of PE/HE projects
  - Principal Investigator, Empower Youth Health; developed PYFP/CDC training based on EYH
  - Director of Training & Outreach for SNAP-Ed, Healthy Living Training Center, & Mobile YMCA
  - Co-chairperson, Arizona Action for Healthy Kids
  - Former Physical Education Teacher, Avondale, Tucson (20 years); Spanish-speaking
  - National award, SHAPE America (Society of Health & Physical Educators), 2015

• **Keri Schoeff**
  - Physical Education/Physical Activity Coordinator, ADE (5 years)
  - Former Physical Education Teacher, Dysart USD; Glendale Union HSD (14 years)

• **Scott Turner**
  - 6 years *pro bono* social entrepreneur; 30 years business: AT&T, Motorola, Bain; tech, ed start-ups
  - BA Amherst; MBA, Stanford; MA, PhD Fielding Graduate University
  - Boards of ABEC & Social Venture Partners Arizona; ADHS AzHIP Workgroups; ASA/ASBA Conf.s.
Overview

• **The Crisis → the Opportunity**
  – 20+ year health crisis & PE/HE neglect; finally, some K-12/health solutions

• **Educators: on board**
  – Helps academic achievement, health, school funding

• **Health Organizations: getting on board**
  – Investing in K-12: rapid payback, high ROI -- & no alternatives

• **Capacity Building + Scale-Up**
  – Next steps
Skyrocketing Diabetes

pre-diabetic already: 23+% of US teens, 86M/243M adults=35%

US Diabetes cost $245B [3x non-diabetic costs/person]

Notes: Diagnosed + undiagnosed diabetes, prevalence% of US population using same diag./undiag. ratio as in 2010. $245B = USA 2012, and growing fast. Annual medical expenditures per nonelderly (ages 18-64) adult enrollee in Medicaid, 2009: No chronic conditions=$4,342/year; CVD (cardiovascular disease) =$9,414/yr; Diabetes=$13,313/year; after out-of-pocket costs; per Kaiser FF. References: Pediatrics, 2012 in USNews, 5/21/2012 (youth prediabetes); Diabetes. org (adults); Boyle et al, 2010 ("middle-ground projections); CDC, 2014: Long-term Trends in Diabetes; Schneiderman et al, 2014; Edunuity ests.; Google images. Slide@9/19/2016.

1/3 of adults, >100M people, >$1.5 trillion per year!?!
AZ Breakthrough: Ed-inoculation

EYH recognized by CDC & PYFP
compelling K-12 opportunity @$10/student/year

Students Reaching Cardiovascular Healthy Fitness Zone

Notes: Empower Youth Health (EYH) results 2012-2015 from lower-income AZ schools with 79-98% FRL (Free & Reduced Lunch) student population; 90% Hispanic, 5% Native-American, 3% White, 2% African-American. By Year 3: 20 schools in EYH, 16,000 students; increased % students with cardio-vascular aerobic fitness 4x from 17% to 78%; >6x increase in % of students with good nutrition: 11% → 73% consuming recommended fruit & vegetable servings; % of students at normal weight increased by 12.5% from 48% to 54% among students in the Healthy Fitness Zone (HFZ); 35-40% of students receiving 60+ mins. PA/day. Healthy Fitness Zone is the FitnessGram/PYFP (Presidential Youth Fitness Program) standard for fitness, as measured by objective aerobic capacity (PACER), BMI, & muscular strength & endurance metrics. References: Reeves, 2016: US Department of Education Grant Performance Report (ED 524B): Jennifer Reeves, UofA, Principal Investigator; fall 2012 - spring 2015. Other notes/references: EYH costs kept low by: school-wide wellness policy planning; training existing PE & classroom teachers & MS/HS student fitness volunteers (& not adding more staff); and regular assessment with FitnessGram. Moderate-to-vigorous physical activity (MVPA) & healthy nutrition increase brain capacity & academic achievement, per extensive research evidence. Teen aerobic fitness is correlated with 35% less heart attacks in middle-age (Hogstrom, Nordstrom, 2014); reducing % of Medicaid enrollees with CVD by 35% would save $50B/year nationally (Kaiser Family Foundation, 2012). Teen fitness correlated with $\frac{1}{2}$ – $\frac{2}{3}$ less risk of type 2 diabetes in middle-age (Crump et al, 2016). Empower Youth Health costs $10/student/year at scale (produces costs may be additional). Potential to reduce chronic health conditions & costs by 20+% with 100x or more ROI (Edunuity estimate). Rapid payback for health sector within first year of EYH implementation in schools, due to reduced health costs for ADHD, asthma, obesity, depression, and related preventable child health issues (see Payback slides/references). Rationale: as fitness increases & nutrition improves, chronic health conditions decrease, Medicaid/AHCCCS/health insurance and out-of-pocket health costs decrease, and productivity & GDP increase from less absenteeism/presenteeism (Milken, 2007); also, as a result, state (& local & federal) tax revenues go up & govt. costs go down. Slide version 09/15/2016. Contact: Scott Turner 602-513-0028 scott.turner@edunuity.org
How EYH So Effective & Low Cost?

Optimizing existing school staff & student resources & community partnerships keeps down costs = $10/student/year @scale

- **Standards-based** Nutrition/Health Education & Physical Education Instruction K-12

- **Collaborations** with Community Partnerships
  - including before, during, and after school, as well as on weekends, holidays, and vacations (e.g., school food service vendor, neighborhood associations, youth physical activity promoting CBO’s, park and recreation, YMCA’s, after-school programs, Walking School Bus Programs, local businesses, and more.

- **School Health Advisory Councils**
  - Improve instructional programs, policies, & support services for the 8 components of a coordinated school health/WSCC model; meet min. every other month, ensure wellness implementation for students, staff, & community

- **Self-Assessment** of all School-based Health-related Elements
  - School Health Index (SHI) to identify & reduce health risk behaviors, including addressing gaps & weaknesses

- **Policy Development** for School-based Health Promotion
  - Mutually agreed plan by staff to improve health: incl. administration, food services, nurse, classroom & PE teachers

- **Regular Assessment** of Student Health Behavior
  - FitnessGram (Presidential Youth Fitness Program), YRBS & others assessments for continuous improvement

- **Youth Development & Student Leadership**
  - Student volunteer peer-led physical & wellness activities before, during, after school
Teen Fitness $\rightarrow \frac{1}{2} - \frac{2}{3}$ less Diabetes as Adult

$>100x$ lifetime payback/ROI for EYH ed-inoculation

Notes: Type 2 diabetes. Hazard ratio (HR) (95% CI), $P$ value $<0.001$: 1.00, 1.58, 3.07 respectively (controlled for SES, education level, BMI, family history of diabetes, etc.; national cohort study population of 1.53M 18-year-old males without prior diabetes). Aerobic capacity had biggest associated impact, but muscle strength was also important. “Overall, the combination of low aerobic capacity and muscle strength was associated with a 3-fold risk for type 2 DM…Overall, these findings suggest that physical fitness has important health benefits for all, even for persons who are not overweight or obese…These findings suggest that interventions to improve aerobic and muscle fitness levels early in life could help reduce risk for type 2 diabetes mellitus in adulthood.”

AZ Stakeholder Input from:

Superintendents/Arizona School Administrators (ASA)
Debbi Burdick, Deb Duvall, Roger Freeman, Chad Gestson, Betsy Hargrove, Mark Joraanstad, Melissa Sadorf, Jeff Smith, Paul Stanton*

AZ School Boards Association (ASBA), AEA, AZ Health & Physical Educators (AZHPE), SHAPE America, FTF
Carly Braxton, Steve Jeffries, Susan Leonard, Matt Mixer, Andrew Morrill, Tim Ogle, Janice Palmer, Trish Robinson, Keri Schoeff, Hans van der Mars

Arizona State Board of Education (ASBE)
Reg Ballantyne, Tim Carter, Roger Jacks, Greg Miller, Jim Rottweiler*, Tom Tyree

Other Nonprofits/NGOs/Misc. (AforAZ, ABEC, AZ Chamber, CAA, CFA, Fit Kids, G. Schwartz, GPL, Goldwater, Playworks SALC, SVPAZ, TriAdvocates)

Health Care Providers & Plans (AHIP, AzAHP (AHCCCS), AzHAA, Banner, BCBSAZ, HSAA (Alliance), Mercy Care/MMIC/Aetna, Tenet)
Reg Ballantyne, Chuck Bassett, Jason Besozo, Jennifer Carusetta, David Childers, Mark Fisher, Tad Gary, Deb Gullett, Debbie Hillman, Christi Lundeen, Karrie Steving, Trisha Stuart, Deborah Fernandez-Turner, Greg Vigdor

Governor’s Office (including GOYFF)
Kirk Adams*, Christina Corieri, Governor Ducey*, Debbie Moak, Danny Seiden*, Kristine Fire Thunder, Dawn Wallace

State Agencies
AZ Commerce Authority*, ADE (AZ Department of Education): School Health/PE, ADHS (AZ Dept. of Health Services): AzHIP Obesity & Cross-Cutting Strategies/School Health Workgroups & BNPA, AHCCCS

Legislators & Legislative Staff
Sylvia Allen, Catcher Baden, Nancy Barto, Carlyle Begay, David Bradley, Kate Brophy-McGee, Paul Boyer, Heather Carter, Regina Cobb, Jeff Dial, Adam Driggs, Randall Friese, Gail Griffin, Katie Hobbs, Jay Lawrence, Debbie Lesko, Emily Mercado, Eric Meyer, Lynne Pancrazi, Matt Simon, Steve Smith, Reed Spangler, Melissa Taylor, Kimberly Yee*

Foundations/Grantmakers (ACF, AGF, AZSTA, BHHS, Helios, Piper, Rodel, United Way)

Higher Education
Tacy Ashby (GCU), Dirk DeHeer(NAU), Kimberly LaPrade (GCU), Melanie Logue (GCU), Teri Pipe (ASU), Jennifer Reeves (UofA), Hans van der Mars (ASU)

National Leaders, Experts & Others
CDC, CMS, David Katz, Lloyd Kolbe, Michael O’Donnell, US House & Senate Legislators & Staff

Notes: *=spoke briefly with; []=[scheduled]. Not a comprehensive list. Key input goals: Do homework, understand perspectives, build consensus, figure out win-wins, etc. Lessons learned include: avoid unfunded mandates; no new taxes; must be accountable; non-punitive; need credible ROI; etc. @09/18/2016.
Why Educators Support?

*M-V Physical Activity Improves Academics*

- **Reallocating time from PE does not improve achievement**
  - Wilkins et al, 2003; Trudeau & Shephard, 2008

- **Keeping time allocated to PE does not harm achievement**
  - Lees & Hopkins, 2013; Rasmussen & Laumann, 2013; RWJF, 2009; Shephard, 1996; Trudeau, 2010

- **Regular PA throughout day helps academic outcomes**

- **Moderate-to-vigorous PA (MVPA) improves academics**

- **PE, PA, Sports increase engagement & reduce drop-outs**
  - Desy et al, 2013; Rumberger, 2011

Notes: e.g., Trudeau & Shephard, 2008: “Given competent providers, [up to 60 minutes] PA can be added to the school curriculum by taking time from other subjects without risk of hindering student academic achievement. On the other hand, adding time to "academic" or "curricular" subjects by taking time from physical education programmes does not enhance grades in these subjects and may be detrimental to health.” Lees & Hopkins, 2013: systematic review of RCTs: “There was no documentation of APA [aerobic physical activity] having any negative impact on children’s cognition and psychosocial health, even in cases where school curriculum time was reassigned from classroom teaching to aerobic physical activity.” References: See other slides, edunuity.org for detailed references.
EYH can Payback costs in <1 Year
rapid ROI from health sector investment in EYH @$10/child/year cost

<table>
<thead>
<tr>
<th>Health Condition</th>
<th>Treatment Cost (per treated student/year)</th>
<th>Prevalence (% students with condition)</th>
<th>Reduced Incidence (% drop in students with condition)</th>
<th>Grade Levels with Most Reduced Costs</th>
<th>Average Reduced Health Cost per Student/Year (all students)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma, ADHD, Obesity, Depression/Other Behavioral Health</td>
<td>$400-1000</td>
<td>6-15%</td>
<td>14-33%</td>
<td>Roughly spread across K-12</td>
<td>$25-35</td>
</tr>
</tbody>
</table>

Notes: EYH “ed-inoculation”, primarily MVPA, reduces health costs by preliminary est. $25-35/child/year @scale cost of $10/student/year = <1 year payback. Costs higher per student at smaller scales: ~$15-30/student/year. In today’s unhealthy lower-income population, it only takes ~1-2 children per class becoming healthier to pay back EYH investment within 1 year. EYH: Empower Youth Health. K-12: Kindergarten through 12th grade. Payback/ROI formula: Condition Cost x Condition Prevalence x Reduced Incidence of Condition = Treatment Cost Reduction per Average Student (across all students). ADHD: attention deficit/hyperactivity disorder. BH: behavioral/mental health. MS: middle school. HS: high school. MVPA = Moderate-to-vigorous physical activity, which is key to improving many of these conditions= e.g., after several minutes of MVPA, children are panting, starting to sweat, & having trouble conversing while moving. Target total of 60 minutes/day in MVPA from before, during and after school activities. Utilized Medicaid & Latino population data from government statistics/reports and peer-reviewed journal articles, when available. Obesity impact develops more slowly than ADHD & depression impact, but BMI has been improving within 1-2 years in both EYH and Fit Kids. Longer-term ROI = >100x, as health condition on-set is delayed & the severity in middle age & later is postponed and reduced. Rapid payback at all grade levels by reducing: Elementary: ADHD, asthma; MS: ADHD, misc.; HS: obesity, depression/BH. ADHD and depression costs vary dramatically based on type of treatment, and can be much higher. Reduced incidence of obesity estimated based on reduced obesity compared to what would have been expected in that sociodemographic population at those ages. Also, EYH payback/ROI is estimated based on changes in the 78% of students now in the Healthy Fitness Zone (HFZ); however, the 22% non-HFZ obesity rates did not likely improve as much. There is some possible double-counting of teen obesity/depression/BH savings, since obesity costs can include some depression/BH costs. Class size assumption: 30-35 students. References incl.: Domino et al, 2009; Hampf et al, 2007; Katz et al, 2010; Kuhle et al, 2011; MACPAC, 2015; Pelham et al, 2007; Schuch et al, 2016; Skinner et al, 2016; Thapar et al, 2012; Wang et al, 2005. More Notes & Refs: see Payback Details slides. Slide @09/17/2016
HFA Role Ensures Outcomes, ROI

highly accountable/pay-for-performance with many partners; without adequate health outcomes, the monies stop

FUNDERS
- Foundations, Others
- Health Care Providers & Plans
- Legislature
- Medicaid/CMS

COLLABORATORS
- ADE, ADHS, AHCCCS, Gov. office
- Health & Education Associations & Nonprofits
- State & Regional Community Groups
- Business/Leadership Orgs., Others

IMPLEMENTERS
- School Districts: School Boards, Superintendents, Staff
- Schools: Principals, PE & Classroom teachers, Food services directors, School nurses, Other school personnel, Parents
- Local Nonprofits, Others

INVESTMENT$

HEALTH OUTCOMES
Next Steps

- Add PE/HE metrics: A-F School Grading Formula & Report Card
- Health Sector Funding: Early champions with $$
- Capacity Building: $$ for launch & people
- Scaling: EYH to 90+ low-income schools
- ACF tbd: Capacity $, seed scaling $, & help expand coalition?
- Measurable Goals:
  - Money: $1M/yr, then $11M/yr, eventually $300M/yr new money into K-12
  - Health: quantified EYH outcomes & ROI; first state to clearly reverse trends in child obesity & chronic conditions
Additional/Background Slides
(not in main presentation; available to review prior/after & to show if needed during Q&A)

Notes: (clockwise from upper left): PE; classroom activity break; peer-led physical activity; PE teacher & student; parent involvement.
References: top photos from mrvhpbw.weebly.com & georgiahealthnews.com from Google images; bottom from EYH AZ/Sunnyside USD.
Next EYH Schools: Open for Applications Statewide
Partial list, 2016-17: initial scaling from 20 to 90 schools

<table>
<thead>
<tr>
<th>County</th>
<th>School District Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apache</td>
<td>Rough Rock Community School</td>
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<tr>
<td>Cochise</td>
<td>Douglas Unified School District</td>
</tr>
<tr>
<td>Coconino</td>
<td>Heritage Elementary School</td>
</tr>
<tr>
<td>Gila</td>
<td>Payson Unified School District</td>
</tr>
<tr>
<td>Graham</td>
<td>[To be decided]</td>
</tr>
<tr>
<td>Greenlee</td>
<td>[To be decided]</td>
</tr>
<tr>
<td>La Paz</td>
<td>[To be decided]</td>
</tr>
<tr>
<td>Maricopa</td>
<td>Academy of Excellence</td>
</tr>
<tr>
<td>Maricopa</td>
<td>Arizona Academy of Science and Technology</td>
</tr>
<tr>
<td>Maricopa</td>
<td>Balsz School District</td>
</tr>
<tr>
<td>Maricopa</td>
<td>Fowler Elementary School District</td>
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<tr>
<td>Maricopa</td>
<td>Kyrene School District</td>
</tr>
<tr>
<td>Mohave</td>
<td>[To be decided]</td>
</tr>
<tr>
<td>Navajo</td>
<td>Holbrook Unified School District</td>
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<tr>
<td>Navajo</td>
<td>Kayenta Unified School District</td>
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<tr>
<td>Navajo</td>
<td>Pinon Unified School District</td>
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<tr>
<td>Pima</td>
<td>Flowing Wells</td>
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<tr>
<td>Pima</td>
<td>Marana Unified School District</td>
</tr>
<tr>
<td>Pima</td>
<td>Sunnyside Unified School District (SUSD)</td>
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<tr>
<td>Pima</td>
<td>Tucson Unified School District</td>
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<tr>
<td>Pinal</td>
<td>Eloy Elementary School District</td>
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<tr>
<td>Pinal</td>
<td>Florence Unified School District</td>
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<tr>
<td>Pinal</td>
<td>Stanfield Elementary School District</td>
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<tr>
<td>Santa Cruz</td>
<td>Santa Cruz Unified School District</td>
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<tr>
<td>Yavapai</td>
<td>Acorn Montessori Charter</td>
</tr>
<tr>
<td>Yuma</td>
<td>Carpe Diem High School</td>
</tr>
</tbody>
</table>

Notes: Voluntary, not mandatory. Applications open to all public district & charter schools that meet EYH requirements. Schools wanting to participate apply individually, so in some cases not all schools in each district are participating. Initial focus is lower-income schools, which statistically have less fit students. This is a partial list of school districts with schools, which have applied to participate in EYH & been accepted @Nov. 2015, subject to change.

References: ADE/EYH, 2015
Newly Enrolled EYH School Example

Stanfield SD can do PE/PA/EYH; so can your school

- Rural (near Casa Grande), 1 school, 85% FRL, 510 students PK-8
- 20% Native-American, 60% Hispanic, 20% white
- 72 FTE, Total budget FY15 $4.2 million
- Loss of an override, $650,000 reduction to M&O in FY13&14
- Yet 30+ minutes/day physical activity, 4-5 days/week PE

FitnessGram: Balanced Fitness Assessment
(successor to Presidential Physical Fitness Test)
evaluates key short- & long-term health determinants

- **Aerobic capacity**
  - 15-20 meter sprints (PACER/“beep test”), 1 mile run/walk

- **Muscular strength & endurance**
  - curl-ups (crunches), arm hang/pull-ups, push-ups, trunk lift

- **Body composition**
  - BMI, (skinfold%), (bioelectric)

- **Other metrics which could be added:**

Notes: BMI = Body Mass Index: comparing height vs. weight. References: PACER photo: blogs.birmingham.k12.mi.us from Google images; cooperinstitute.org; PACER test overview: [https://www.youtube.com/watch?v=IroAhVO83il](https://www.youtube.com/watch?v=IroAhVO83il)
### Activity

<table>
<thead>
<tr>
<th>Activity</th>
<th>Mins./day offered</th>
<th>Mins./day activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom breaks during school (3/day x 7 mins. ea.)</td>
<td>21</td>
<td>16</td>
</tr>
<tr>
<td>Physical Education class (60 minutes/week PE)</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Recess #1 (one 15 minute/day)</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Recess #2 (or PE #2: add’l 60 mins./week PE, totaling 120 mins/week PE)</td>
<td>12-15</td>
<td>12</td>
</tr>
<tr>
<td>Before/after-school program/morning/afternoon activity</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td><strong>Total Physical Activity</strong></td>
<td><strong>75-78</strong></td>
<td><strong>60</strong></td>
</tr>
</tbody>
</table>

**Notes:** Physical activity (PA) should be moderate to vigorous physical activity (MVPA) for full academic and health benefits: moderate to vigorous physical activity = e.g., after several minutes of MVPA, children are panting, starting to sweat, & having trouble conversing while moving.

**References:** Adapted from LMAS PAL training, 2015. Classroom exercise break sample, GoNoodle example: https://www.youtube.com/watch?v=TbzFq7gH2Zw&list=PLX0p6giOu3DWJIPWagUwbFS-Bgm8AQbXj&index=3
- Fitness assessments **mandated** in 21+ states:
  AL, AR, CA (grades 5,7,9), CT, DC, DL, GA, LA (focused on high-poverty districts), MO, MN (local assessments), MS (grade 5), NC, NY (local assessments), RI, SC (grades 2,5, 8-12), TN, TX (grades 3-12), VA (grades 4-12), VT (grades 5-12), WV (grades 4-8 & HSx1), WI

- Mandated public **reporting** of results in 10+ states:
  AL, CA, CT (in Strategic School Profile), DC, DL (results to parents), MO (% meeting min.), SC (to parents + school effectiveness score), TX (summarized results to TEA) VA, WV

Note: state assessments appear to be FitnessGram or equivalent in vast majority of cases.
• **All Levels**: Participates in SBP, NSLP, Team Nutrition; reimb. meals & snacks sold meet USDA nutrition standards (Smart Snacks); “Smarter Lunchroom” in all six areas: Fruits, Veg., Entrees, Milk, Sales of Reimb. Meals, School Synergies

• **Bronze**: SBP, NSLP: no min. ADP%; 45 mins./week PE + PA opportunities; 30-49 action items

• **Silver**: SBP: 20%+ ADP; NSLP: 60%+ NSLP; 45 mins./week elem. PE; MS/HS: PE offered + PA opps.; 50-69 action items

• **Gold**: 90 mins./week elem. PE, MS/HS: PE offered; 70+ action items (Balsz SD, Stanfield SD—high FRL schools)

Notes: SBP: School Breakfast Prog.; NSLP: Nat’l School Lunch Prog.; ADP: ave. daily participation
Fit Kids
Flagstaff Area

- Founded 2012: ~$1M/yr funding by Northern AZ Healthcare
  - ~$100/student/year
- 20 elementary/middle schools, 5 districts, >9000 students/year
- Mandatory 1 class/week moderate-to-vigorous physical activity (MVPA) & nutrition ed, led by trained Health Aides
  - Optional before/after/lunch activity sessions
  - Supplements existing PE, health education
- Evaluation:
  - 2350 children, 4x BMI measurements over first 2 years
  - Outcomes: ~50% reduction in likelihood* of being overweight

Note: *50% reduction in the incidence of being overweight from what would be expected based upon school district data.
References: Fit Kids evaluation reports & Prof. DeHeer/NAU emails; Fit Kids website: https://nahealth.com/fit-kids; Fit Kids staff
Whole School, Whole Community, Whole Child Model

Coordinated School Health 2.0: a collaborative preventive approach to health via schools

Empower Youth Health addresses many of these

Influencers of Children’s Health

Biggest missing impact: schools with parents

Notes: Illustrative not comprehensive.
References: Turner, 2013-16 (Bronfenbrenner, 1979; Vygotsky, 1978)
@09/06/2016
**MS Students Know: “Exercise & Nutrition Help Me Academically”**

How you do in class when have been physically active?

<table>
<thead>
<tr>
<th>Physical Activity</th>
<th>I do Worse</th>
<th>I do About Same</th>
<th>I do Better</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4%</td>
<td>49%</td>
<td>47%</td>
</tr>
</tbody>
</table>

How you do in class when you eat healthy food?

<table>
<thead>
<tr>
<th>Nutrition</th>
<th>I do Worse</th>
<th>I do About Same</th>
<th>I do Better</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2%</td>
<td>53%</td>
<td>45%</td>
</tr>
</tbody>
</table>

References: Turner, 2013 (research in 3 primarily lower-income schools, grades 6-8, in Maricopa County, AZ)
More Brain, More Gain

Prevent brain bottlenecks with MVPA & nutrition →
more & better-wired hippocampus, basal ganglia, etc.
better attention, more self-discipline, greater cognitive capacity, more learning including better math scores

Coalition for Healthy Behavior

Conservatives/Libertarians
- Lower government spending; No new taxes;
- Not pay for others’ unhealthy behavior;
- Choice/avoid mandatory federal system

Democrats
- Improve health of lower-income families
- & affordability of health care for all

Businesses
- Reduce costs, boost profits & productivity

Health Advocates
- Improve public’s health

Educators
- Healthier kids; Higher student achievement,
  engagement; Lower district health costs

HC Providers/Plans
- Better patient health; Lower costs;
  Financial viability

National Security
- Fit, eligible recruits; More $$ for Defense

Voters/Taxpayers/USA Deficit/Debt
- Sustainably affordable health care & lower
  private, Medicaid, Medicare, ACA costs

Lost GDP/Tax Revenue from Chronic Conditions

Potential to increase AZ GDP $2B+ from 10+% less absenteeism & presenteeism
Also, $1B in new GDP generates state tax revenue of approx. $100M → $200M/year

Note: Annual cost in $ billions in 2003. $1+ trillion in lost productivity/GDP for USA. Productivity loss from: ill employees (and their caregivers, if any) forced either to miss work days (absenteeism) or to show up but not perform well (presenteeism). Reference: DeVol, Ross, and Armen Bedroussian, An Unhealthy America: The Economic Burden of Chronic Disease, Milken Institute, October 2007 www.milkeninstitute.org. Tax estimates based on 2013 AZ GDP and tax data from census.gov. Slide@09/17/2016
Serious Warning Signs
an undeclared 20+ year public health emergency

• $3 trillion/year USA health costs ➔ $9,500/person
  – Yet median household = $56,500 income with 2.5 people
  – US costs 2x other developed countries, yet worse health

• 50+% of US adults have chronic conditions
  – Chronic conditions = 86% US health costs, mainly preventable
  – US adults: 36+% obese, 11+% heart disease/25+% hypertension, 14+% diabetic/35% pre-diab.
    • 10% teens severely obese (>100 lbs.); 23% teens pre-diabetic
    • Latinos, Native-Americans, lower-income: much higher prevalence rates, mortality
  – AZ approaching USA levels
    • AZ: 15+% child/25-30+% adult obesity; ~83% lower-income kids unfit

• 1/3 of adults diabetic by 2050 (@2.5-3x healthy person cost)

• Health costs: serious social, economic & philanthropic risks

Notes/References: interplas.com & kristenelisephd.com/Google images; NHE, 2014: US health costs; US Census, 2016: median HH income; OECD Health Indicators, 2015; JAMA, 2014; CDC, 2015: http://www.cdc.gov/chronicdisease/: “treating people with chronic diseases accounts for 86% of our nation’s health care costs...Half of all American adults have at least one chronic condition, and almost one of three have multiple chronic conditions.”; Mensah G., May 23, 2006: Global and Domestic Health Priorities: Spotlight on Chronic Disease, National Business Group on Health webinar: 80% of heart disease & stroke & type-2 diabetes and 40% of cancer is preventable; NHIS, 2014: diagnosed levels—true levels higher+; also see ADA & AHA, 2011-15; Pediatrics, 2012 in US News, 5/21/2012 (youth prediabetes); Skinner et al, 2016: Prevalence of obesity and severe obesity in US children, 1999-2014; Milken, 2007; ADHS AZ CVD State Plan, 2005?; ADHS State Health Assessment, 2014; ~83%: EYH FitnessGram baseline data, 2012—J. Reeves, UofA, Principal Investigator; Diabetes% (adults): Boyle et al, 2010; Schneiderman et al, 2014; No chronic conditions=$4,342/year; Diabetes=$13,313/year: Kaiser Family Fdn., 2012 (Medicaid); Edunuity ests. Slide @09/14/16.
### Americans’ Health: Not Better yet >2x More Costly

**US--better: smoking, cancer; worse: diabetes, obesity, heart disease, life expectancy, costs**

<table>
<thead>
<tr>
<th>Health Indicator</th>
<th>USA</th>
<th>OECD</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Expectancy</td>
<td>78.8</td>
<td>80.5</td>
<td>at birth, in years</td>
</tr>
<tr>
<td>Mortality from Heart Disease</td>
<td>128</td>
<td>117</td>
<td>ischemic, deaths per 100K population</td>
</tr>
<tr>
<td>Cancer Mortality</td>
<td>198*</td>
<td>202*</td>
<td></td>
</tr>
<tr>
<td>Breast Cancer Survival</td>
<td>93%*</td>
<td>87%*</td>
<td>5-year relative survival</td>
</tr>
<tr>
<td>Daily Smoking</td>
<td>14%</td>
<td>20%</td>
<td>% for whole population</td>
</tr>
<tr>
<td>Alcohol Consumption</td>
<td>8.4%*</td>
<td>8.5%</td>
<td>liters per capita (15 years +)</td>
</tr>
<tr>
<td>Fruit &amp; Vegetable Consumption</td>
<td>47%/78%*</td>
<td>60%/65%*</td>
<td>% of population aged 15+ eating fruit/vegetables daily</td>
</tr>
<tr>
<td>Diabetes Prevalence</td>
<td>13%*</td>
<td>9%*</td>
<td>ages 40-59, 2011 data</td>
</tr>
<tr>
<td>Obesity (adults)</td>
<td>35%</td>
<td>19%</td>
<td>UK 25%, Mexico 32%</td>
</tr>
<tr>
<td>Obesity &amp; Overweight (children)</td>
<td>34%*</td>
<td>23%*</td>
<td>% of children at various ages</td>
</tr>
<tr>
<td>Health Expenditure per Capita</td>
<td>$8,713</td>
<td>$3,453</td>
<td>US$ at purchasing power parity (PPP)</td>
</tr>
<tr>
<td>Health Expenditure % GDP</td>
<td>16.4%</td>
<td>8.9%</td>
<td>as share of GDP, 2013</td>
</tr>
</tbody>
</table>

Strategies that Worked vs. Smoking...
Yet We Aren’t Doing Now to Promote Physical Activity & Healthy Nutrition

[Report Card graded (A-F) on how well we are re-using strategies that helped reduce smoking]

- Strong health-related education programs in schools (D)
- Broad & profound awareness of seriousness of problem (D)
- Hard-hitting, pervasive public information campaigns (F)
- Large insurance premium discounts for healthy behavior (D+)
- Cost-effective behavior cessation/adoption products/programs (D)
- Very strong government health warnings (D)
- Government restrictions on unhealthy prod. marketing/promotion (F)
- Dramatically increased unhealthy product sales taxes (F)

Notes: Effective steps we can realistically start taking NOW are bold and/or underlined. Anti-smoking track record: 42% US adults smoked in 1965 → 17% US adults now. List of key strategies that helped to dramatically reduce smoking among Americans; followed by an (A-F) grade, indicating Edunuity’s rating of how well AZ & the USA are using the particular strategy to prevent other unhealthy behaviors--particularly lack of physical activity and unhealthy nutrition--and thereby prevent or reduce chronic health conditions. Ranked by Edunuity in rough order of what is realistically implementable & politically achievable starting in 2016.
References: alexiamuscat1.blospot.com at Google images; CDC, 2015 (NHIS, 1965; YRBSS 2013 data, AZ: HS student cigarette use); Ending the Tobacco Problem, Institute of Medicine, 2007; Turner, 2014-16
Health Care Costs since 1970+
“Reforming” health care without preventing the root causes


Many Arizonans’ Health Declining
heading toward or worse than national averages*

• **Bad news = Most chronic health conditions**
  - AZ: largest increase in obesity/overweight in USA since 1993
  - Child obesity: 80% persistence to adulthood
  - Diabetes mortality: 19 to 25/100K;
  - Native-American mortality: 79/100K; 4x higher risk of death from diabetes than average
• **Mixed news = Heart disease**
  - Mortality rate down 30%, 2000-10; down 51% since 1972; but rising for Native-Americans, African-Americans
  - Heart Disease 2nd leading cause of death: 143/100K, 9719 deaths, 2010
  - 41% of adults ever told had high cholesterol, 24% have high blood pressure (BP)
  - (Cancer highest COD: 10,423 deaths)
• **Good news = Smoking down**
  - AZ adult smoking down to 15% in 2010
  - AZ High school student cigarette use down to 14%, from 23% in 2003

<table>
<thead>
<tr>
<th>Condition</th>
<th>AZ 2004</th>
<th>AZ 2010</th>
<th>USA 2010</th>
<th>USA 2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child Obesity (CO)</td>
<td>12%</td>
<td>14.2%</td>
<td>16.9%#</td>
<td></td>
</tr>
<tr>
<td>Child Overweight</td>
<td>14.7%</td>
<td>15.7%</td>
<td>14.9%#</td>
<td></td>
</tr>
<tr>
<td>CO: Hispanics</td>
<td></td>
<td></td>
<td>22.4%#</td>
<td></td>
</tr>
<tr>
<td>Adult Obesity</td>
<td>21%</td>
<td>25%</td>
<td>28%</td>
<td></td>
</tr>
<tr>
<td>Adult Obesity: Hispanics/N.A.</td>
<td></td>
<td></td>
<td>31/33%</td>
<td></td>
</tr>
<tr>
<td>Diabetes #</td>
<td></td>
<td>~450K</td>
<td>29M</td>
<td></td>
</tr>
<tr>
<td>Diabetes % (diagnosed)</td>
<td>7.5%^</td>
<td>9.1%</td>
<td>8.7%</td>
<td></td>
</tr>
<tr>
<td>Diabetes% (diag.):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hisp./N.A./Afr.-Amer.</td>
<td>12%/9%/16%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diab.(diag.): Medicare</td>
<td>22.4%</td>
<td>27.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes% (total:adults)</td>
<td>14</td>
<td>26.5-33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes% (Mex-Amer.)</td>
<td>18.3</td>
<td>33+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart Disease #</td>
<td>~250K</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: CO=child obesity; *Preliminary rough summary (difficult to combine data in one chart from multiple sources using varying definitions & timeframes); *=2009; ^=2005; ^=2011-12
References: ADHS AZ CVD State Plan, 2005?; ADHS State Health Assessment, 2014;
Notes: Low-income student fitness data based on baseline Empower Youth Health (EYH) FitnessGram results from representative sample of approx. 16,000 students in 20 lower-income schools in AZ, indicating 83% with cardiovascular aerobic unfitness (i.e., not in aerobic “Healthy Fitness Zone”). Adult unfitness estimates based on 80+% persistence of overweight/obesity from adolescence into adulthood. References: Google images: wupr.org; AZ student fitness EYH baseline FitnessGram PACER data, 2012--Jennifer Reeves, UofA, Principal Investigator; Herman, Craig, et al, 2009: Tracking of obesity and physical activity from childhood to adulthood. Also, see Kaiser Family Foundation, 2012: The Role of Medicaid for Adults with Chronic Illnesses; Whitaker, Wright, Pepe, Seidel, & Dietz, 1997; Brownell & Horgan, 2004; CDC, 2015. Slide version 09/03/2016.
Obesity/Unfitness Severity Worsening
the earlier conditions start, the worse they get later

Reference: Sturm & Hattori, 2013. Notes: Obese >30 BMI, Severely/Morbidly Obese >40 BMI. Sturm & Hattori’s calculation based on Behavioral Risk Factor Surveillance Survey, BMI cutpoints calculated based on self-reported height and weight. Adjusted line (squares) uses cutpoint of 37.3 for men and 37.0 for women to make it comparable to BMI>40 calculated from objective height and weight measurement. 200 indicates a 200% increase over baseline, i.e. a tripling of baseline rates.
Health Costs Up with Obesity/Unfitness

6M US children & 15.5M+ adults morbidly obese--& increasing fast

Notes: Per capita health care expenditures, 2009. 6M children severely/morbidly obese 2013-14 (>100 lbs. overweight). 15.5M US adults severely/morbidly obese in 2010. From Underweight on left to Morbidly Obese on right: BMI (kg/m2): <18.5; 18.5-24.9; 25-29.9; 30-34.9; 35-39.9; >=40

Unhealthy Body  ↔  Unhealthy Mind
empower them to be fit physically & social-emotionally

- Depression can lead to obesity & obesity can lead to depression in adolescence & into adulthood
- Teen body dissatisfaction contributor to anorexia & bulimia
- Overweight/obesity contributes to lower grades, dropping out

References: Google images, Mellin et al, 1991; Gustafson-Larson & Terry, 1992; Levine, 1987; Smolak, 2011; Stice, 2002. Depression linked to obesity & obesity linked to depression in adolescence & into adulthood: Marmorstein et al, 2014; Obesity and depression in adolescence and beyond: reciprocal risks
Chronic Conditions → 2-3x Higher Health Costs

Note: Annual medical expenditures per nonelderly (ages 18-64) adult enrollee in Medicaid, 2009: No chronic conditions=$4,342/year; CVD (cardiovascular disease)=$9,414/year; Diabetes=$13,313/year; after out-of-pocket costs. References: Kaiser Family Foundation, 2012: The Role of Medicaid for Adults with Chronic Illnesses / Cardiovascular Diseases: 56,274,369 nonelderly adult Medicaid enrollees, of which 28% with CVD=15.8M individuals; 9% with diabetes=5.1M. AZ AHCCCS Population Highlights, October 2015: 1,818,445 individuals. US Census, Arizona population, 2014 estimate, 6,731,484. Chronic conditions = vast majority of Medicaid costs: http://www.gallup.com/poll/161615/preventable-chronic-conditions-plague-medicaid-population.aspx
Postponing Diabetes Onset Dramatically Reduces Costs

Teen Fitness $\rightarrow$ 35% less Heart Attacks as Adult

>100x lifetime payback/ROI for EYH ed-inoculation

Notes/References: CVD=cardiovascular disease. Results from long-term study of population of 743K 18-year-old men in Sweden followed into middle-age; controlled for BMI, diseases, education level, blood pressure, SES, etc. “Thus, our results indicate that regular cardiovascular training in late adolescence is independently associated with ~35% reduced risk of myocardial infarction in men.”: Hogstrom, Nordstrom, Nordstrom, 2014: High aerobic fitness in late adolescence is associated with a reduced risk of myocardial infarction later in life: a nationwide cohort study in men. 2009 Medicaid annual medical expenditure data for nonelderly adults ages 18-64: in 2009, per Kaiser Family Foundation 2012 Fact Sheets: 28% of Medicaid nonelderly adult enrollees had CVD, costing Medicaid $9,414/year: Kaiser Family Foundation, 2012: The Role of Medicaid for People with Cardiovascular Diseases. $4,342/year per capita cost to Medicaid for “nonelderly Medicaid beneficiaries without chronic illness”: Kaiser Family Foundation, 2012: The Role of Medicaid for Adults with Chronic Illnesses. 56,274,369 adult Medicaid enrollees, of which 28%=approx. 15.8 million with CVD x$9,414/year=$148M*.28=$52M in potential savings. Slide @09/01/2016
>20% Lower Lifetime Costs
from 13 years effective K-12 PE/health ed

Note: Preliminary/conceptual based on actual data @08/09/2016. Relative health care cost in 2010 by age for males in US commercial market. If costs are shifted down by 5 years (in effect, the onset & impact of chronic conditions are postponed due to prolonged, effective, early intervention K-12), total amount saved for ages 6-64 is 22%; if shifted down by 10 years, 36% is saved; if shifted down 10 years initially then tapering toward 0 years (i.e., returning toward current actual costs by age 64), 21% is saved. Significant savings start early in life: “Chronic conditions in the young (under age 30) take a higher relative toll on that population than they do for the older population. For commercial members under 30 identified with cancer or circulatory conditions…their costs were much higher on average.” See also Payback slides: EYH pays for itself within 1st year. References: 2010 commercial cost data held by Health Care Cost Institute (HCCI) w/analysis from: Yamamoto, 2013: Health Care Costs—From Birth to Death, sponsored by Society of Actuaries; reduced costs estimated by Edunuty.
<table>
<thead>
<tr>
<th>Condition</th>
<th>Treatment Cost</th>
<th>Prevalence</th>
<th>Reduced Incidence</th>
<th>Grade Levels w/ Most Reduced Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma</td>
<td>$400 (Wang et al, 2005)</td>
<td>6% (Wang et al, 2005)</td>
<td>14% (Katz, Cushman et al, 2010)</td>
<td>Elementary, MS</td>
</tr>
<tr>
<td>ADHD</td>
<td>$800-$1,000 (CDC, 2016; WebMD, 2016; Pelham et al, 2007)</td>
<td>7-9% (Wolraich et al (CDC), 2012/2014; MACPAC, 2015)</td>
<td>33% (Katz, Cushman et al, 2010)</td>
<td>Elementary, [MS]</td>
</tr>
<tr>
<td>Obesity</td>
<td>$600 (Kuhle et al, 2011; Buescher et al, 2008; Hampl et al, 2007)</td>
<td>15% (YRBS - AZ, 2013)</td>
<td>15-20% (Reeves, 2016; DeHeer, 2014; Skinner et al, 2016; Edunuity est.)</td>
<td>[MS], HS</td>
</tr>
<tr>
<td>Depression/BH</td>
<td>$700 (Domino et al, 2009)</td>
<td>3-5% (MACPAC, 2015; Thapar et al, 2012)</td>
<td>26-33% (Shuch et al, 2016)</td>
<td>[MS], HS</td>
</tr>
</tbody>
</table>

Notes: ADHD: attention deficit/hyperactivity disorder. BH: behavioral/mental health. [MS]: moderate cost reduction among middle school students. HS: high school.
NOW:  In “Core” 0-100 A-F School Grading Accountability Formula and/or “Extra Credit” in Formula

Not in formula = implies = physical & health education have zero value

⇒ Schools with good PE/HE outcomes should get the credit they deserve

- note: extra credit is voluntary--doesn't count against schools, only helps their grade

SOON: Expand Empower Youth Health Program (EYH)

Highly effective & accountable AZ PE & nutrition ed. program @$10/student/year at-scale

2012-15: 17% fit to 78% fit, 48% to 54% normal weight; regular FitnessGram assessments

Next: Grow from 20 schools, 16K lower-income students ⇒ 90 schools, 50K+ students @$1M/year

- Then: Keep increasing to all lower-income AZ schools: ~1000 schools?

Co-funding/matching: AZ health sector (e.g., Fit Kids: Northern AZ Healthcare: ~$1M/yr now) + legislature

LONGER-TERM: Build Support for Statewide EYH, Mandates; Grow to $300M/year new money ⇒ K-12

Currently: Standards with zero mandates & little funding imply minimal respect for PE/HE,

PA/Recess, Children’s health + hurt our math scores (Hollar et al, 2010; Hillman & Castelli, 2009)

Fund: minimum required PE, recess time; accountable outcomes assessments; EYH statewide; other TBD

Pay-for-performance based on health outcomes, co-funded with health sector & legislature (1/3 each?)

⇒ Earn Medicaid/CMS co-funding based on health outcomes, beginning with AHCCCS waivers

⇒ Co-funding/matching: AZ health sector, legislature, CMS ($100M each?)
Healthy Future Arizona Initiative

possible new 501(c)(3) ?

• Working title  Healthy Future Arizona (HFA), (future: Healthy Future USA/America)

• First Priority  Scaling Empower Youth Health in AZ (& nationally) to trajectory of
  >20% reduction in chronic diseases & costs

• Follow-on  Co-develop path to ~50% reduction in chronic diseases & costs; including outside schools TBD; dramatically improve other aspects of health; (see below)

• Vision  Arizona as the Healthiest State (& USA as healthiest country)

• Mission  Develop & implement long-term, systemic, sustainable, high-ROI, school-based & related/mutually reinforcing approaches to empower individuals to substantially improve their health, in the broadest sense, & in social context

• “Health”  Physical, cognitive, social-emotional, mental, financial, civic, creative, etc.

• Guidelines  SEAS approaches: Scalable, Effective, Affordable, Self-funding

• ROI-based  Highly results-oriented, quantified, objective, accountable, “speed of biz”; measuring financial, public + private, socioeconomic & quality-of-life returns

• Governance  Independent on-going statewide citizens/community oversight board/“commission” : representative social, economic, political cross-section, incl. key funders

• Funding  Year 1-2 seed funding by leader Founder-Partners → evolving longer-term to sustainably self-funding via HFA value-add
Next Steps: HFA Initiative (cont’d)

key investments in capacity & programs

• Management

  General Management, Strategic Partner Dev. & Relations:
  Health Care, Education, Foundations, Business, School Districts,
  Government (State/County/Local: Education, Public Health, AHCCCS,
  Gov.’s Office, Legislature; Federal: Exec.: CMS etc., Congress)

• EYH Operations

  Training, Field Support, Technical Assistance, Logistics,
  FitnessGram & YRBS Tech Support, Ops. Mgmt./Admin.

• EYH R&D

  Training/Materials/Curric. Dev., Program Improvement & Expansion

• EYH M&E

  FitnessGram, YRBS, Other Assessment & Evaluation, QC Audits, Health Outcomes

• Communications

  With PE/Classroom Teachers, Student Fitness & Nutrition Clubs, School Staff,
  Strategic Partners, Funders, Employees, Public; Reports, Articles;
  Website, Email, Traditional & Social/Digital Media, etc.

• Funding

  Cost-benefit/ROI Research, Grant-writing, Fund-raising, Pay-for-performance

• G&A

  Accounting, HR, IT, Compliance, Internal Audit, Admin. & Office Support

Notes: underlined indicates immediate focuses; bold indicates other current priorities for expanding EYH to more schools; discussion draft slide version @09/01/2016