

# Preventing Type 2 Diabetes in Colorado Communities: An Evaluation of the National Diabetes Prevention Program

CANCER, CARDIOVASCULAR AND PULMONARY DISEASE GRANT PROGRAM

HEALTH DISPARITIES GRANT PROGRAM | FY16-18

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# Collaborative Partnership

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## PiER Center Evaluation Team

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## CDPHE CCPD Team

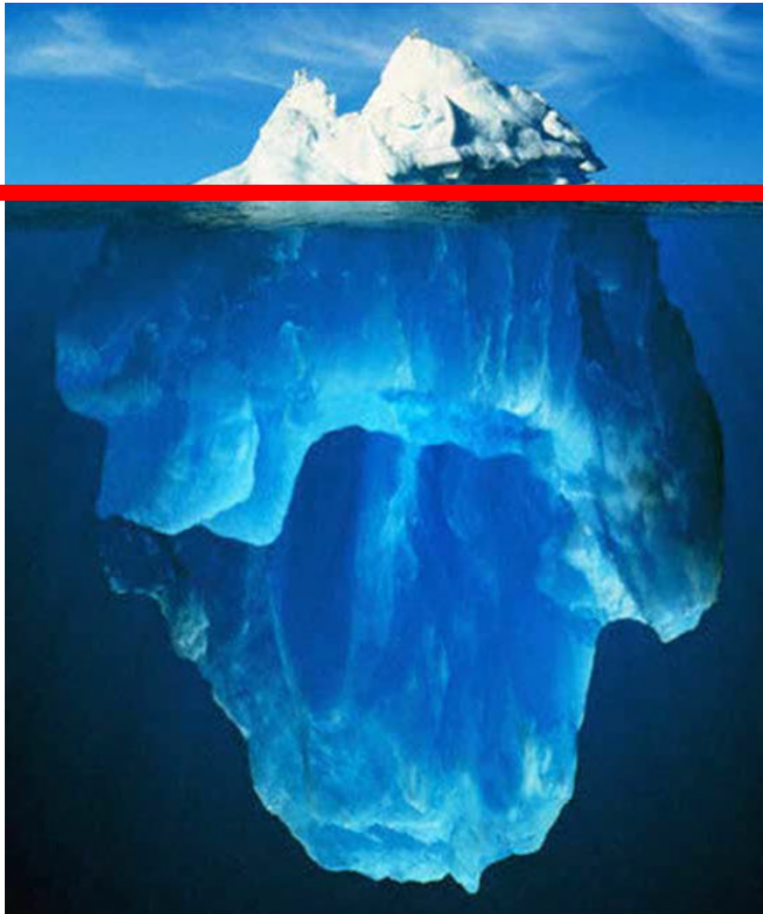
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CCPD NDPP Grantees FY16-18

HDGP NDPP Grantees FY16-18

# Diabetes in Colorado

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410,000 with Diabetes

1.5 million with Prediabetes

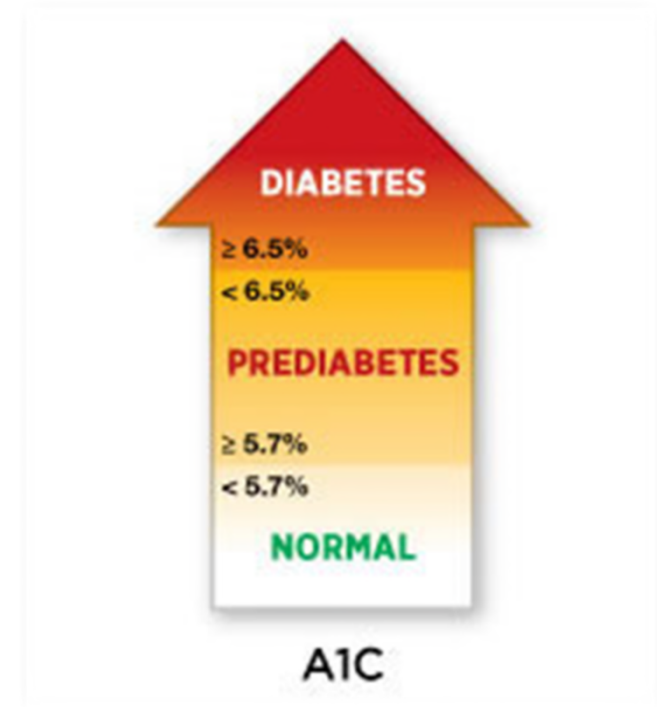
# What is Prediabetes?

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A blood sugar level that is higher than normal but not high enough to be classified as diabetes

Without lifestyle changes, 15-30% of people with prediabetes will develop type 2 diabetes within five years

Few Coloradans (7%) are aware of their risk for prediabetes



*American Diabetes Association, 2016*

# National Diabetes Prevention Program

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The National Diabetes Prevention Program (NDPP) is a CDC-recognized, evidence-based program to prevent type 2 diabetes.

- Based on randomized control clinical research trials led by NIH & CDC.
- Year-long lifestyle change program, includes 16 sessions in the first 6 months, followed by six monthly sessions.
- Facilitated by trained Lifestyle Coaches in community organizations, clinics, worksites, and online.

## Evidence-based:

- 5% to 7% body weight loss and increased physical activity to 150 minutes/wk reduced risk of developing type 2 diabetes by 58%

# Amendment 35: CCPD & HDGP Grants Programs

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In 2004 Colorado voters approved Amendment 35, a tax increase on cigarettes and other tobacco products. The revenue was designated for health care services and tobacco education to improve the health of all Coloradans.

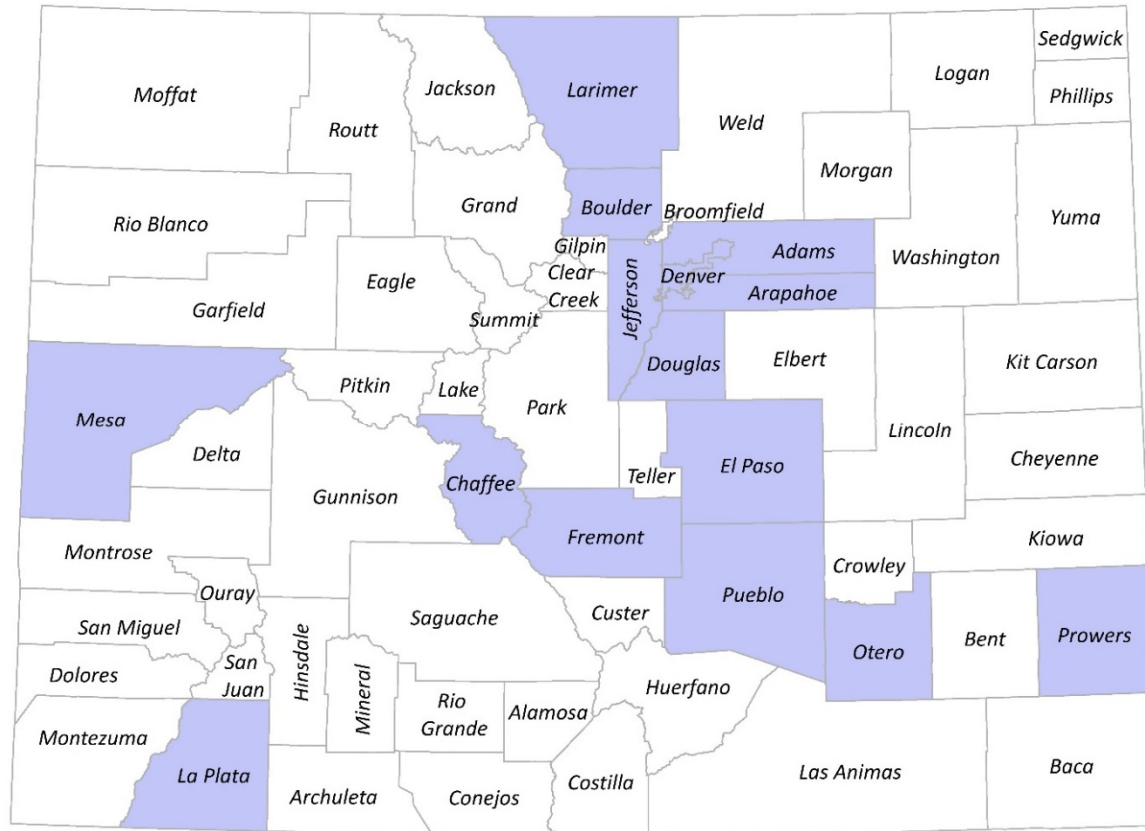
The **Cancer, Cardiovascular and Chronic Pulmonary Disease Grants Program (CCPD)** funds programs for prevention, early detection, and treatment of cancer, cardiovascular disease, and chronic pulmonary disease.

The **Health Disparities Grant Program (HDGP)** was created to "provide prevention, early detection, and treatment of cancer and cardiovascular and pulmonary diseases to under-represented populations" (CRS 25-4 2201 (2)).

# NDPP Grantees (FY16-18)

CCPD (8 Grantees)	\$ Invested
American Diabetes Association	<b>\$3.3 Million</b>
Center for African American Health	
Chaffee County Public and Environmental Health	
Denver Health and Hospital Authority	
Mesa County Health Department	
Penrose – St. Francis Health Center	
Southeast Mental Health Services – Southeast Health Group	
Tri-County Health Department	
HDGP Grantees (3 grantees)	\$ Invested
American Diabetes Association	<b>\$1.7 Million</b>
CREAndo Bienestar	
YMCA of Metropolitan Denver	

# CCPD & HDGP NDPP Coverage



**11 Grantees**  
~\$5 million invested (FY16-18)

**110 NDPP Sites**  
**242 NDPP Cohorts**

**15 Counties**



# Expectations of Grantees

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Develop infrastructure to implement the CDC-recognized NDPP

Enroll at-risk people in the NDPP

- Establish partnerships with health care providers to develop referral systems
- Outreach to priority populations with high risk of developing type 2 diabetes

Deliver the NDPP per the CDC standards

Provide feedback to referring health care providers

Work toward program sustainability

Optional: add additional supports to increase engagement and retention (e.g. physical activity classes, transportation, child care, etc.)

# Evaluation Questions

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1. Who was reached through NDPP?
  - 1+ sessions attended
2. Who was most likely to complete NDPP?
  - 9+ sessions attended
  - Individual-level characteristics
3. How effective were NDPP participants at achieving:
  - $\geq 5\%$  body weight loss?
  - $>150$  minutes/week of physical activity (PA)?

# Methods

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Data collected annually (July 2015-June 2018)

Deidentified data submitted to PiER Center for evaluation

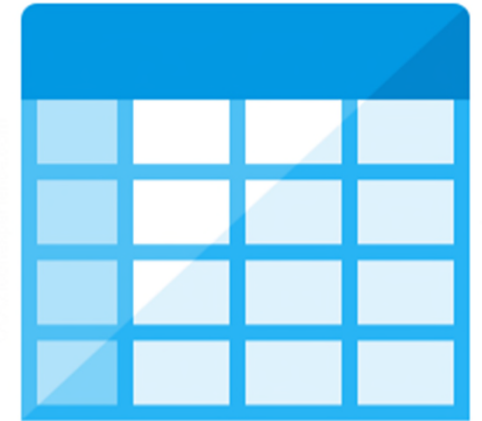
Descriptive statistics (overall sample and subsample)

- Reach

Mixed-level regression (subsample) *(Zhang et al., JAMA 1998)*

- Completing NDPP
- Health outcomes

*\*Subsample included participants enrolled for  $\geq 6$  months with a method of prediabetes determination and 2+ weight or physical activity measurements, respectively.*



# Results: NDPP Reach

Baseline Sample Characteristics	NDPP Participants (n=2,764)	Colorado (n=5.5M)
Gender		
Male	17.5%	51.4%
Female	<b>82.5%</b>	49.6%
Age (Years)	54.4 ± 34.3	36.7 ± 0.2
Race/Ethnicity		
Hispanic	<b>44.2%</b>	21.5%
NH Black	6.3%	4.5%
NH White	34.9%	68.3%
Other/Unknown	14.7%	4.7%
Weight (Pounds)	193.7 ± 45.80	182.1 (CDC)
% Meets Physical Activity Guidelines	50%	60.5% (BRFSS)

(Attending 1+ session; n=2,764)

# Results: Meeting Completion Threshold

(Attending 9+ Sessions; n=1,950)

- **1,460 (75%)** of 1,950 participants met the completion threshold
- Likelihood of meeting completion threshold (after controlling for covariates):
  - Hispanic 14% less likely vs. Non-Hispanic White
  - Non-Hispanic Black 17% more likely vs. Non-Hispanic White
  - Referred by Healthcare Providers 10% less likely vs. Other
- No differences across age groups, gender, method of pre-diabetes determination, and insurance status.

Independent Variable	Relative Risk	95% CI	p-value
Race/Ethnicity (ref=NHW)			
Hispanic	0.86	(0.76, 0.97)	0.0157
Non-Hispanic Black	1.17	(1.00, 1.36)	0.0488
Other/Unknown	1.01	(0.92, 1.11)	0.8016
Healthcare Provider Referral (ref=Other)	0.90	(0.83, 0.98)	0.0189

# Results: Achieved $\geq 5\%$ weight loss

(Adults enrolled in NDPP for at least 6 months with 2+ weight measurements and a method of prediabetes determination)

- **592 (30%)** of 1,950 participants achieved  $\geq 5\%$  weight loss
- Likelihood of achieved  $\geq 5\%$  weight loss (after controlling for covariates):
  - Meeting PAG 48% more likely vs. not meeting PAG.
- No differences across:
  - age groups
  - gender
  - race/ethnicity
  - method of pre-diabetes determination
  - referral method and
  - insurance status

Independent Variable	Relative Risk	95% CI	p-value
Physical Activity $\geq 150$ Min/Week (ref= $<150$ Min/Week)	1.48	(1.26, 1.74)	$<0.0001$

# Results: Achieved $\geq 150$ min/wk PA

*(Adults enrolled for at least 6 months with 2+ weight/PA measurements, a method of prediabetes determination)*

- **589 (75%)** of 940 participants met physical activity guidelines (PAG;  $\geq 150$  min/wk)
- Likelihood of meeting PAG (after controlling for covariates):
  - Males 25% more likely vs. Females
  - Non-Hispanic Black 22% less likely vs. Non-Hispanic White
  - Uninsured ~30% less likely vs. Insured
  - Achieved  $\geq 5\%$  weight loss 26% more likely

- No differences across:
  - age groups
  - referral status

Independent Variable	Relative		
	Risk	95% CI	p-value
Male Gender (ref=Female)	1.25	(1.13, 1.39)	<0.001
Non-Hispanic Black (ref=NHW)	0.78	(0.61, 0.98)	0.04
Medicare/Medicaid (ref=Uninsured)	1.30	(1.04, 1.63)	0.02
Private (ref=Uninsured)	1.27	(1.01, 1.60)	0.04
Other/Unknown (ref=Uninsured)	1.31	(1.05, 1.65)	0.02
$\geq 5\%$ Weight Loss (ref=<5% weight loss)	1.26	(1.16, 1.37)	<0.001

# Summary of Findings: NDPP Reach

Enrolled (1+)

Inclusion Criteria

Attendance Threshold

Colorado CCPD  
& HDGP NDPP

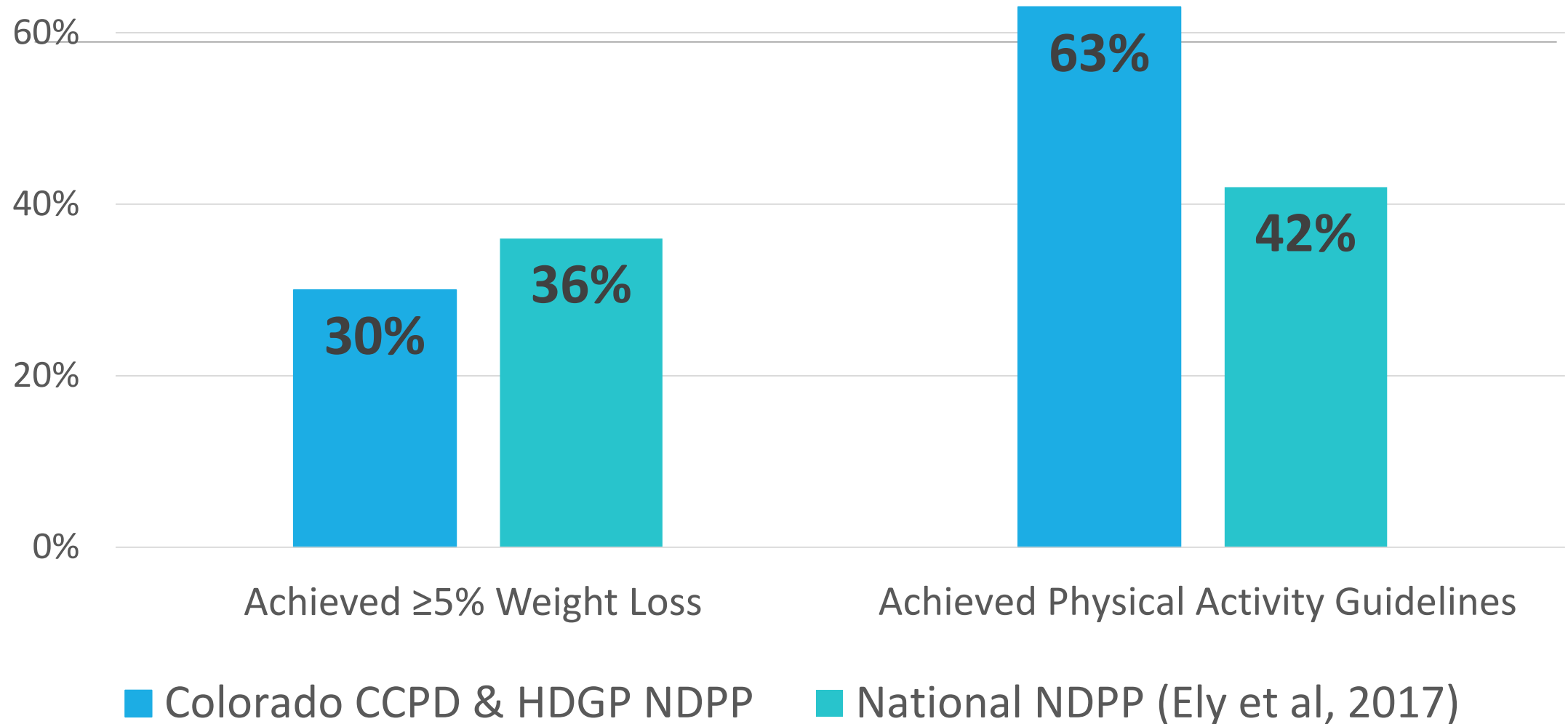
2,764

National NDPP  
(Ely et al 2017)

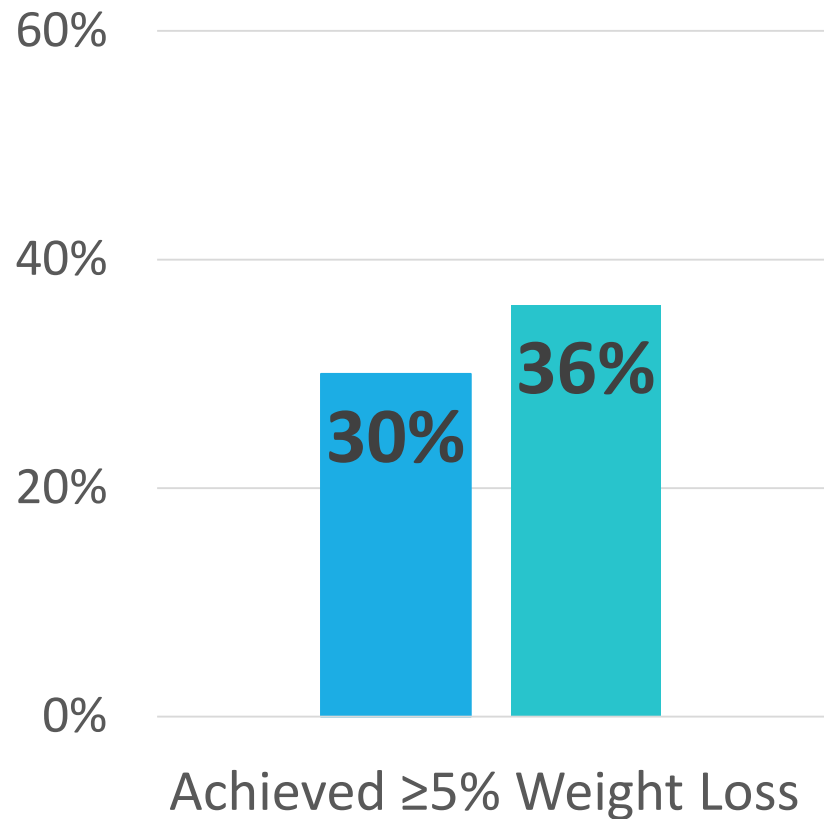
14,747



# Summary of Findings: Health Outcomes

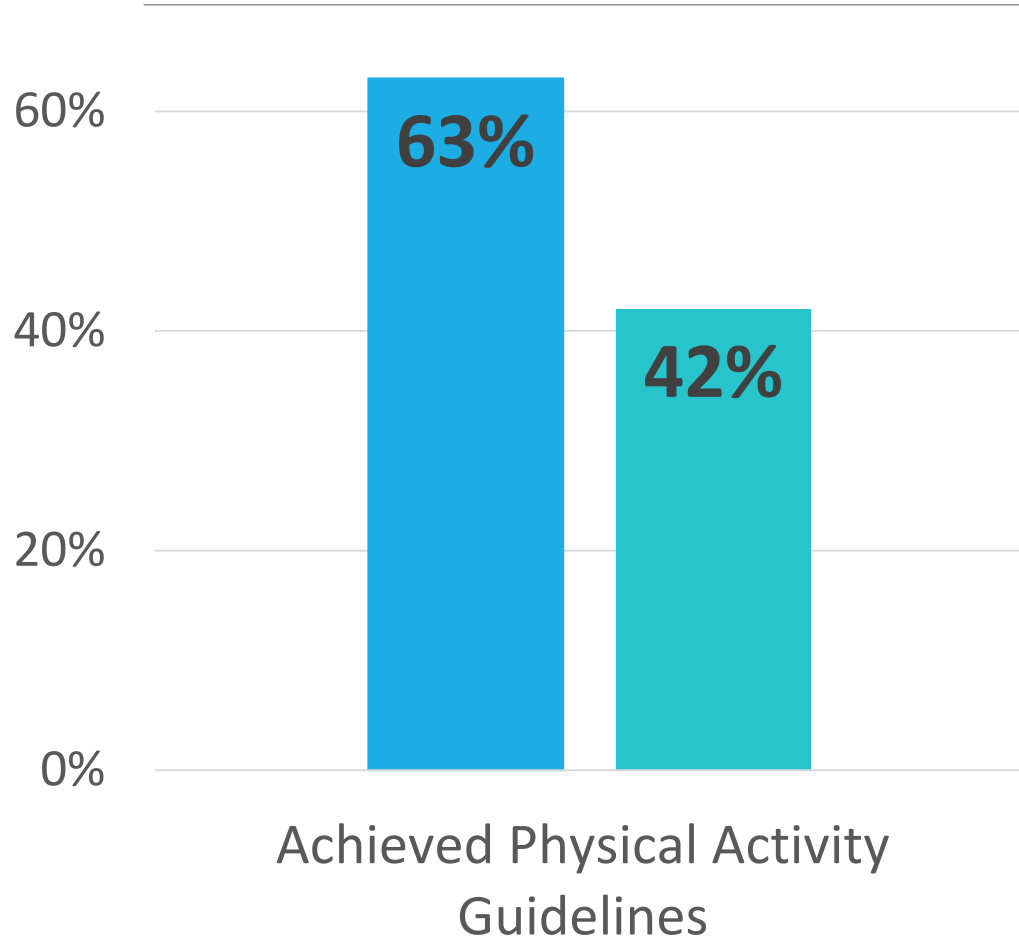


# Summary of Findings: Weight Outcomes



<b>Outcome</b>	<b>CCPD/HDGP NDPP</b>	<b>National NDPP</b>
Initial Weight	195 lbs.	213 lbs.
% Change in Weight	-3.7%	-4.2%

# Summary of Findings: PA Outcomes



Outcome	CCPD/HDGP NDPP	National NDPP
Avg. PA (min/wk)	178	152
% Change in PA	+29%	-10%

# Discussion: Effectively Engaging Populations

<b>Observations</b>	<b>Discussion Questions</b>
<p>Grantees reached a high proportion of Hispanic participants.</p>	<p>What strategies can NDPP providers use to keep these participants engaged in the program longer?</p>
<p>A majority of NDPP participants were females.</p>	<p>What strategies can NDPP providers use to enroll more men in the program? Other priority populations?</p>
<p>Overall, reach was low compared to the population at-risk for developing type 2 diabetes.</p>	<p>How do we continue to scale these programs to reach more people?</p>

# Questions?

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# What's the Relative Risk?

## A Method of Correcting the Odds Ratio in Cohort Studies of Common Outcomes

Jun Zhang, MB, PhD; Kai F. Yu, PhD

Logistic regression is used frequently in cohort studies and clinical trials. When the incidence of an outcome of interest is common in the study population ( $>10\%$ ), the adjusted odds ratio derived from the logistic regression can no longer approximate the risk ratio. The more frequent the outcome, the more the odds ratio overestimates the risk ratio when it is more than 1 or underestimates it when it is less than 1. We propose a simple method to approximate a risk ratio from the adjusted odds ratio and derive an estimate of an association or treatment effect that better represents the true relative risk.

*JAMA.* 1998;280:1690-1691

# Results: Meeting Completion Threshold

(Attending 9+ Sessions; n=1,950)

Independent Variable	Relative Risk	95% CI	p-value
Gender, Male (ref=Female)	0.98	(0.92, 1.06)	0.6809
Age Group (ref=18-44)			
45-65	1.05	(0.99, 1.12)	0.1251
65+	1.08	(0.99, 1.18)	0.0687
Race/Ethnicity (ref=NHW)			
Hispanic	0.86	(0.76, 0.97)	0.0157
Non-Hispanic Black	1.17	(1.00, 1.36)	0.0488
Other/Unknown	1.01	(0.92, 1.11)	0.8016
Prediabetes Determination (ref=Glucose)			
Gestational Diabetes	0.93	(0.78, 1.11)	0.4299
Risk Test	0.97	(0.91, 1.03)	0.3132
Multiple Methods	0.98	(0.91, 1.05)	0.5568
Insurance Status (ref=Uninsured)			
Medicare/Medicaid	1.00	(0.90, 1.11)	0.9487
Private	1.01	(0.92, 1.11)	0.8156
Other/Unknown	0.94	(0.86, 1.03)	0.1560
Healthcare Provider Referral (ref=Other)	0.90	(0.83, 0.98)	0.0189

# Results: Achieved $\geq 5\%$ weight loss (n=1,950)

Independent Variable	Relative Risk	95% CI	p-value
Male Gender (ref=Female)	0.99	(0.83, 1.18)	0.8832
Age Group (ref=18-44)			
45-65	1.15	(0.95, 1.40)	0.1518
65+	1.24	(0.98, 1.56)	0.0733
Race/Ethnicity (ref=NHW)			
Hispanic	0.94	(0.75, 1.19)	0.6273
Non-Hispanic Black	0.73	(0.47, 1.14)	0.1628
Other/Unknown	0.83	(0.68, 1.01)	0.0626
Prediabetes Determination (ref=Glucose)			
Gestational Diabetes	1.11	(0.74, 1.66)	0.6224
Risk Test	0.93	(0.79, 1.09)	0.3738
Multiple Methods	1.14	(0.89, 1.45)	0.3094
Insurance Status (ref=Uninsured)			
Medicare/Medicaid	0.82	(0.61, 1.11)	0.1964
Private	0.93	(0.69, 1.25)	0.6264
Other/Unknown	0.85	(0.64, 1.12)	0.2423
Healthcare Provider Referral (ref=Other)	1.05	(0.88, 1.25)	0.6082
<b>Physical Activity <math>\geq 150</math> Min/Week (ref=<math>&lt;150</math> Min/Week)</b>	1.48	(1.26, 1.74)	<b><math>&lt;0.0001</math></b>



# Results: Achieved $\geq 150$ min/wk PA (n=940)

Independent Variable	Relative Risk	95% CI	p-value
<b>Male Gender (ref=Female)</b>	1.25	(1.13, 1.39)	<b>&lt;0.0001</b>
Age Group (ref=18-44)			
45-65	0.95	(0.83, 1.08)	0.4205
65+	1.03	(0.89, 1.19)	0.7324
Race/Ethnicity (ref=Non-Hispanic White)			
Hispanic	0.90	(0.78, 1.03)	0.1380
<b>Non-Hispanic Black</b>	0.78	(0.61, 0.98)	<b>0.0371</b>
Other/Unknown	1.04	(0.93, 1.17)	0.4469
Method of Prediabetes Determination (ref=Glucose)			
Gestational Diabetes	1.14	(0.91, 1.43)	0.2446
Risk Test	0.96	(0.87, 1.06)	0.3740
<b>Multiple Methods</b>	0.70	(0.56, 0.88)	<b>0.0024</b>
Insurance Status (ref=Uninsured)			
<b>Medicare/Medicaid</b>	1.30	(1.04, 1.63)	<b>0.0189</b>
<b>Private</b>	1.27	(1.01, 1.60)	<b>0.0413</b>
<b>Other/Unknown</b>	1.31	(1.05, 1.65)	<b>0.0185</b>
Healthcare Provider Referral (ref=Other)	0.99	(0.89, 1.09)	0.8192
<b><math>\geq 5\%</math> Weight Loss (ref=<math>&lt; 5\%</math> weight loss)</b>	1.26	(1.16, 1.37)	<b>&lt;0.0001</b>

# Summary of Findings:

<b>Participant Characteristics</b>	<b>CCPD &amp; HDGP NDPP Sample</b>	<b>National NDPP Sample</b>
Attendance Outcomes		
Enrolled (attended 1+ Sessions)	2,764	14,747
Met Inclusion Criteria	1,950	14,747
Met Threshold of 4+ Sessions	91.0%	86.6%
Met Threshold of 9+ Sessions	74.9%	xxx
Average Days in Program	183	172

# Summary of Findings: Health Outcomes

<b>Participant Characteristics</b>	<b>CCPD &amp; HDGP NDPP Sample</b>	<b>National NDPP Sample</b>
Weight-Related Outcomes	n = 1,950	n=14,747
Average Initial Weight (pounds)	194.9	213.4
Average Change in Weight (%)	3.7%	4.2%
Achieved $\geq 5\%$ Weight Loss (%)	30.4%	35.5%
Physical Activity Outcomes	n = 1,789	n=12,929
Achieved Physical Activity Guidelines (%)	63%	41.8%