

From initiation to *a way of life*: Changing behavior to reverse obesity

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WELLNESS
CHANGES
EVERYTHING

Obesity is increasing globally

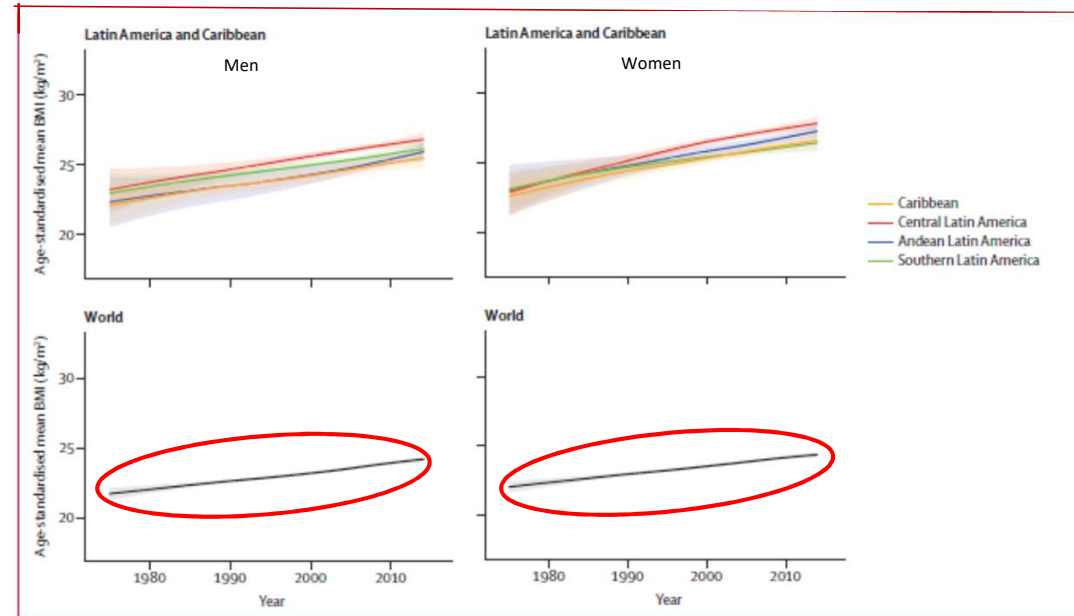
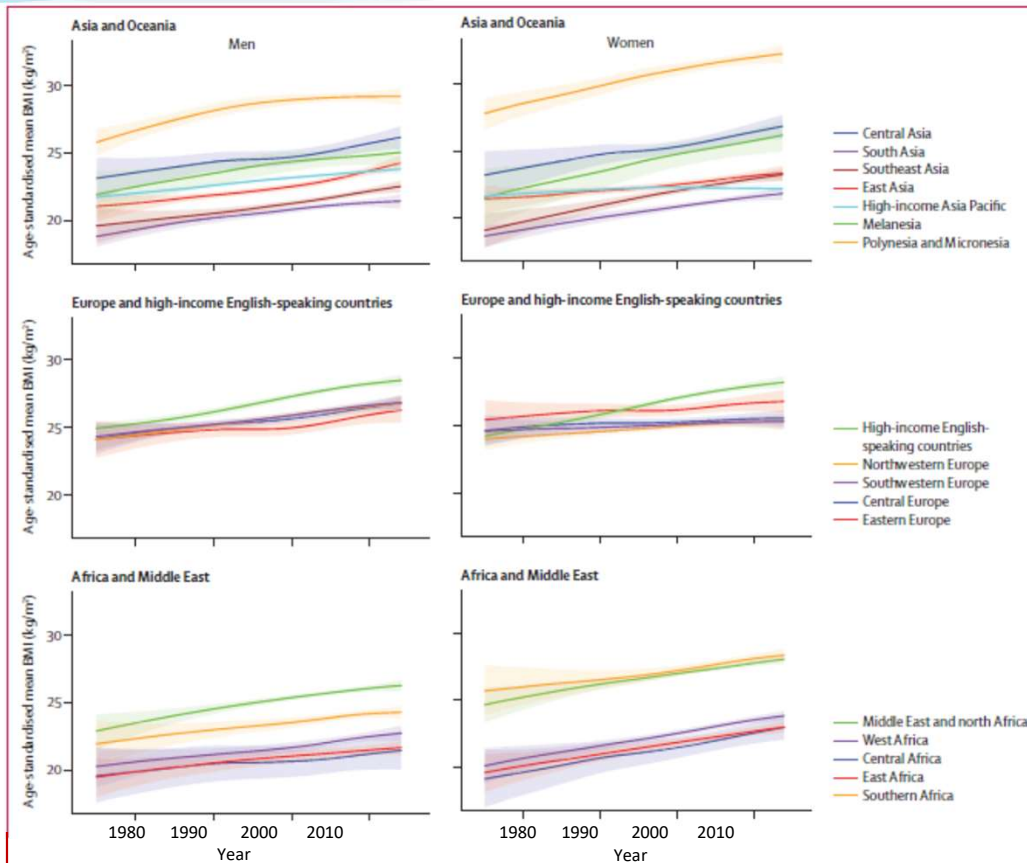


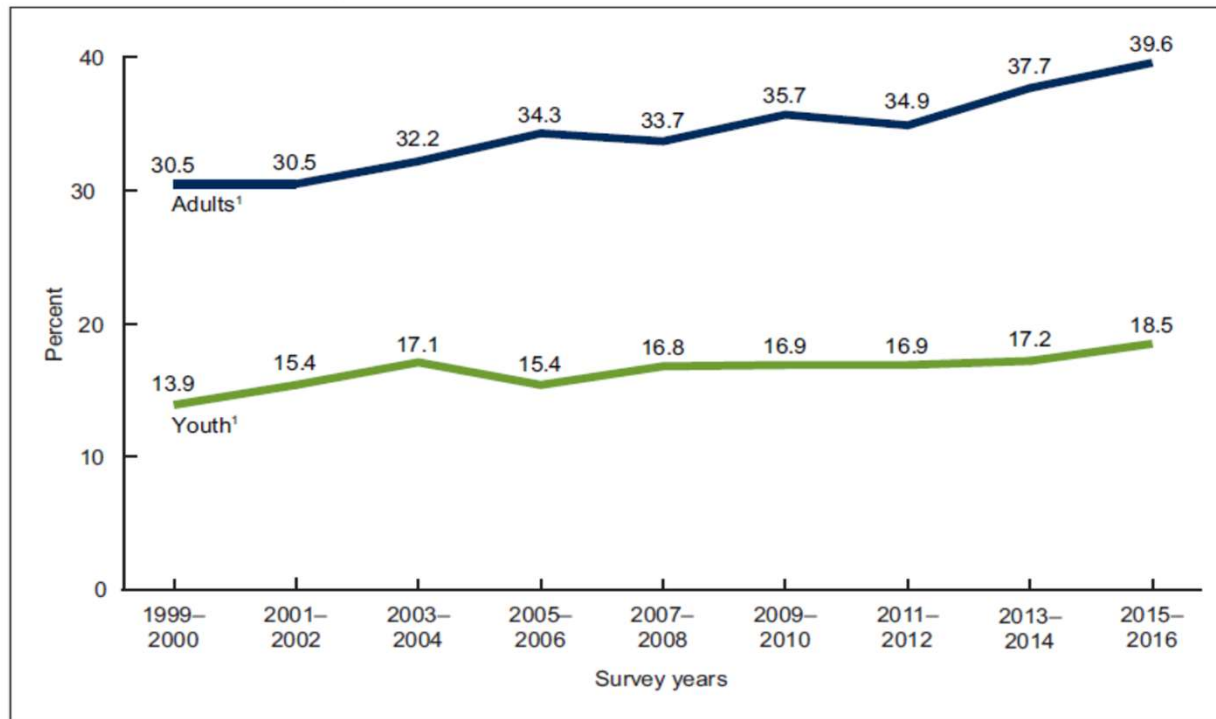
Figure 1: Trends in age-standardised mean BMI by sex and region. Lighter colours are 95% credible intervals. See appendix (pp 155–355) for results by sex and country. BMI=body-mass index.

World Population: 7,505,257,673
 World Obesity Population : 774,000,000

Trends in adult body-mass index in 200 countries from 1975 to 2014: a pooled analysis of 1698 population-based measurement studies with 19.2 million participants

Obesity in the USA continues to rise...

Figure 5. Trends in obesity prevalence among adults aged 20 and over (age adjusted) and youth aged 2–19 years: United States, 1999–2000 through 2015–2016



¹Significant increasing linear trend from 1999–2000 through 2015–2016.

NOTES: All estimates for adults are age adjusted by the direct method to the 2000 U.S. census population using the age groups 20–39, 40–59, and 60 and over. Access data table for Figure 5 at: https://www.odc.gov/nchs/data/databriefs/db288_table.pdf#5.

SOURCE: NCHS, National Health and Nutrition Examination Survey, 1999–2016.

Top 10 Most Obese Countries

(July 1st, 2017)

1. USA – 109,342,839
2. China – 97,256,700
3. India – 65,619,826
4. Brazil – 41,857,656
5. Mexico – 36,294,881
6. Russia – 34,701,531
7. Egypt – 28,192,861
8. Turkey – 23,819,781
9. Iran – 21,183,488
10. Nigeria – 20,997,494



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The Problem

- Humans are maladapted to maintain healthy weight “instinctively” in the modern world.

The modern world is one of relative food abundance and elective physical activity.

“Bad” behaviors are biologically rewarding, immediately.

Hyperbolic discounting of future benefits affects our decision making today... “I’ll start tomorrow...”

- Overcoming these biases requires cognitive management...which is energetically expensive.

obesity reviews

Viewpoint

From instinct to intellect: the challenge of maintaining healthy weight in the modern world

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Summary

The global obesity epidemic is being driven in large part by a mismatch between our environment and our metabolism. Human physiology developed to function within an environment where high levels of physical activity were needed in daily life and food was inconsistently available. For most of mankind’s history, physical activity has ‘pulled’ appetite so that the primary challenge to the physiological system for body weight control was to obtain sufficient energy intake to prevent negative energy balance and body energy loss. The current environment is characterized by a situation whereby minimal physical activity is required for daily life and food is abundant, inexpensive, high in energy density and widely available. Within this environment, food intake ‘pushes’ the system, and the challenge to the control system becomes to increase physical activity sufficiently to prevent positive energy balance. There does not appear to be a strong drive to increase physical activity in response to excess energy intake and there appears to be only a weak adaptive increase in resting energy expenditure in response to excess energy intake. In the modern world, the prevailing environment constitutes a constant background pressure that promotes weight gain. We propose that the modern environment has taken body weight control from an instinctual (unconscious) process to one that requires substantial cognitive effort. In the current environment, people who are not devoting substantial conscious effort to managing body weight are probably gaining weight. It is unlikely that we would be able to build the political will to undo our modern lifestyle, to change the environment back to one in which body weight control again becomes instinctual. In order to combat the growing epidemic we should focus our efforts on providing the knowledge, cognitive skills and incentives for controlling body weight and at the same time begin creating a supportive environment to allow better management of body weight.

Keywords: Cognitive control, environment, obesity, prevention.

obesity reviews (2012) 3, 69–74



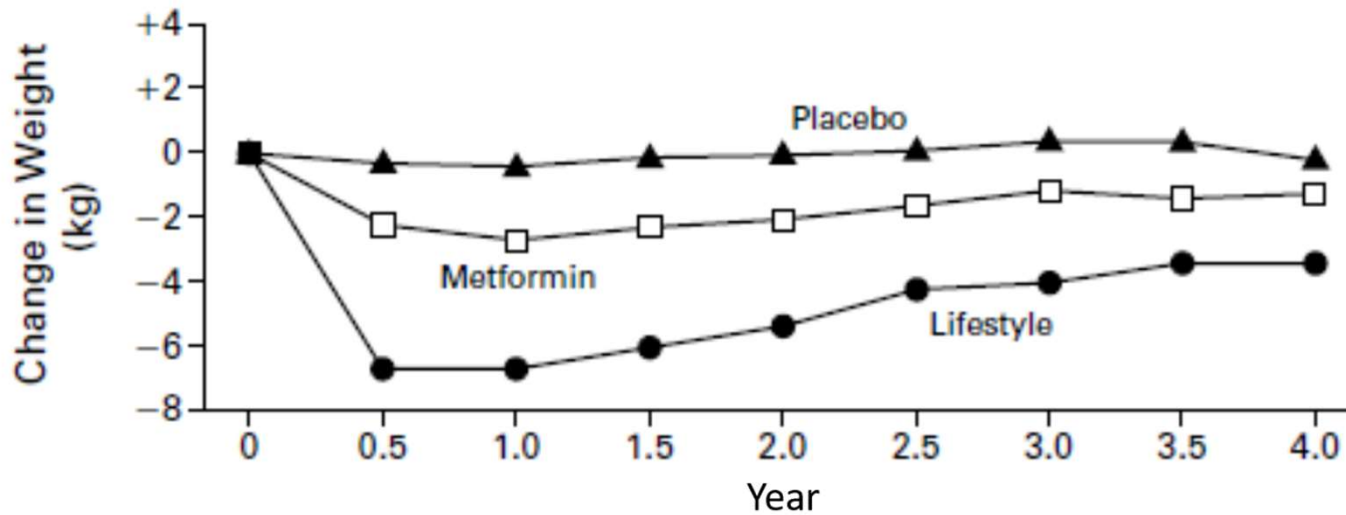
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The Challenge

- We are fighting evolutionary biology...human behavior has been shaped by survival: We are wired to focus “in the moment” and we are energy misers (both physical and cognitive)
- Humans are endowed with decisional biases that are often working against behavior change, especially if cognitive load is increased
- We have evolved complex systems to serve the biology making great tasting food widely available and subsistence physical activity essentially obsolete—the environment we built promotes obesity (unintended consequence)
- Cultural practices and incentive systems generally do not support healthy behaviors
- Marketing/sales strategies play to primal drives, e.g., food, sex, etc.
- Sustained change requires brain rewiring, which can take years (yet, treatment programs are usually short-term)
- This is a complex adaptive system problem—both at the individual and population level

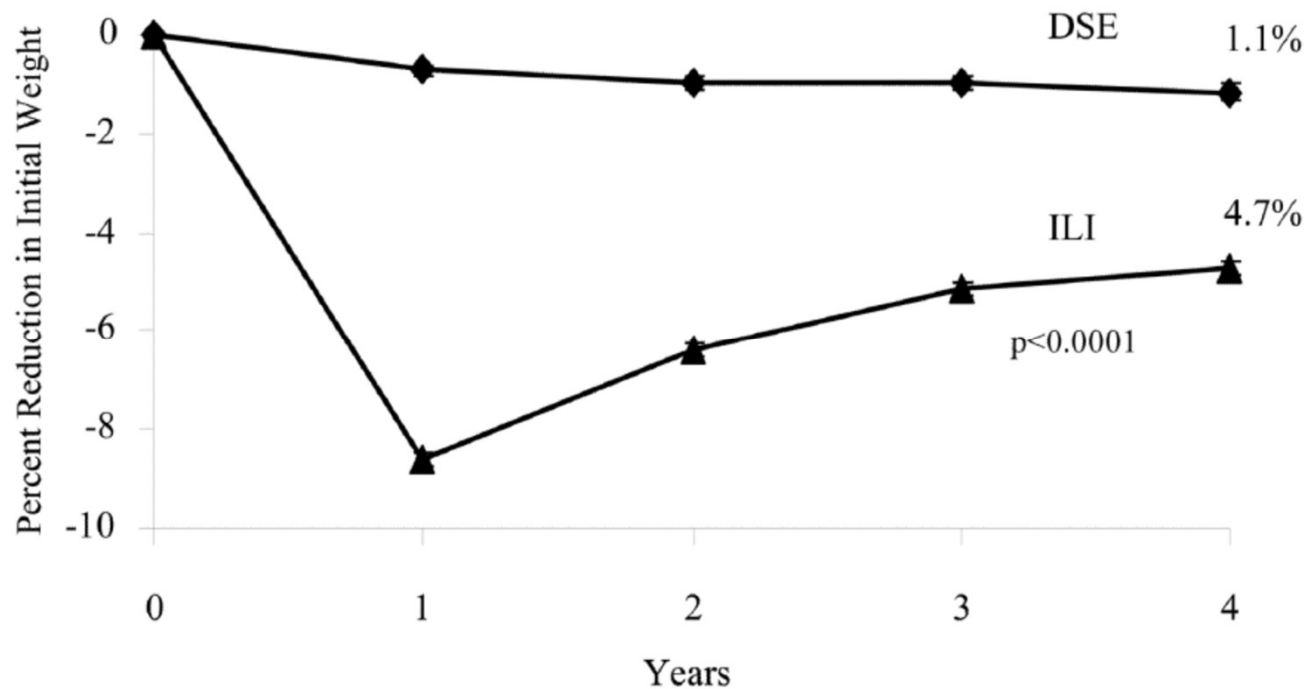
Is it even possible to manage obesity through lifestyle behavior change?

Weight Loss in the Diabetes Prevention Program (DPP)



Changes in weight over 4 years in participants who received placebo, metformin, or lifestyle modification in the Diabetes Prevention Program. N=1510 – 3234, depending on year.

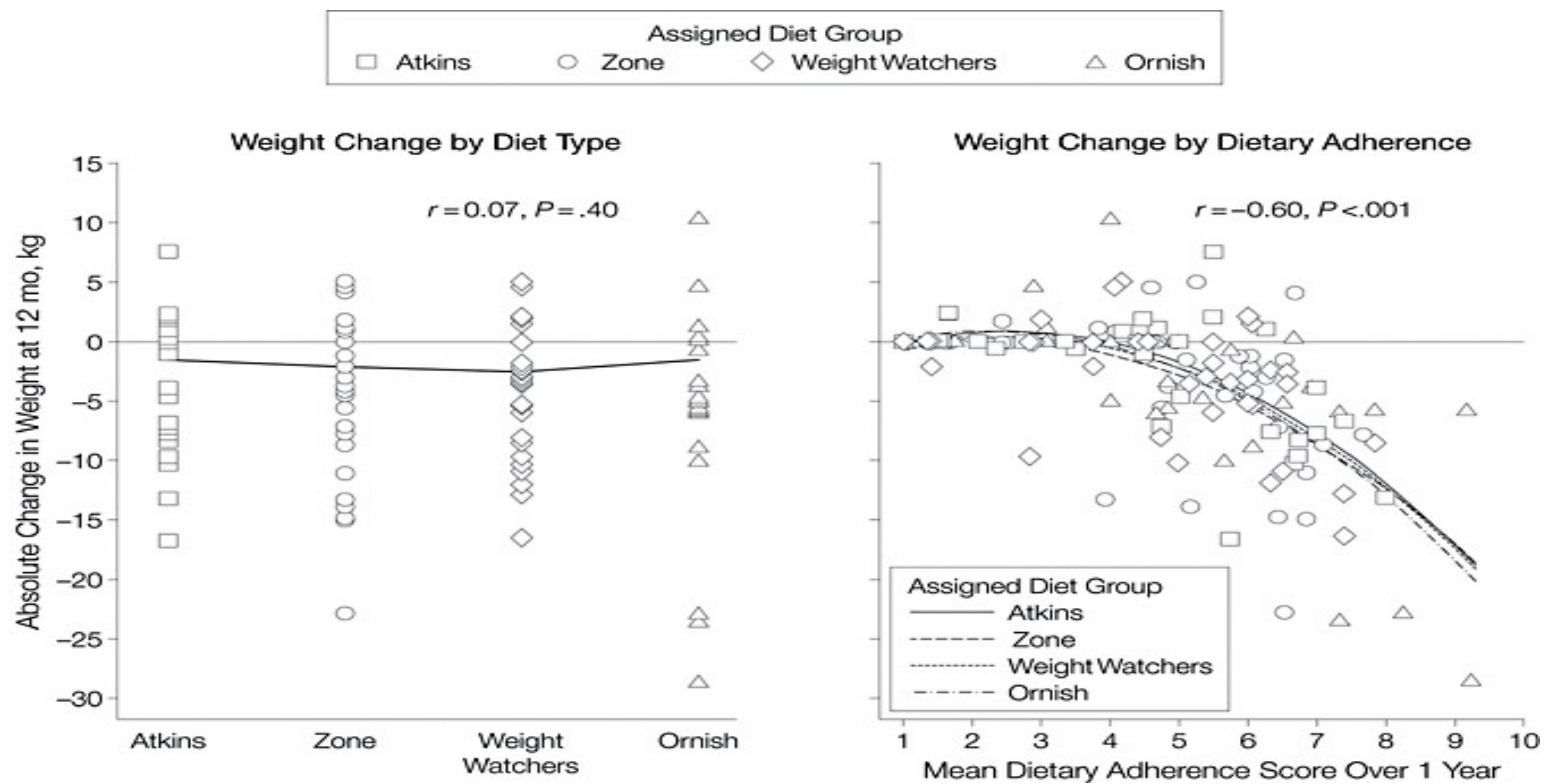
Weight loss in the Look AHEAD Trial (Action for HEALTH in Diabetes)



Mean percent reduction in initial weight in the Diabetes Support and Education (DSE) and Intensive Lifestyle Intervention (ILI) groups over 4 years. Differences between groups were significant ($p < 0.0001$) at all 4 years. N=4815 at year 4.

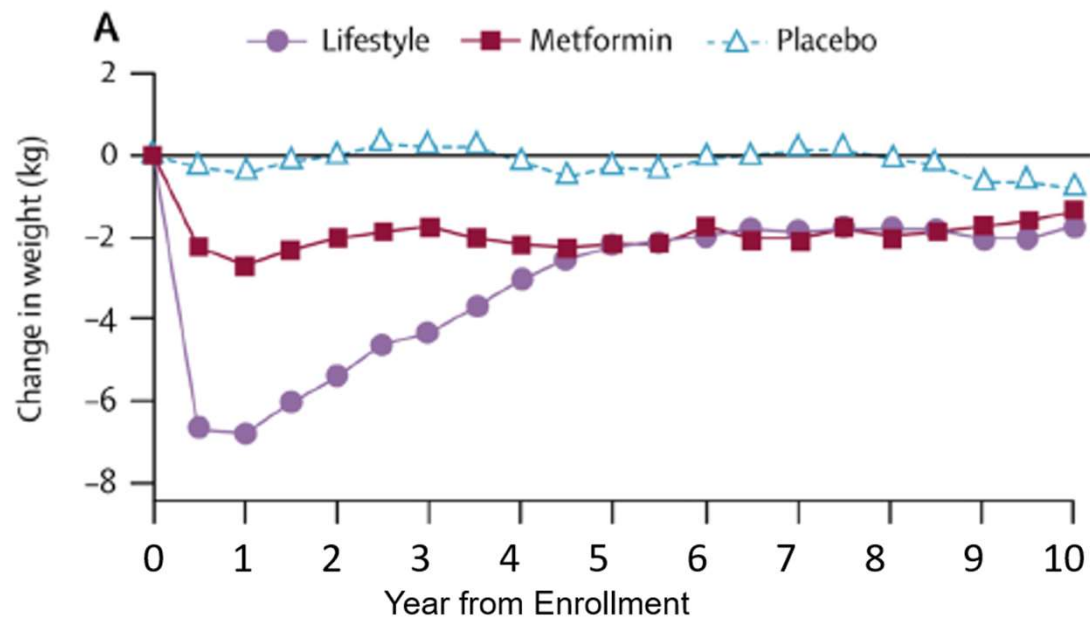
If we are able to initiate behavior change to get weight loss...why doesn't it “stick”?

Long-term success is about adherence...



Dansinger, M. L. et al. JAMA 2005;293:43-53

DPP weight loss at ten-year follow-up



Weight changes for originally assigned treatment group since Diabetes Prevention Program (DPP) randomisation for (A) all participants,

Weight loss at 8 years in the Look AHEAD Trial

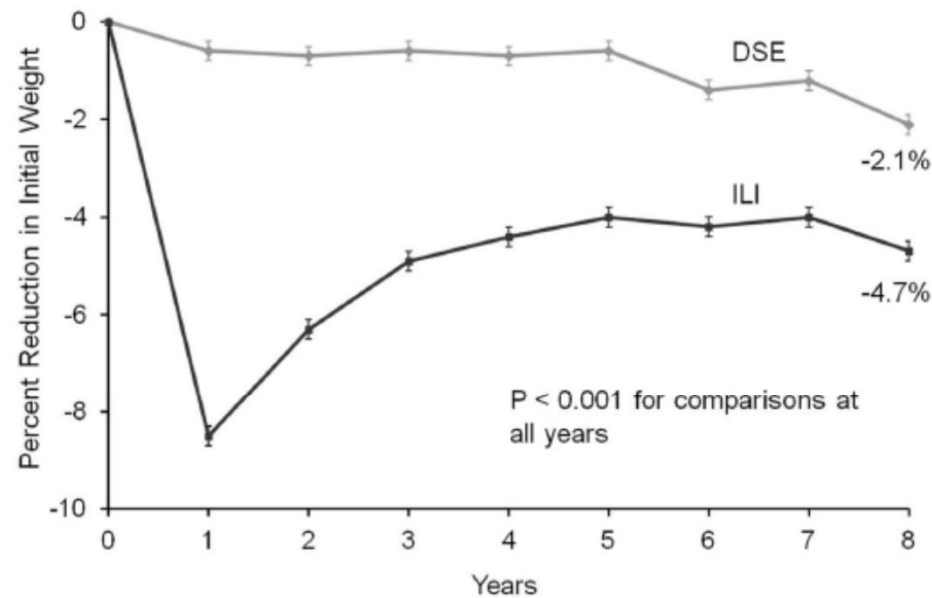


Figure 2.

Figure shows mean (\pm SE) weight losses over 8 years for participants randomly assigned to an intensive lifestyle intervention (ILI) or diabetes support and education (DSE; usual care group). Differences between groups were significant ($p < 0.001$) at all years.

5,145 overweight/obese adults with type 2 diabetes;

Predictors of maintenance: Look AHEAD

Weight control behaviors at Year 8 for ILI participants who maintained (N=324) versus regained (N=117) their $\geq 10\%$ weight loss, achieved at Year 1.

Year 8 Behaviors	Year 8 Weight Change		P Value
	Maintained $\geq 10\%$ Loss	Gained Above Baseline Weight	
Physical activity (kcal/wk)	1471.9 \pm 121.2	799.9 \pm 100.9	0.001
Reduced Kcal (no. wk/yr)	20.4 \pm 1.4	11.9 \pm 2.1	<.001
Reduced fat (no. wk/yr)	24.2 \pm 1.5	15.6 \pm 2.2	<.001
Increased exercise (no. wk/yr)	12.9 \pm 1.3	8.2 \pm 1.8	0.013
Meal replacements (no. wk/yr)	22.8 \pm 2.0	17.3 \pm 2.9	0.072
Monitored weight			
\geq Weekly, N (%)	262 (82.4)	81 (69.8)	0.001
\geq Daily, N (%)	152 (47.8)	33 (28.4)	<.001

Values shown are LS means (raw means for Paffenbarger) \pm standard error or frequency count (percentage).

P values are adjusted for clinical site and baseline value.

Why don't people adhere?

Weight Loss and Weight Loss Maintenance are Different Processes

Weight Loss	Maintenance of Weight Loss
<ul style="list-style-type: none">▪ Time limited▪ Requires a negative energy balance▪ Reduced caloric intake is critical▪ Physical activity not required for success▪ Weight change highly reinforcing▪ Support network reinforcing▪ Common	<ul style="list-style-type: none">▪ Life-long▪ Requires energy balance at a reduced body weight▪ Physical activity is critical for success▪ Requires constant vigilance▪ Weight change no longer reinforcing▪ Support network no longer attentive▪ Rare

Quote from Dr. Richard Thaler, winner of the 2017 Nobel Prize in Economics:

“...you have to keep in mind that people are human”...

What does it mean to be human in the context of weight management?

- Our “wiring” favors behaviors/decisions geared toward reproductive fitness and survival, *in the moment* (these decisions may appear irrational when considering long-term health and well-being).
- We are biased toward energy conservation: tempted by possibilities to acquire more energy...and predisposed to not expend physical or cognitive energy without a good reason.

Godzilla Meets Bambi

BIOLOGY

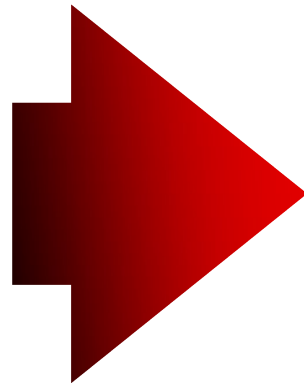
Sugar

Fat

Salt

Rest

Enjoy



Farmer's markets

Sidewalks, brighter stairwells

Restrictions/taxes on unhealthy food

Free gym memberships

Reduced health premiums

T-shirts, water bottles

...AND?

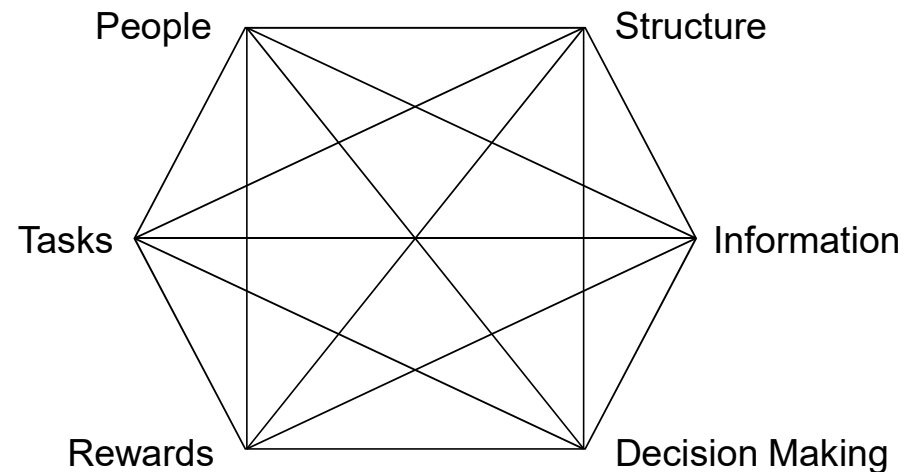
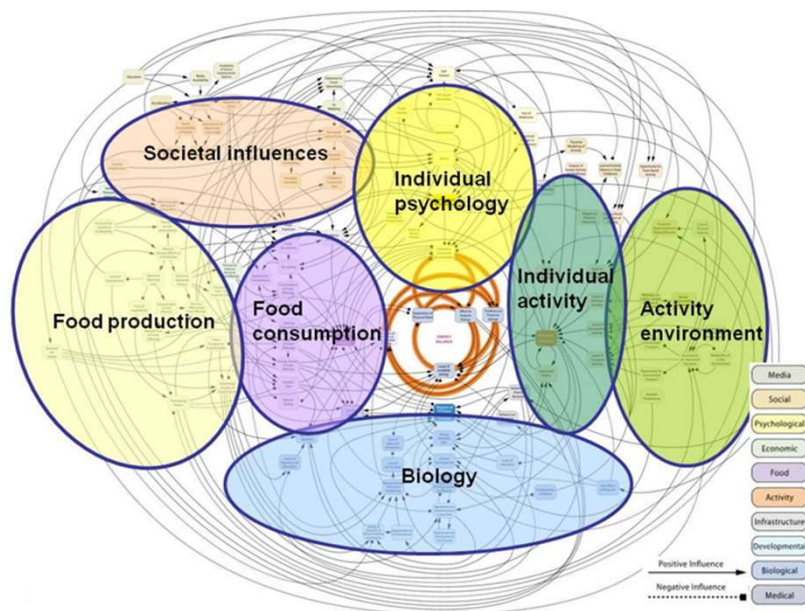


Human Cognitive Biases

- Ambiguity effect
- Anchoring
- Attentional bias
- Availability heuristic
- Availability cascade
- Backfire effect
- Bandwagon effect
- Base rate fallacy
- Belief bias
- Bias blind spot
- Choice-supportive bias
- Clustering illusion
- Confirmation bias
- Congruence bias
- Conjunction fallacy
- Conservatism bias
- Conservatism (Bayesian)
- Contrast effect
- Curse of knowledge
- Decoy effect
- Denomination effect
- Distinction bias
- Duration neglect
- Empathy gap
- Endowment effect
- Essentialism
- Exaggerated expectation
- Experimenter's or expectation bias
- False-consensus effect
- Functional fixedness
- Focusing effect
- Forer effect or Barnum effect
- Framing effect
- Frequency illusion
- Gambler's fallacy
- Hard-easy effect
- Hindsight bias
- Hostile media effect
- Hot-hand fallacy
- **Hyperbolic discounting**
- Identifiable victim effect
- Illusion of control
- Illusion of validity
- Illusory correlation
- Impact bias
- Information bias
- Insensitivity to sample size
- Irrational escalation
- Just-world hypothesis
- Less-is-better effect
- Ludic fallacy
- Mere exposure effect
- Money illusion
- Moral credential effect
- Negativity bias
- Neglect of probability
- Normalcy bias
- Observation selection bias
- Observer-expectancy effect
- Omission bias
- Optimism bias
- Ostrich effect
- Outcome bias
- Overconfidence effect
- Pareidolia
- Pessimism bias
- Planning fallacy
- Post-purchase rationalization
- Pro-innovation bias
- Pseudocertainty effect
- Reactance
- Reactive devaluation
- Recency bias
- Recency illusion
- Restraint bias
- Rhyme as reason effect
- Risk compensation / Peltzman effect
- Selective perception
- Semmelweis reflex
- Selection bias
- Social comparison bias
- Social desirability bias
- **Status quo bias**
- Stereotyping
- Subadditivity effect
- Subjective validation
- Survivorship bias
- Texas sharpshooter fallacy
- Time-saving bias
- Unit bias
- Well travelled road effect
- Zero-risk bias
- Zero-sum heuristic

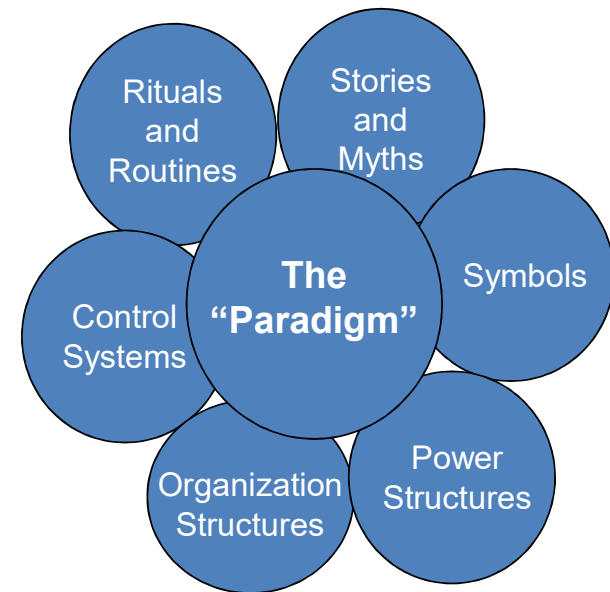
Energy balance system operates in a complex systems environment

“All organizations (systems) are perfectly designed for the results they get”



And, the current system (paradigm) was designed for a different purpose

- Not designed for primary prevention
 - Wait for the crash, then respond
- Attempts at prevention (or treatment) have no real teeth...weak accountability
- Social systems not aligned with behavioral goals
- Established safety net buffers most severe consequences
- Value of good behavior not salient “in the moment”



Does anyone succeed at long-term weight loss?

The National Weight Control Registry (USA) — learning from “successful losers”:

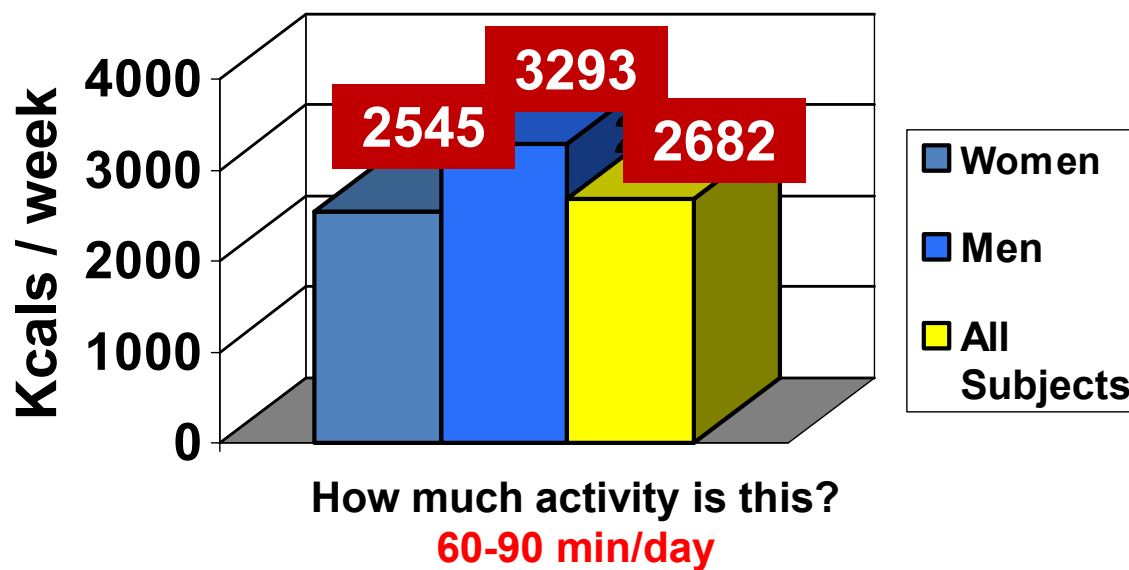
- Founded in 1994 by Drs. James Hill and Rena Wing
- Registry of “successful losers” (n>10,000)
- Minimum of 30 lbs (14 kg) of weight loss for a minimum of one year
- Average weight loss 70 pounds (45 kg)
- Average maintained for at least 5.5 years
- 16% maintained loss for >10 years

NWCR Weight Management Strategies

- No similarity in how weight was lost (no one-size fits all)
- Maintenance associated with high physical activity, frequent monitoring, smart eating, environmental mastery, routines and rituals
- Attach behaviors to something of higher order value or meaning in their life
- Identity shift and social support are key

The necessary behaviors never become unconscious but they become more routine after 2-3 years

Average Energy Expended In Physical Activity In The NWCR

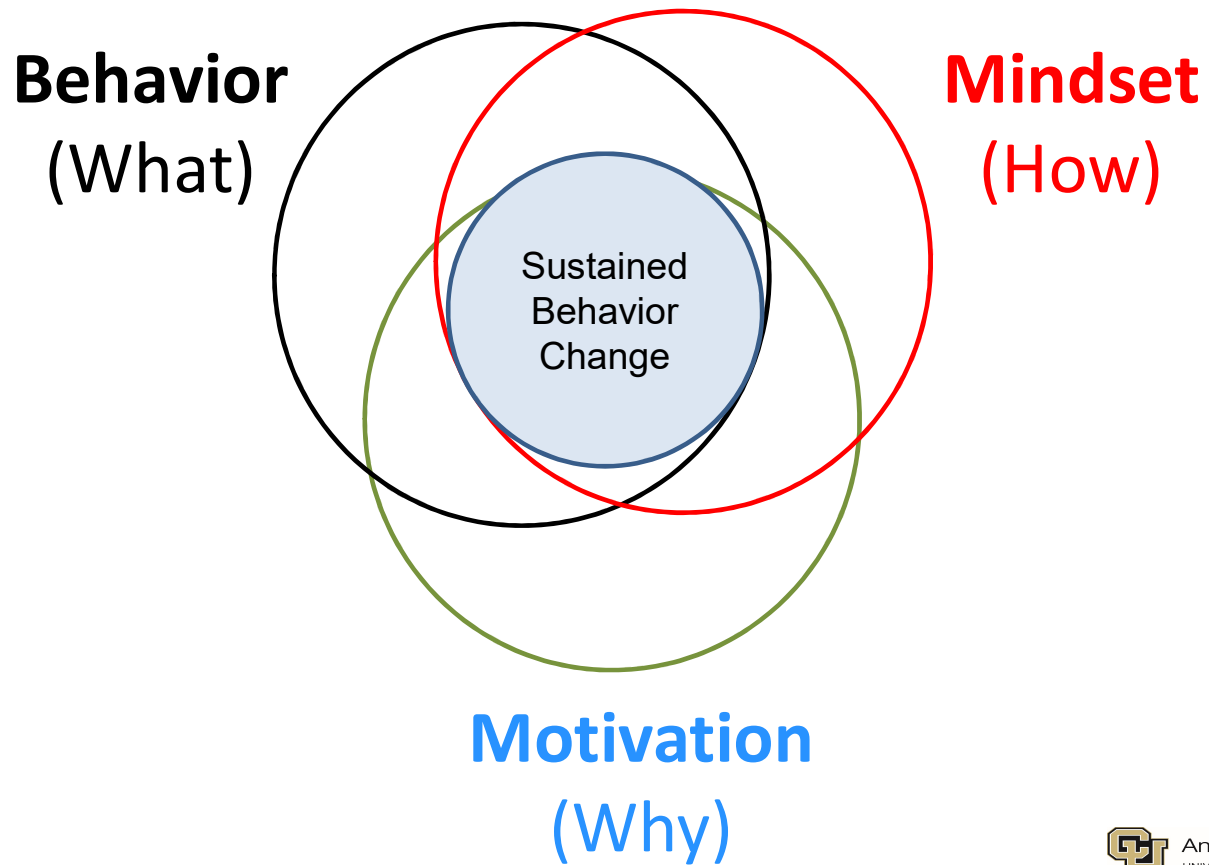


What is needed for long-term success?

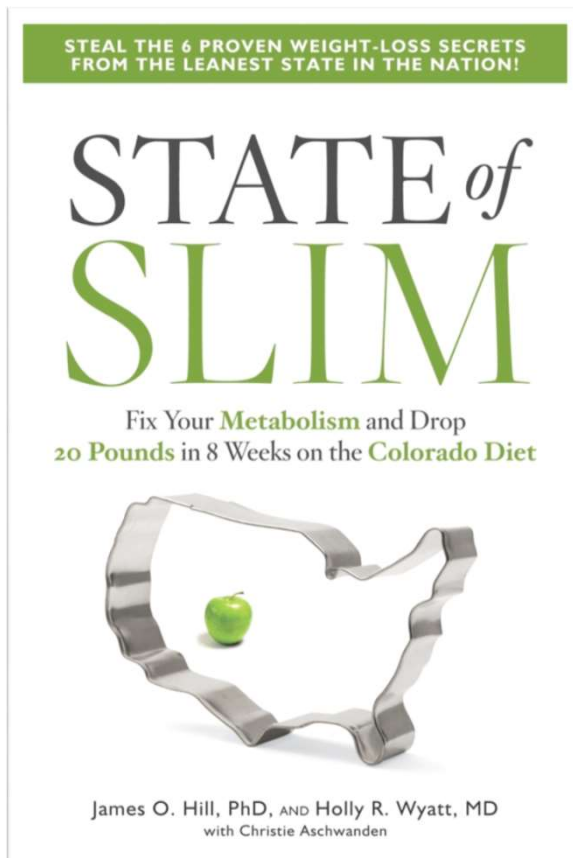
Must address/treat the *Body, Mind and Environment*

- Solid nutrition and activity plans are necessary for weight loss success but are usually not sufficient
- Information alone is not enough
- Mindset and motivation (the HOW and WHY) are critical for long-term success
- A transformation is needed (mind, body and environment) to support the new behaviors
- A *new way of life* at all levels

Our approach

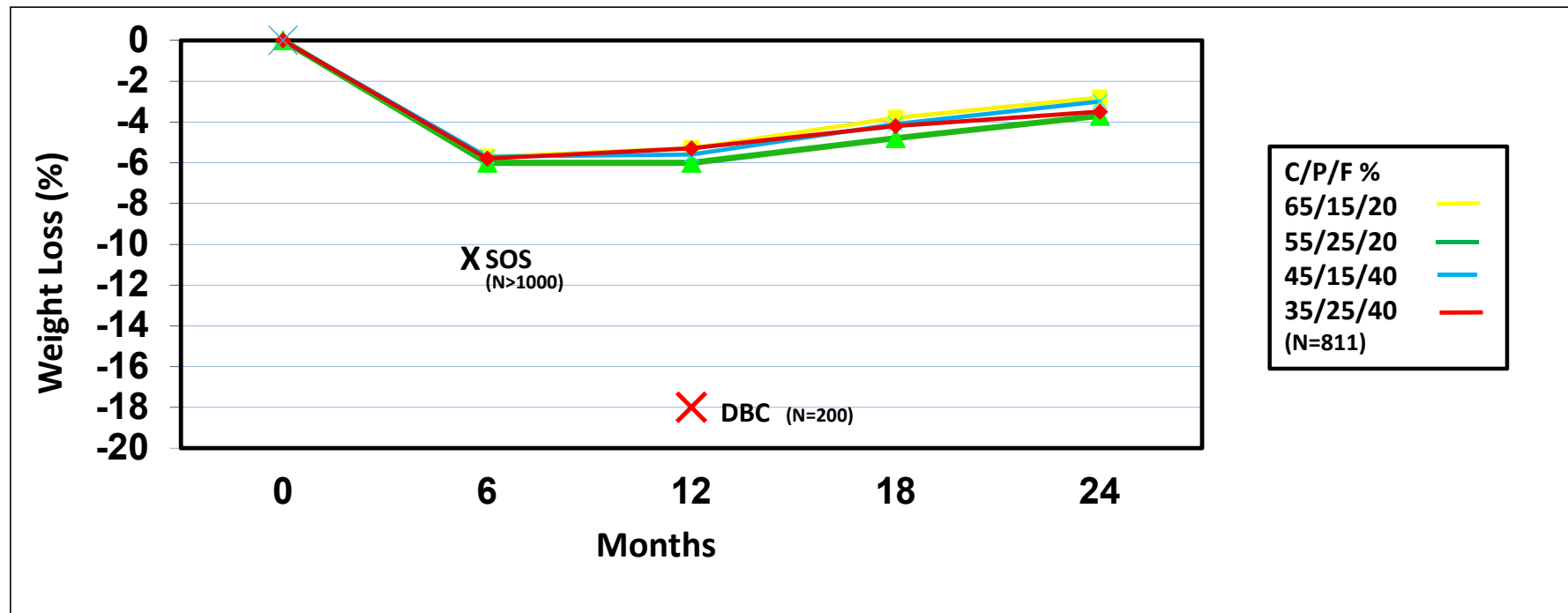


Putting it all together



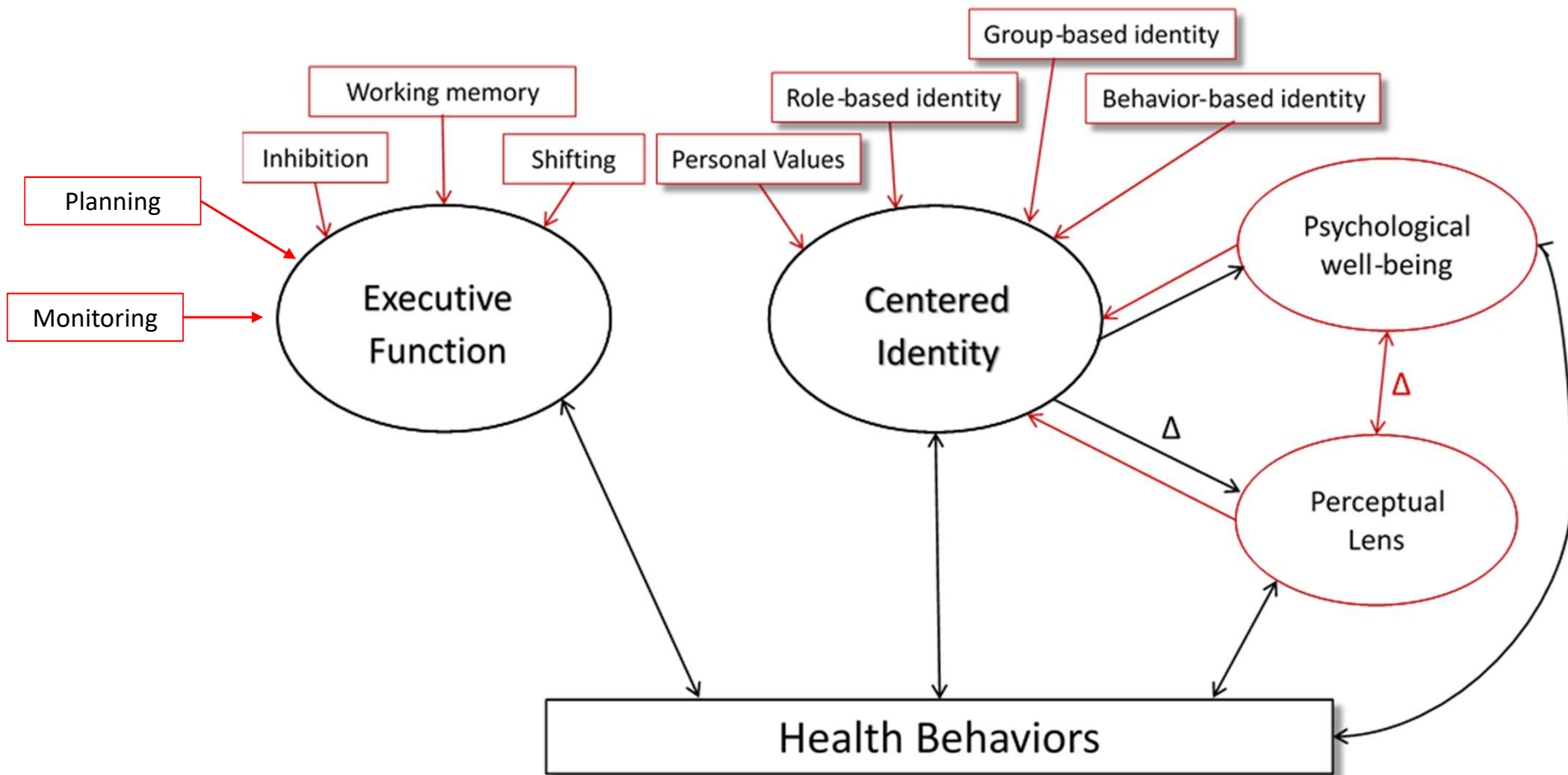
- 16 week plan (initiation)
- Follow up for a year (transformation)
- Focus on building a more flexible metabolism
- Environmental mastery
- Mindset growth
- Discovering the “why” and deeper purpose
- Building routines and rituals
- Building new social network to support ID shift
- Connecting to things that give meaning

Outcomes



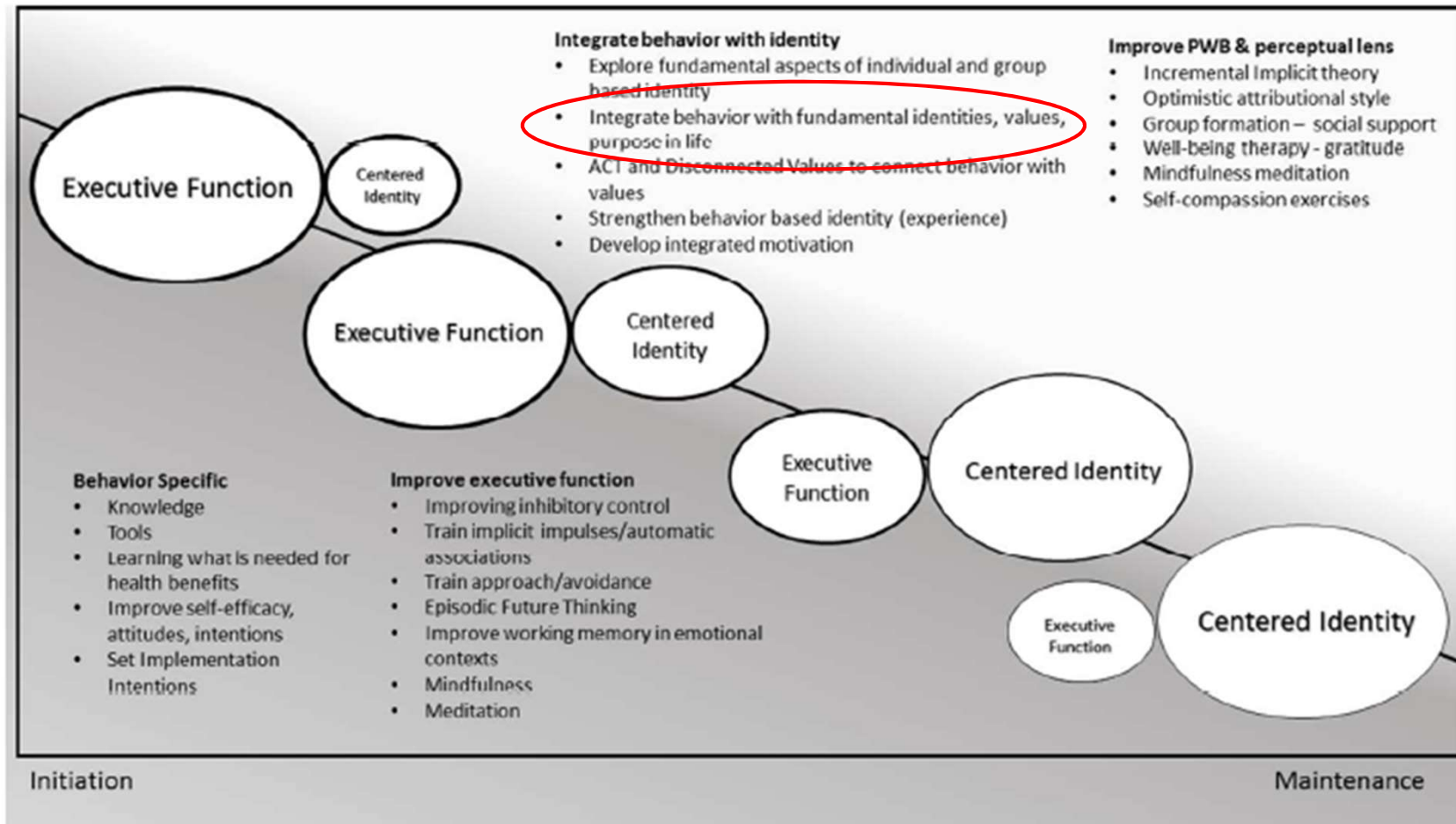
Upper graph diet comparison from: Sacks FS. et al. *NEJM* 2009;360(9) 859-873

A New Model for Sustained Behavior Change



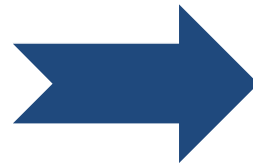
Confidential pre-publication, do not share

The Dynamic Process of Behavior Change



How do we apply what we have learned about individual behavior change to the population?

Change the environment to make unhealthy behavior less possible or less likely?



Conceptually appealing...and, requires the population to agree at some level...

Challenges faced by current approaches:

- Policy initiatives to restrict the environment to reduce probability of unhealthy behavior are not comprehensive
- Many initiatives are self-empowerment focused (e.g., make choice available)...but, internal motivation often too weak
- External rewards common, but often out of context
- Not survival/purpose based...behaviors required are not essential in motivational context where implemented

What's missing?

Hypothesis: *People have not been given a good enough reason for behavior change that is salient in the present moment on a day to day basis.*

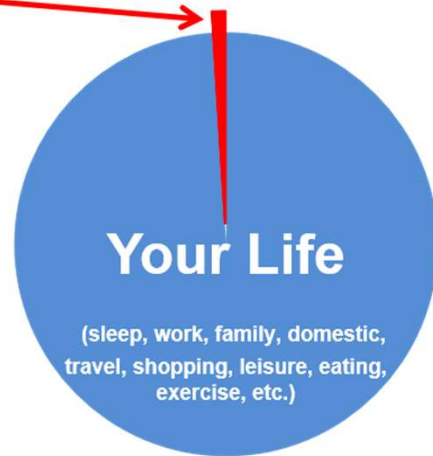
The social and economic framework in most countries has not incorporated the real value of good health and disease prevention into the paradigm

We don't have a compelling enough **"WHY"** ...

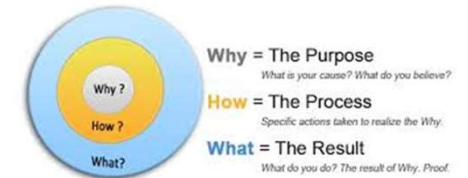
Are rising health care costs a sufficient WHY?

Often incentives for better health behavior are tied to the health care system and are not integrated with day to day life/business conduct...they are out of context with the behaviors they seek to change.

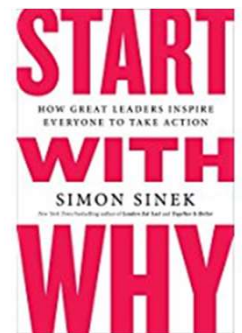
Health care slice of daily life?



Start with “WHY”



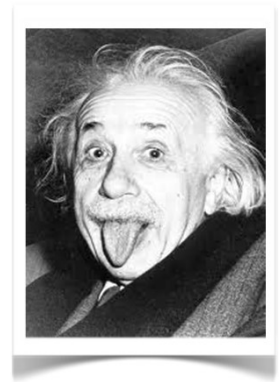
- We usually start with WHAT to do and HOW to do it without fully developing a compelling WHY behind our actions that resonates with the population
- The WHY is the purpose of the intervention and it must align in some way with the purpose and values of the people being affected
- The people being targeted want to be actively engaged and want to believe in the cause
- We have to avoid the perception that the people implementing the intervention are “doing it to them” (i.e., the target population)



What is motivating action against obesity? What is the “WHY” for a population?

- Social justice
- Health care costs
- Global competitiveness
- Academic and work productivity/performance
- National security
- Climate change
- Other

To reverse obesity we need to think about the problem in a new way



- Identify a compelling WHY that can drive a cause
- Work with the biology...rewards immediate and part of daily life
- Align individual and collective purpose
- Align behavioral purpose and motivational context...organizations (including government), workplaces, schools, public spaces...it doesn't have to be about health!
- Not opt in...everyone is part of it...new behavioral expectations become “part of the woodwork”

The biology we are up against is so strong that we will likely need everything we've got to solve the problem



We are going to need it all:

- Economics
- Regulation
- Nudges
- Rewards
- Penalties
- Inspiration
- Social cause

Thank You!

