



Stopping the Spiral: Physical Activity and Pre Diabetes

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Learning Objectives:

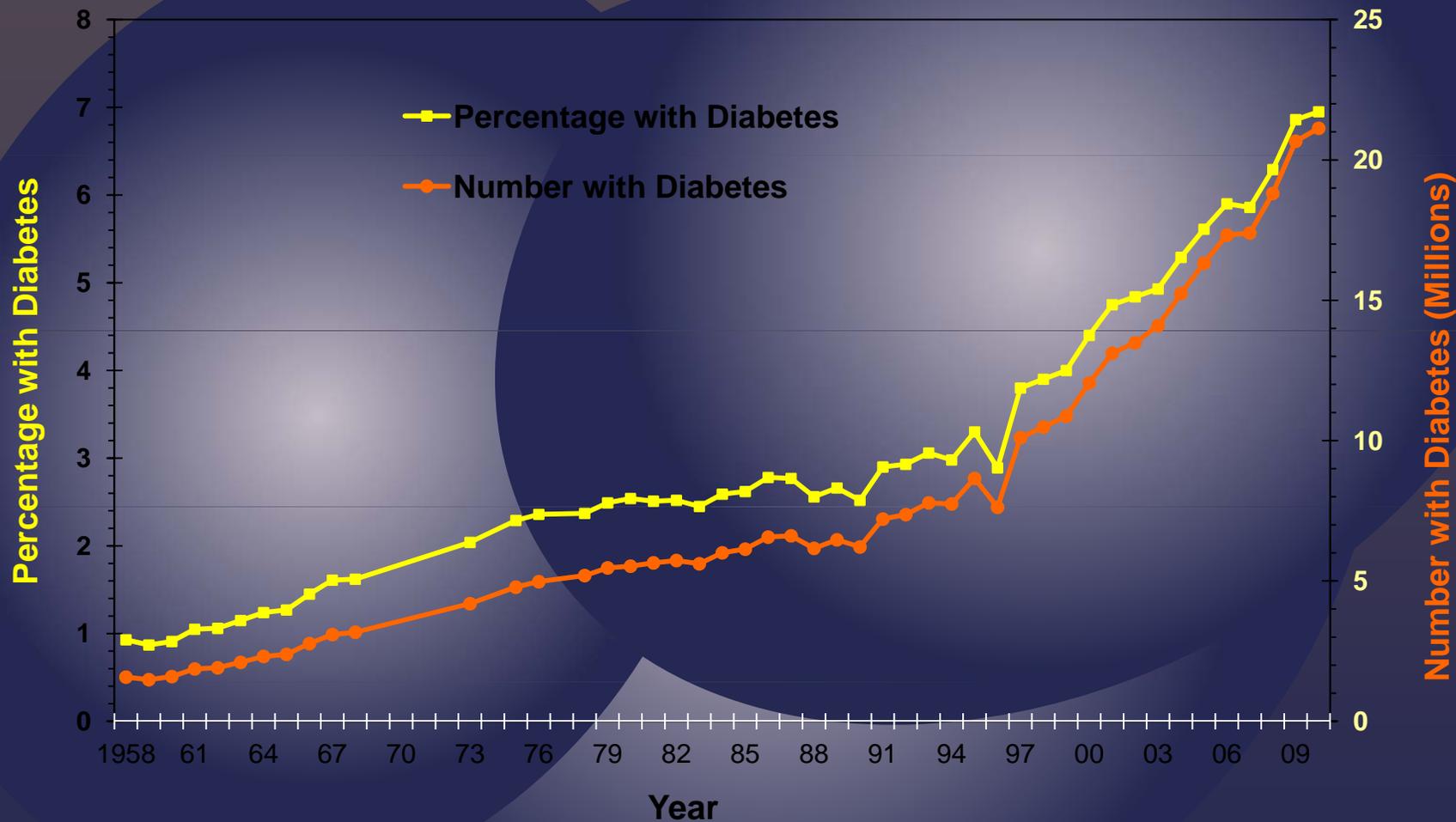
- Participants will be aware of the impact regular physical activity has on preventing conversion from pre diabetes to diabetes
- Participants will be able to make recommendations to their clients/patients on how to integrate physical activity into their treatment



Why do we bother?

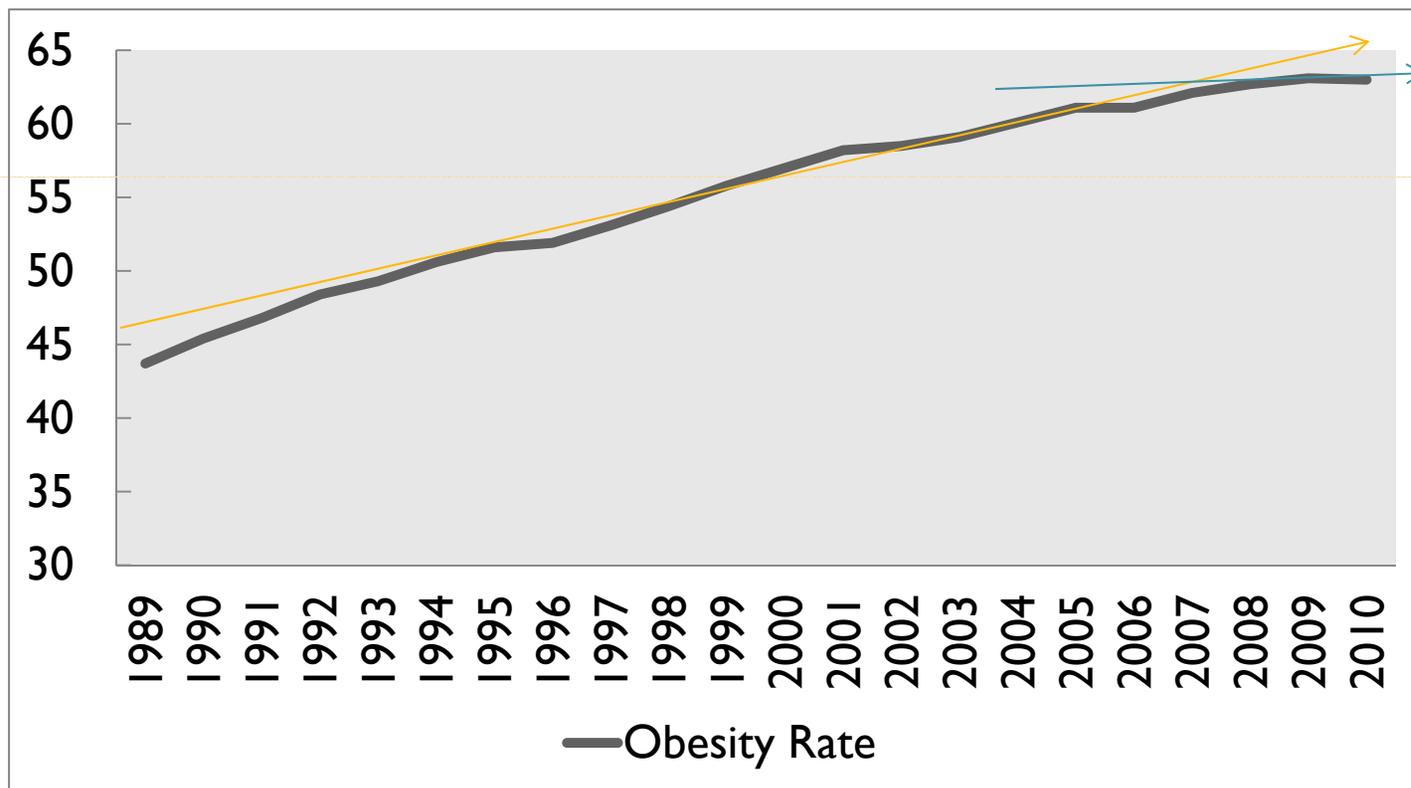
- The number of people with type 2 diabetes is increasing
 - The number of people with pre diabetes is both increasing and somewhat unknown
 - Diabetes is the 6th leading cause of death in Utahns
- Even if we didn't make a change in people with type 2 or pre diabetes, the health benefits are overwhelming

Number and Percentage of U.S. Population with Diagnosed Diabetes, 1958–2010

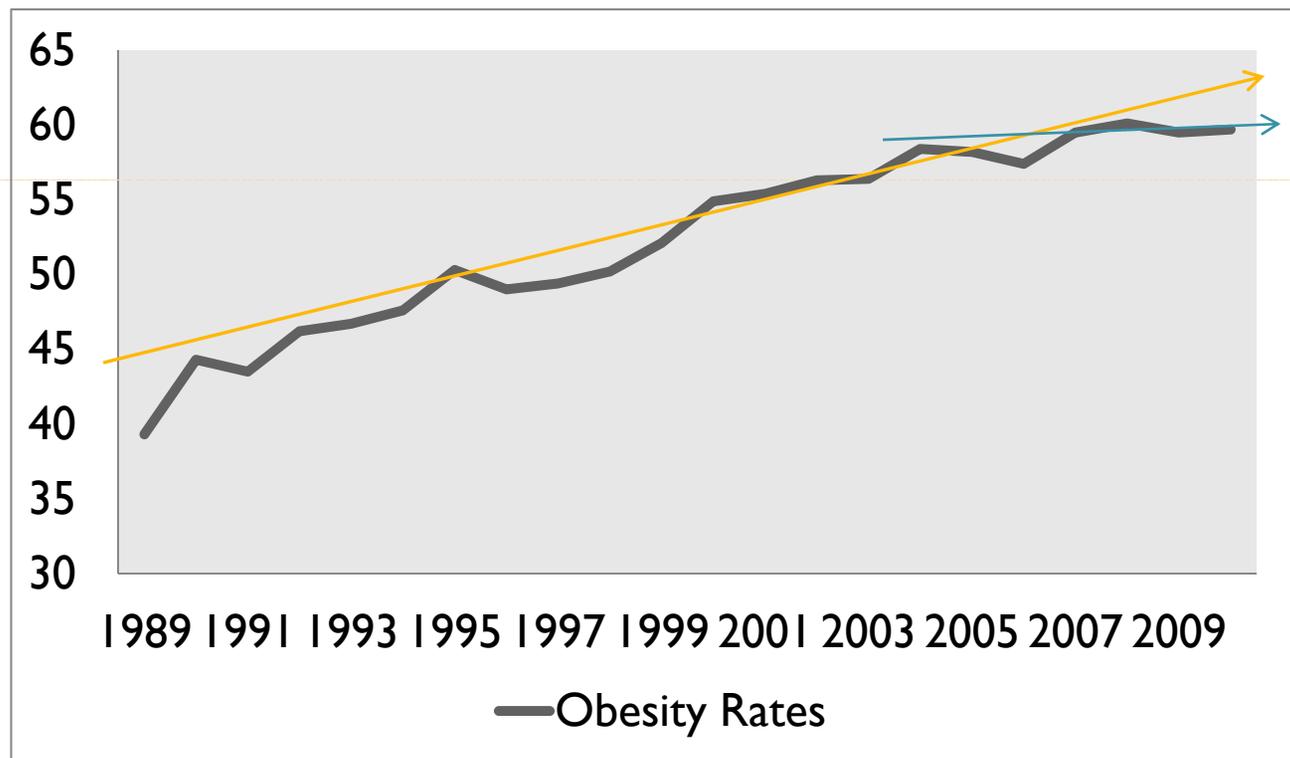


CDC's Division of Diabetes Translation. National Diabetes Surveillance System available at <http://www.cdc.gov/diabetes/statistics>

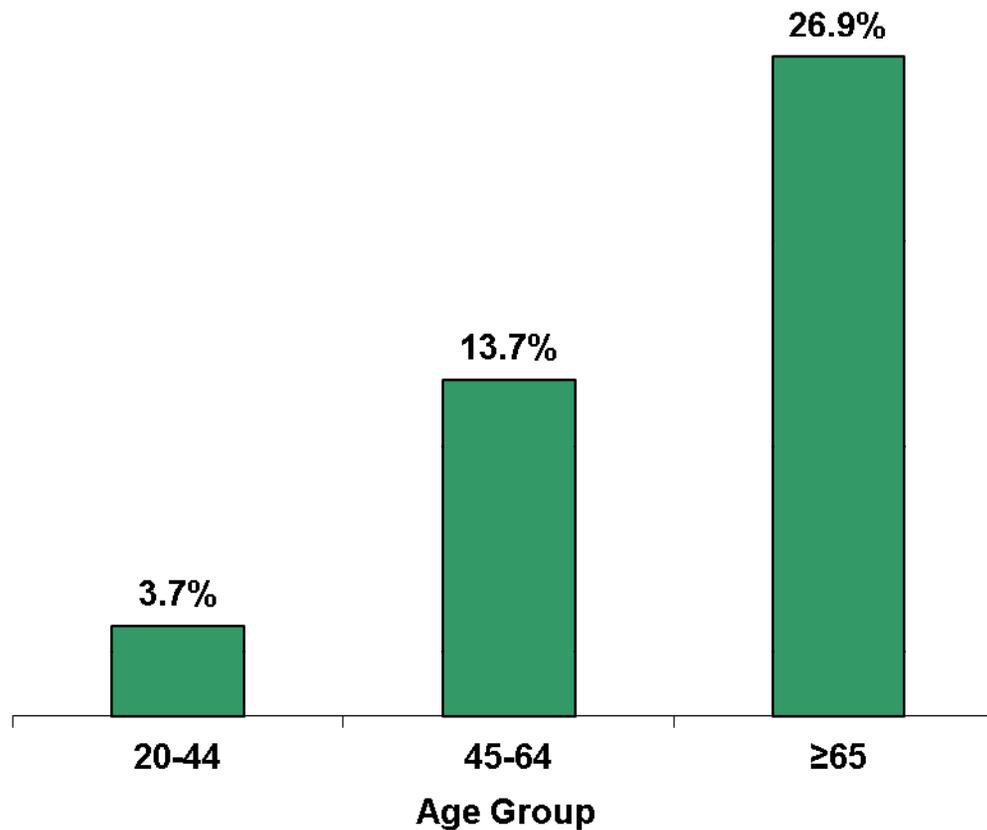
Overweight and Obesity Rates in U.S., 1989-2010



Overweight and Obesity Rates in Utah, 1989-2010



Estimated percentage of people aged 20 years or older with diagnosed and undiagnosed diabetes, by age group, United States, 2005–2008



2005–2008 National Health and Nutrition Examination Survey.

Who is affected the most?

- Older adults
- Hispanic, African American, and Pacific Islander populations
- Lower income populations



Physical Activity as a “Magic Bullet”

- Exercise Dose and Insulin Sensitivity
 - 55 healthy volunteers (BMI 30.5) participated in a 16 week supervised endurance exercise intervention
 - Improved insulin sensitivity was significantly related to exercise dose in a graded dose response relationship.
 - Even an exercise dose of ~400 kcal/week (about 40-50% of guidelines) was associated with a significant improvement in insulin sensitivity

Dube, et al (2012). Exercise dose and insulin sensitivity: relevance for diabetes prevention. *Medicine and Science in Sports and Exercise*, 44: 793-799.

Even in Obese Populations

- Cardiometabolic benefits do not appear to be limited to only the most active individuals; benefits may be achieved by adding as little as 2,500 steps (~1.3 miles walked) per day to baseline activity

Fretts, et al (2012). Modest levels of physical activity are associated with a lower incidence of diabetes in a population with a high rate of obesity: The Strong Heart Family Study. *Diabetes Care*, 35: 1743-1745.



Physical Activity Guidelines for Americans



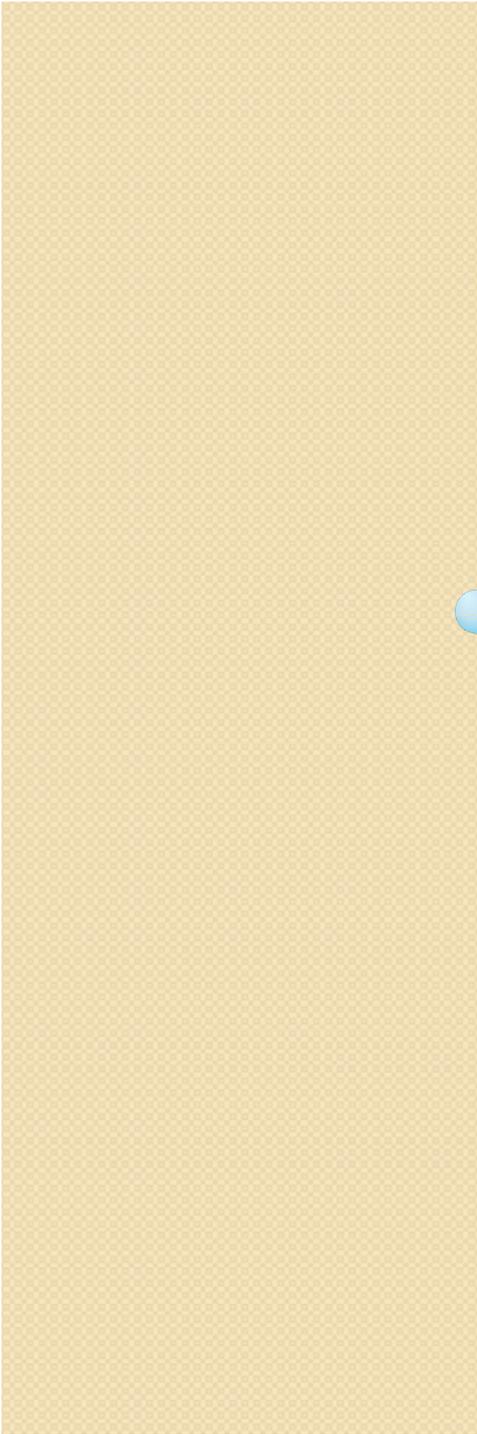
- Adults should strive for
 - At least 150 min/week of moderate physical activity, or 75 min/week of vigorous physical activity
 - Additional benefits occur at 300 min/week
 - Should include at least 2 days of resistance training per week



Physical Activity Guidelines for Americans



- Specifically for people with type 2 diabetes
 - Same as rest of adult population
 - Adapt activity as needed and appropriate for their condition (e.g., monitor glucose before and after, avoid injury to feet)



**PRE DIABETES AND
PHYSICAL ACTIVITY**



Diabetes Prevention

**79 million U.S. adults ages
20 and older have pre-
diabetes**

National Diabetes Fact Sheet, CDC, 2011.

<http://www.cdc.gov/diabetes/pubs/factsheet11.htm>

What is Pre-diabetes?

- Pre-diabetes is a medical condition where blood glucose is higher than normal but not high enough to be diagnosed as diabetes
- It increases the risk for type 2 diabetes and cardiovascular disease
- Most people have pre-diabetes before they develop type 2 diabetes

What is Pre-diabetes?

- Most people with pre-diabetes develop type 2 diabetes within 10 years
- People with pre-diabetes are identified by having a screening test which shows they have an A1C of 5.7% - 6.4%
- **Progression to diabetes is NOT inevitable**



What is Pre-Diabetes?

- Comes before type 2 diabetes
- Blood glucose higher than normal, but not yet diabetes
- You may have pre-diabetes but not know it

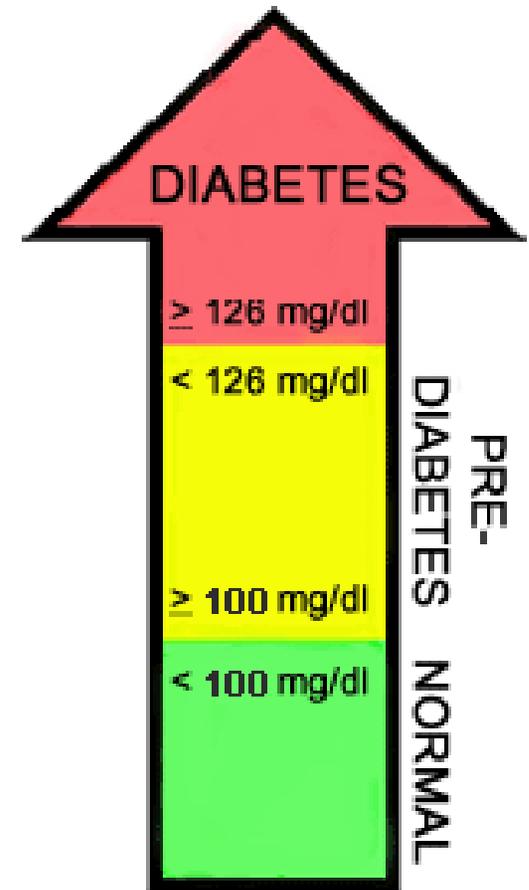
Pre Diabetes

- **Diabetes**

- Fasting blood glucose of 126 mg/dl or higher

- **Pre-diabetes**

- Fasting blood glucose of 100 - 125 mg/dl

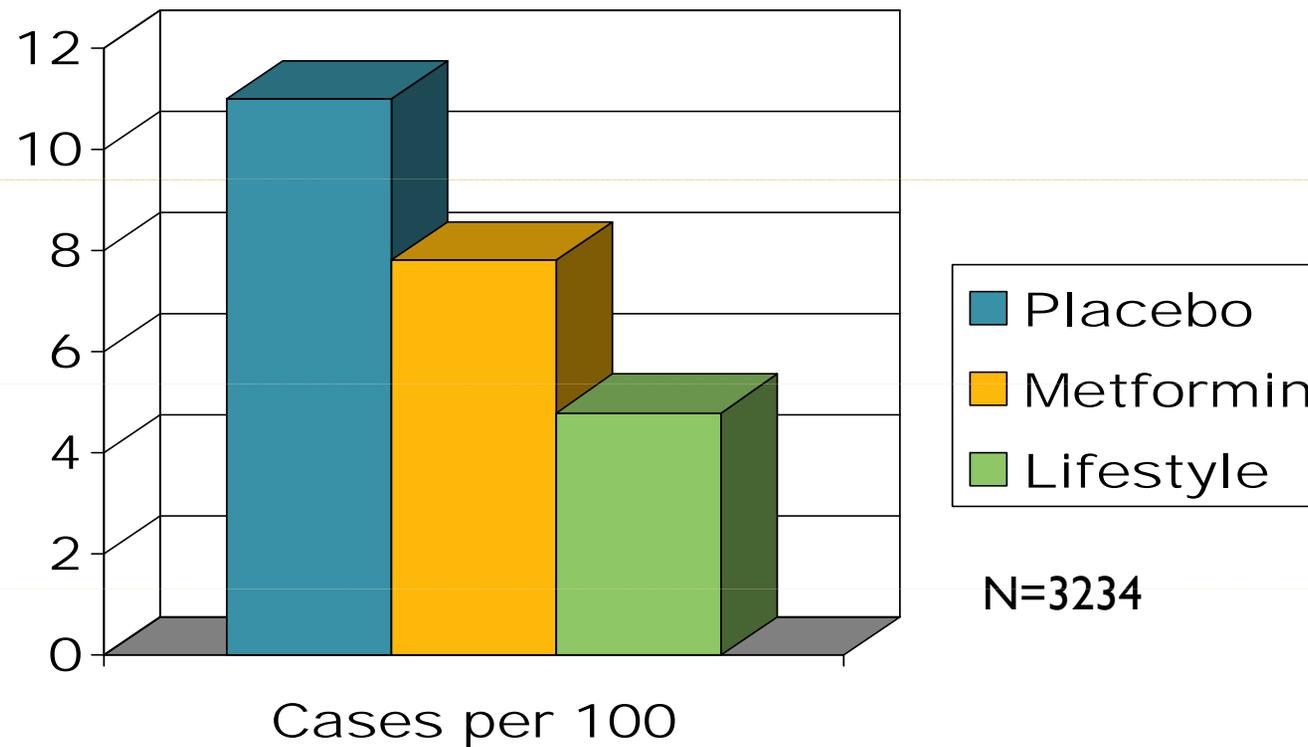




Pre-diabetes

- You might get type 2 diabetes soon or sometime in the future
- You are more likely to get heart disease or have a stroke

Effectiveness of Interventions



Knowler et al, NEJM, 2002

Preventing Diabetes

The Diabetes Prevention Program study found

- ***30 minutes a day of moderate physical activity along with a 5 to 10% weight loss produced a 58% reduction in diabetes***

What Losing 5 to 10% Could Mean

If You Weigh:	Losing 5 to 10% is
150 pounds	8 to 15 pounds
175 pounds	9 to 18 pounds
200 pounds	10 to 20 pounds
225 pounds	11 to 23 pounds
250 pounds	13 to 25 pounds
300 pounds	15 to 30 pounds



Diabetes Prevention Program Outcomes Study (DPPOS)

- Follow-up study to the DPP

- Assess the long-term effects of the DPP interventions on the development of type 2 diabetes and its complications

Diabetes Prevention Program Outcomes Study (DPPOS)

After 10 years' follow up:

Lifestyle intervention

- Reduced the rate of developing type 2 diabetes by 34%
- Reduced the rate of developing type 2 diabetes by 49% in those age 60 and older
- Delayed type 2 diabetes by about 4 years
- Reduced cardiovascular risk factors
- Reduced A1C

Diabetes Prevention Program Research Group (2009). 10-year follow-up of diabetes incidence and weight loss in the Diabetes Prevention Program Outcomes Study. *The Lancet* Vol.374, No. 9702.

Available at <http://www.thelancet.com/journals/lancet/article/PIIS0140-6736%2809%2961457-4/fulltext#>

Diabetes Prevention Program Outcomes Study (DPPOS)

At 10 years' follow up,:

Metformin

- Reduced the rate of developing diabetes by 18% compared with placebo.
- Delayed diabetes by 2 years compared with placebo.
- Reduced A1C and fasting glucose compared with placebo.

Diabetes Prevention Program Outcomes Study (DPPOS)

Preliminary results

- 8% of participants with pre-diabetes had diabetic eye disease (retinopathy)
- 12.6% of participants with type 2 diabetes who developed diabetes during the DPP had diabetic eye disease

The findings suggest that patients with pre-diabetes or newly diagnosed type 2 diabetes should be screened for retinopathy.

Does the Effect Last?

- The Pre-diabetes Risk Education and Physical Activity Recommendation and Encouragement (PREPARE) study
 - Ninety-eight overweight or obese individuals with impaired glucose tolerance were randomized to receive: (1) advice leaflet, (2) 3-h structured education program aimed at promoting physical activity, (3) 3-h structured education with personalized pedometer use.
 - The primary outcome was change in 2-h post-challenge plasma glucose.
 - Significant improvements were sustained at 24 months in pedometer group compared to control, but not significant in education only

- Yates T, Davies MJ, Sehmi S, Gorely T, Khunti K. (2011). The Pre-diabetes Risk Education and Physical Activity Recommendation and Encouragement (PREPARE) programme study: are improvements in glucose regulation sustained at 2 years? *Diabetes Medicine*, Oct. 28, 10: 1268-71

Who is affected the most?

- Older adults
- Hispanic, African American, and Pacific Islander populations
- Lower income populations





Double Impact

- These are the populations who are often less active!



How to Reach These Populations

- Meet them where they are
 - Talking about 5k races may be motivational, but small steps that can be taken every day are more effective
- Doctor's orders
 - Where possible, systems should include regular physical activity in patient instructions
- Support in the community
 - Find social support systems and environments to encourage regular activity

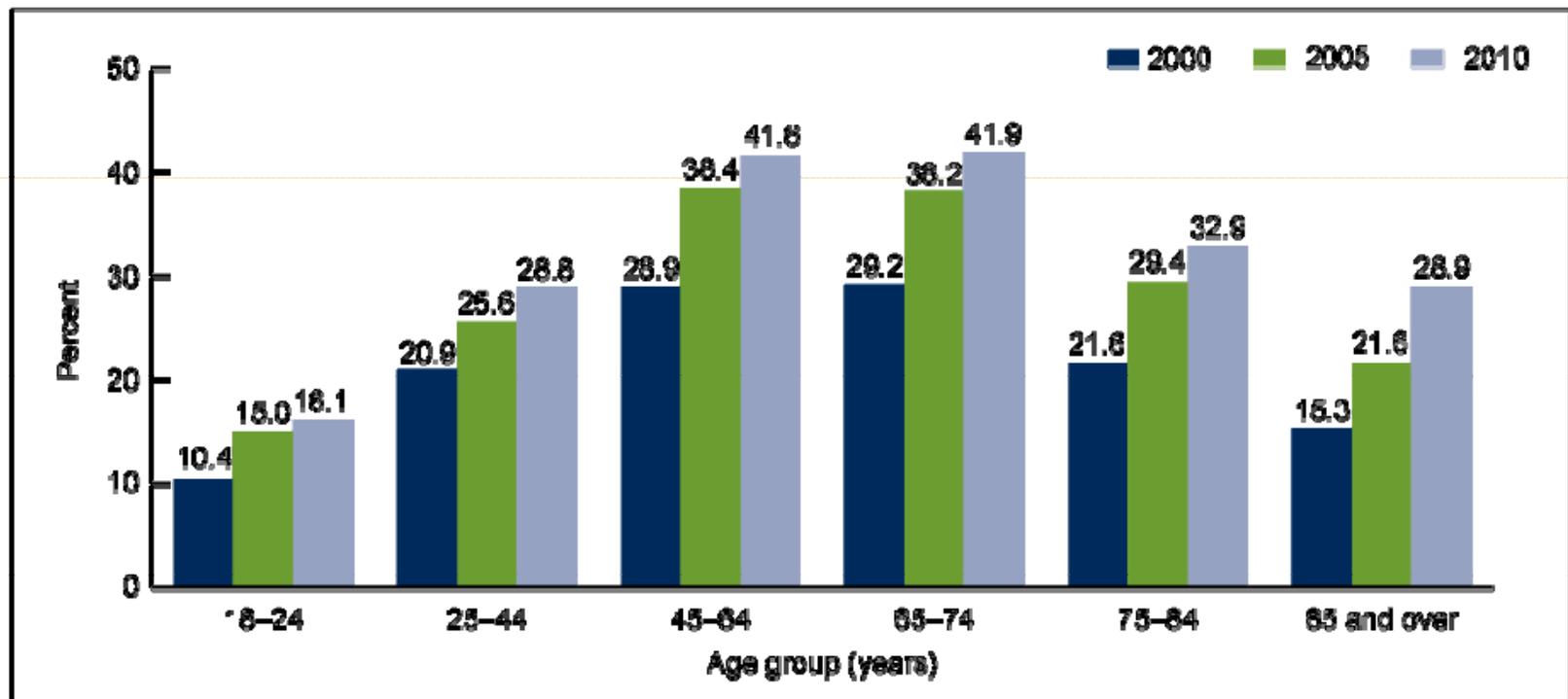
What Can We Say/Do to Help

- If you see something, say something
 - Not just for Homeland Security anymore
- Exercise is Medicine
 - American College of Sports Medicine
 - <http://www.exerciseismedicine.org/>
- Doing anything is better than doing nothing



Are We Sharing the Message?

Figure 2. Percentage of adults aged 18 and over whose physician or other health professional recommended exercise or physical activity, by age group and year: United States, 2000, 2005, and 2010

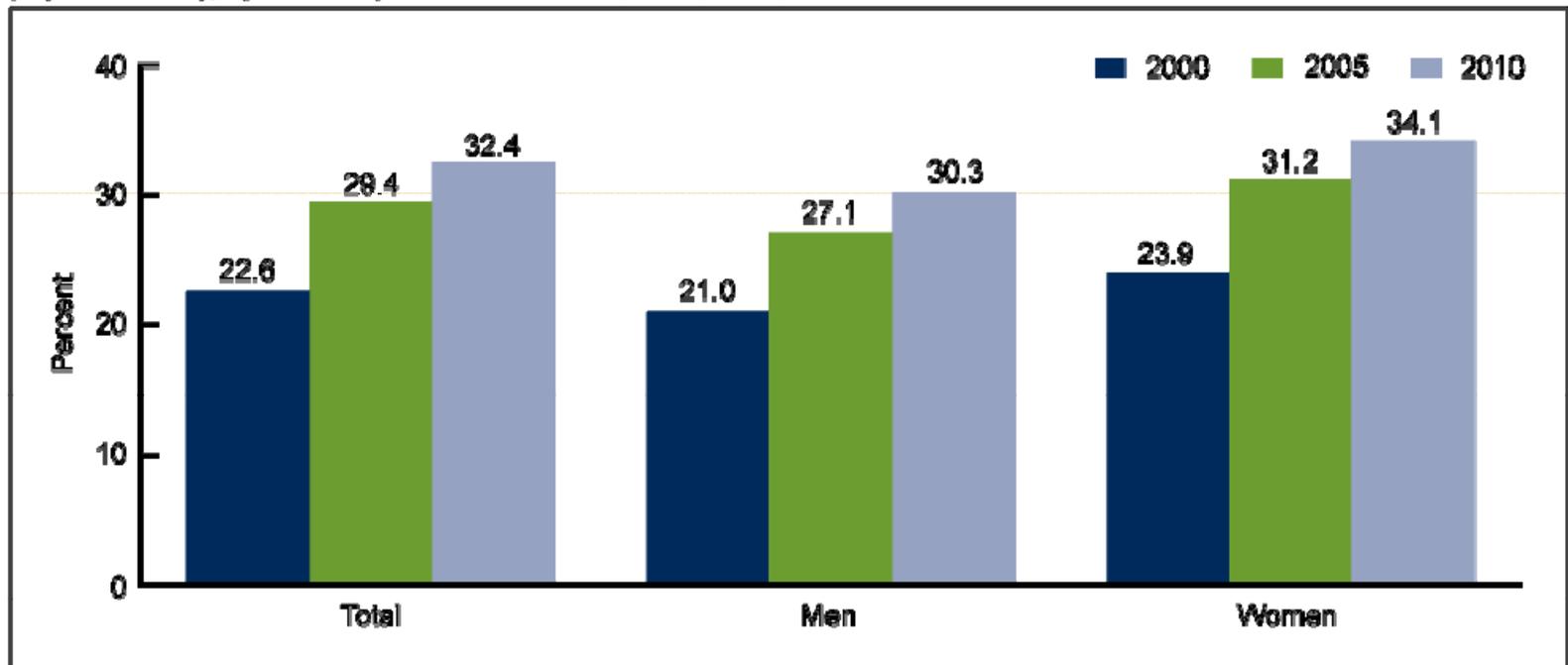


NOTE: Denominator is adults aged 18 and over who had seen a physician or other health professional in the past 12 months. Access data table for Figure 2 at http://www.cdc.gov/nchs/data/tables/tables/1b00_tables.pdf#2.

SOURCE: CDC/NCHS National Health Interview Survey.

Are We Sharing the Message?

Figure 1. Percentage of adults aged 18 and over whose physician or other health professional recommended exercise or physical activity, by sex and year: United States, 2000, 2005, and 2010



NOTES: Denominator is adults aged 18 and over who had seen a physician or other health professional in the past 12 months. Age-adjusted to the 2000 U.S. standard population. Access data table for Figure 1 at http://www.cdc.gov/nchs/data/data/briefs/b366_tables.pdf#1.

SOURCE: CDC/NCHS, National Health Interview Survey.



**“I see you’ve doubled your amount of daily exercise.
Unfortunately, two times nothing is still nothing.”**

What will that impact be?

- We have the capacity to slow and even reverse the trend
 - However, it will take changing the systems, the environment, and the culture to make regular physical activity the default



5 SOLUTIONS FOR CHANGING OUR COMMUNITIES

INTEGRATE PHYSICAL ACTIVITY
EVERY DAY IN EVERY WAY.

STRENGTHEN SCHOOLS AS
THE HEART OF HEALTH.

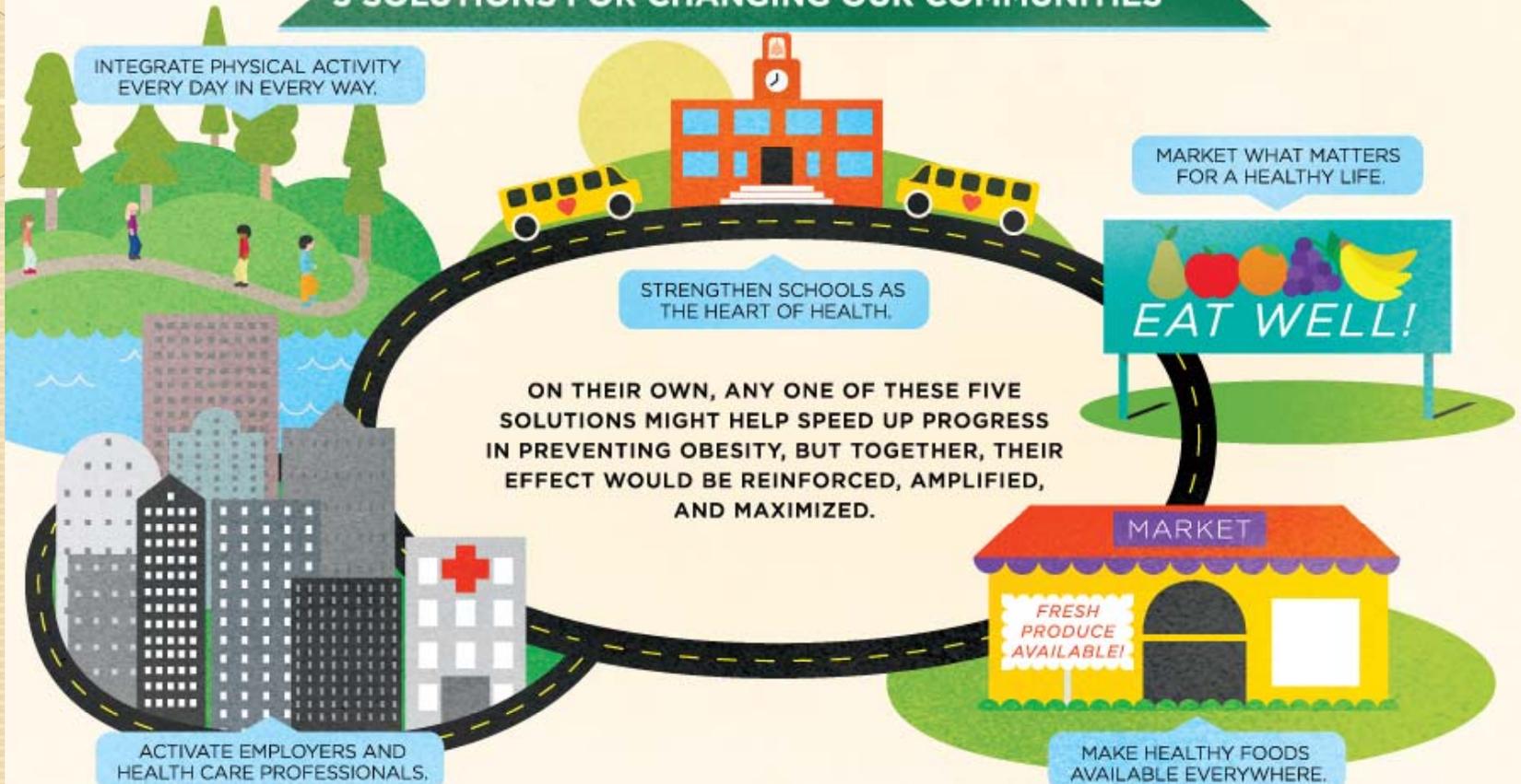
MARKET WHAT MATTERS
FOR A HEALTHY LIFE.

EAT WELL!

ON THEIR OWN, ANY ONE OF THESE FIVE
SOLUTIONS MIGHT HELP SPEED UP PROGRESS
IN PREVENTING OBESITY, BUT TOGETHER, THEIR
EFFECT WOULD BE REINFORCED, AMPLIFIED,
AND MAXIMIZED.

ACTIVATE EMPLOYERS AND
HEALTH CARE PROFESSIONALS.

MAKE HEALTHY FOODS
AVAILABLE EVERYWHERE.





“Walk your dog every day, even if
you don’t have a dog”

--Per Ostrand



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Questions?

- [Diabetes Res Clin Pract](#). 2010 Oct;90(1):15-21. doi: 10.1016/j.diabres.2010.04.011. Epub 2010 Aug 19.

- **Physical activity and health-related quality of life in individuals with prediabetes.**

- [Taylor LM](#), [Spence JC](#), [Raine K](#), [Plotnikoff RC](#), [Vallance JK](#), [Sharma AM](#).

- **Source**

- Faculty of Physical Education and Recreation, University of Alberta, Edmonton, Alberta, Canada. lmtaylor@ualberta.ca

- **Abstract**

- **OBJECTIVE:**

- The objective of this study was to determine if differences existed in health-related quality of life (HRQoL) between individuals with prediabetes who are physically active (i.e., achieving ≥ 600 MET min per week) compared to those who are inactive.

- **METHOD:**

- Individuals with prediabetes (N=232) residing in Northern Alberta, Canada completed a mailed questionnaire assessing self-reported PA, and health-related quality of life in August-September 2008.

- **RESULTS:**

- Thirty-eight percent of individuals with prediabetes were meeting prediabetes PA guidelines. Covarying on age, gender, income, smoking and BMI, a significant multivariate analysis of covariance model [Wilks'lambda=0.967, F(2,224)=3.791, p<.05] indicated those achieving PA guidelines reported higher Physical Health (Mean diff=2.7, p<.05, ES=.27) and Mental Health (Mean diff=3.0, p<.05, ES=.31) compared to those not achieving PA guidelines.

- **CONCLUSION:**

- These findings demonstrate people with prediabetes who achieve prediabetes PA guidelines have higher levels of physical and mental HRQoL than people who are inactive. Further, these results support the rationale for developing strategically designed PA programs for individuals with prediabetes.