

### **IMPROVEMENT BY F&V INTAKE OF WEIGHT MANAGEMENT IN ADULTS WITH MORBID OBESITY**

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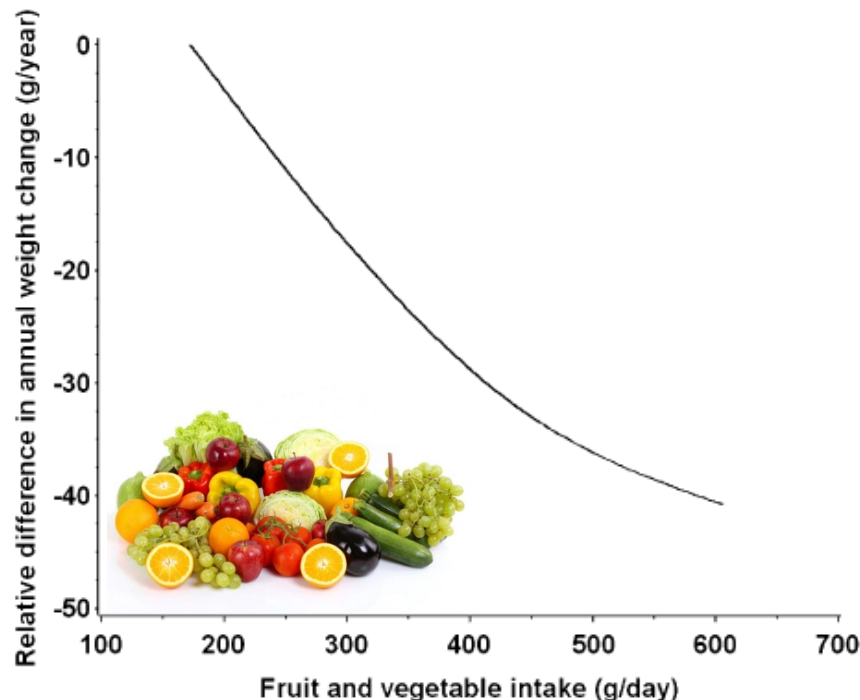
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## Fruit and vegetable intakes and subsequent changes in body weight in European populations: results from the project on Diet, Obesity, and Genes (DiOGenes)<sup>1-4</sup>

The data used were from **89,432 men** and **women** from **5 countries** participating in the **EPIC**. The association between fruit and vegetable intake and weight change after a mean **follow-up of 6.5 y** was assessed by linear regression



Per 100-g intake of fruit and vegetables, weight change was -14 g/y.

For **persons who stop smoking**, high F&V intake may be recommended to reduce the risk of weight gain.

## Inverse Association between Fruit and Vegetable Intake and BMI even after Controlling for Demographic, Socioeconomic and Lifestyle Factors

We used 2007 Behavior Risk Factors Surveillance System (**N > 400,000**) data. FV intake was dichotomized as  $\geq 5$  servings (FV5+) versus  $< 5$  servings/day.

Only **24.6% of US adults** consumed  $\geq 5$  servings per day.

Overweight (% FV5+ = 23.9%) and **obese** (21.9%) groups consumed significantly **less FV** than the normal-weight (27.4%) group ( $p < 0.0001$ ).

This inverse association remained significant after controlling for potential confounding factors.

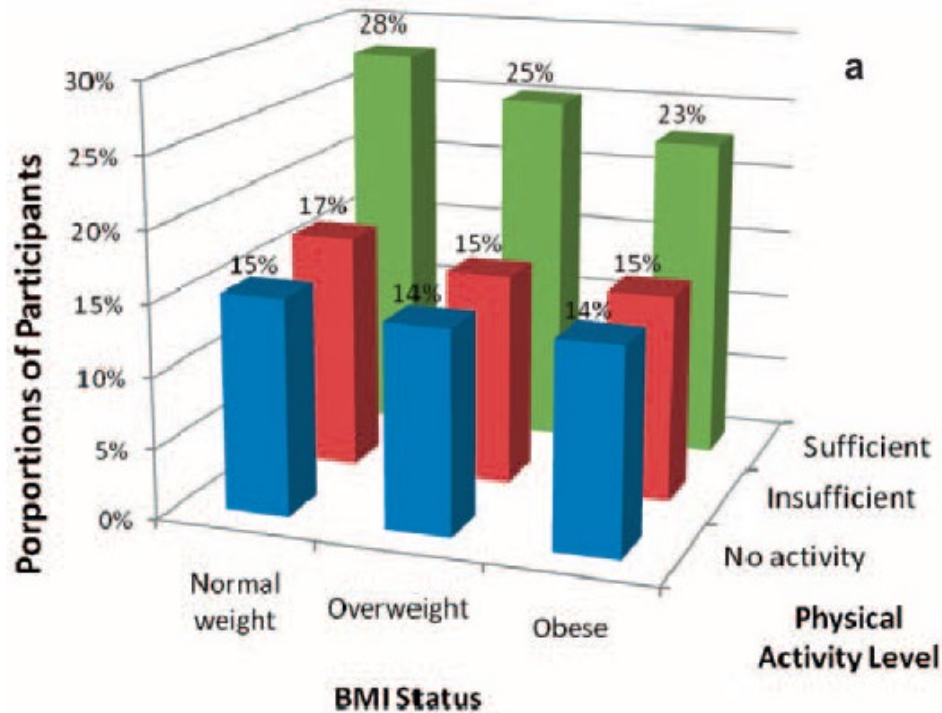
Multivariate analysis identified five significant moderators ( $p < 0.0001$ ) after controlling for all evaluated variables: **race**, **sex**, **smoking** status, and **physical activity**.

Physically **inactive obese males** tended to consume the **least FV** (% FV5+ = 14.7%).

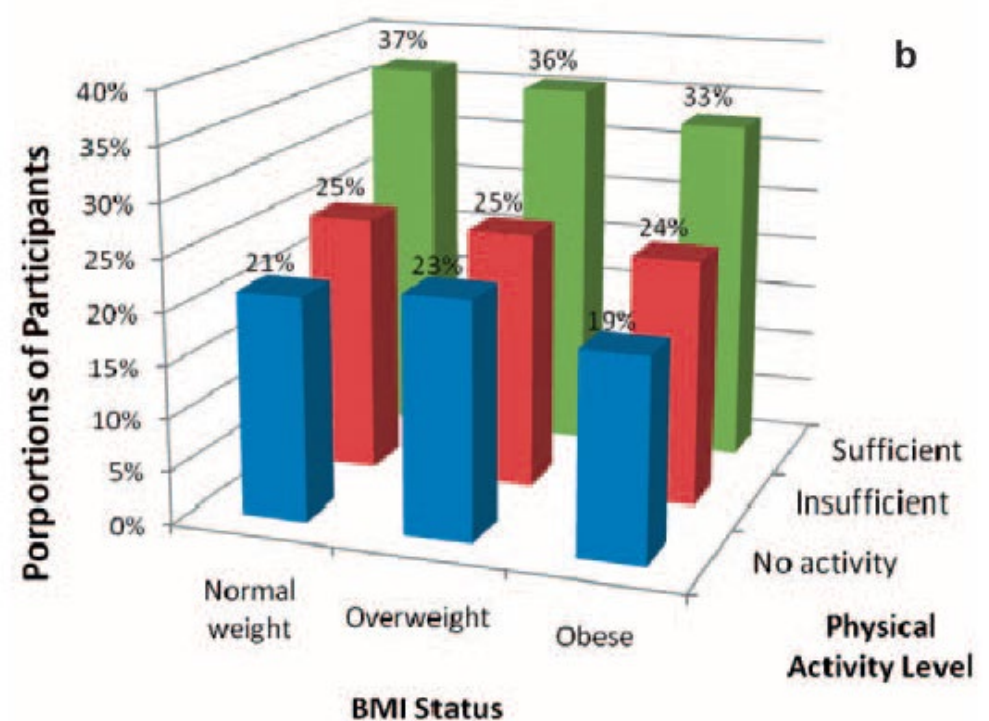
# Inverse Association between Fruit and Vegetable Intake and BMI even after Controlling for Demographic, Socioeconomic and Lifestyle Factors

Prevalence of FV intake more than five servings per day by BMI status and physical activity levels

**MEN**



**WOMEN**



## Obesity Prevention

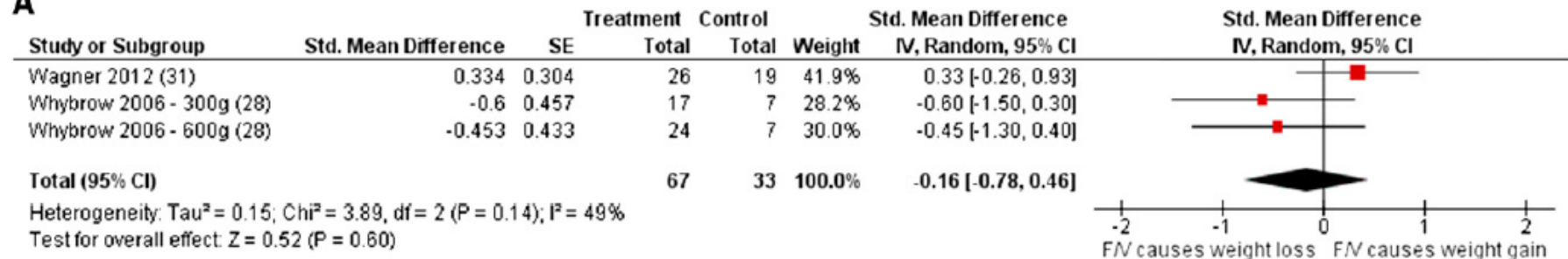
# Relationship of fruit and vegetable intake with adiposity: a systematic review

An **inverse relationship** between **FV** intake and **adiposity** among overweight adults appears **weak**; this relationship among children is unclear.

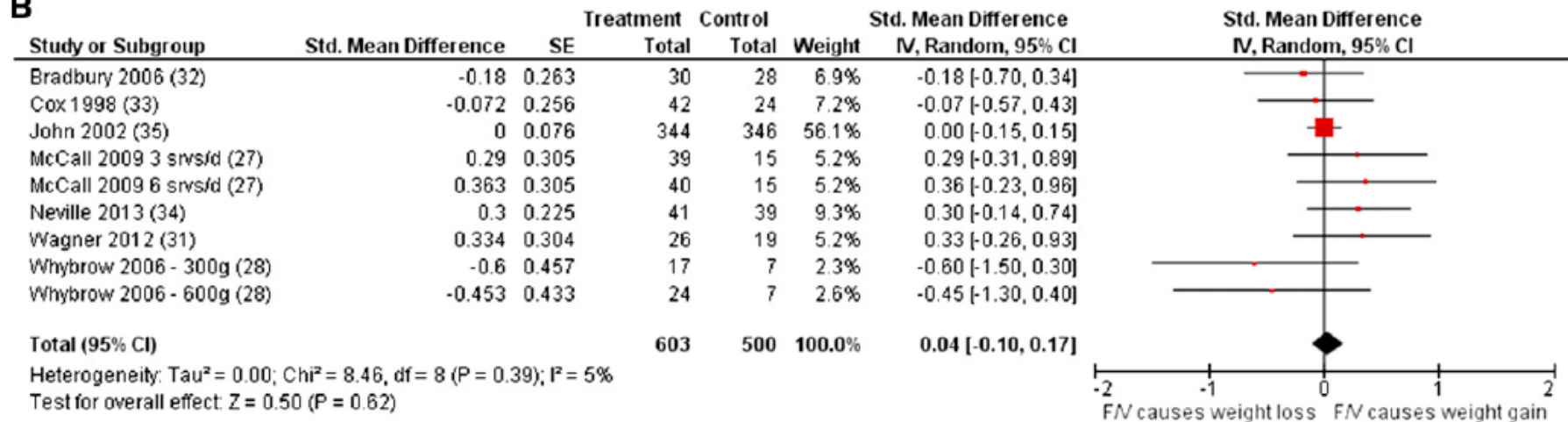
Whether increases in FV intake in isolation from lower caloric intake or increased physical activity will result in declines or slower growth in adiposity remains **unclear**.

# Increased fruit and vegetable intake has no discernible effect on weight loss: a systematic review and meta-analysis<sup>1-4</sup>

**A**



**B**



Although many F/Vs have demonstrable positive health benefits, recommending increased F/V consumption to treat or prevent obesity without explicitly combining with methods to reduce intake of other energy sources is unwarranted.

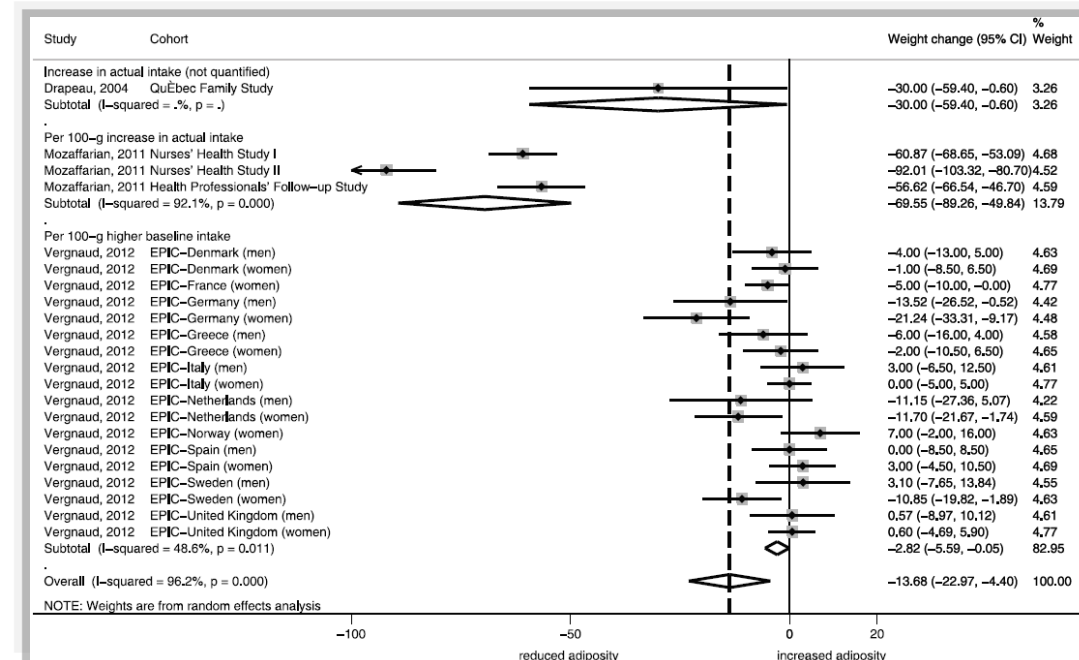


# Fruit and Vegetable Consumption and Changes in Anthropometric Variables in Adult Populations: A Systematic Review and Meta-Analysis of Prospective Cohort Studies

17 cohort studies including 563,277 participants met inclusion criteria

Higher intake of **fruits** was **inversely associated with weight change** (decrease) (-13.68 g/year).

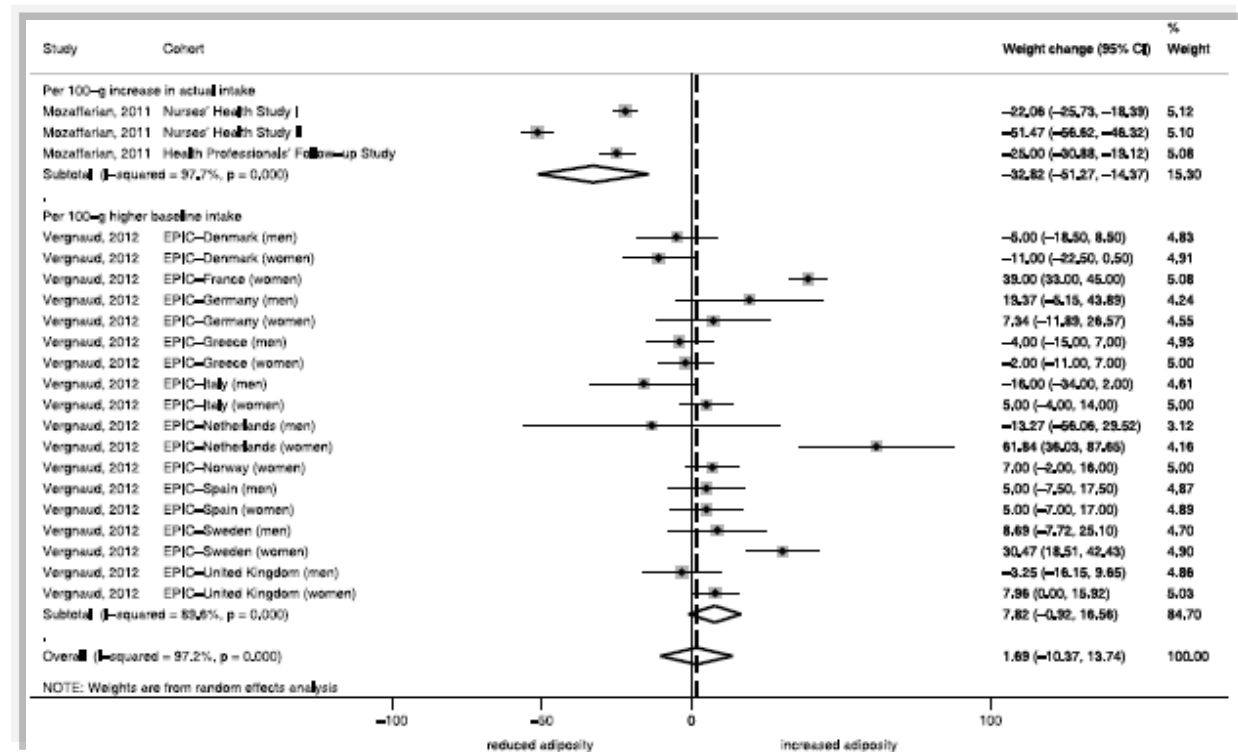
Increased intake of **fruits** was **inversely associated with changes** (decrease) in **waist circumference** (-0.04 cm/year).



# Fruit and Vegetable Consumption and Changes in Anthropometric Variables in Adult Populations: A Systematic Review and Meta-Analysis of Prospective Cohort Studies

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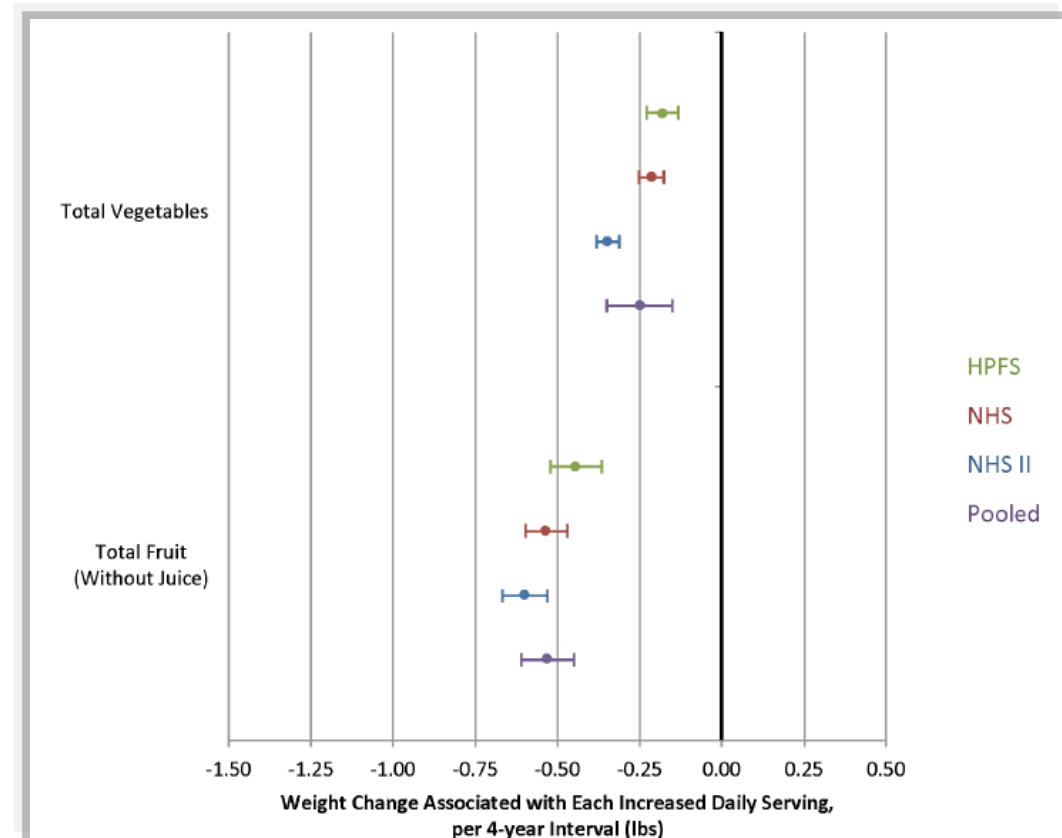
**No significant** changes could be observed for **combined fruit and vegetable consumption** or **vegetable consumption**



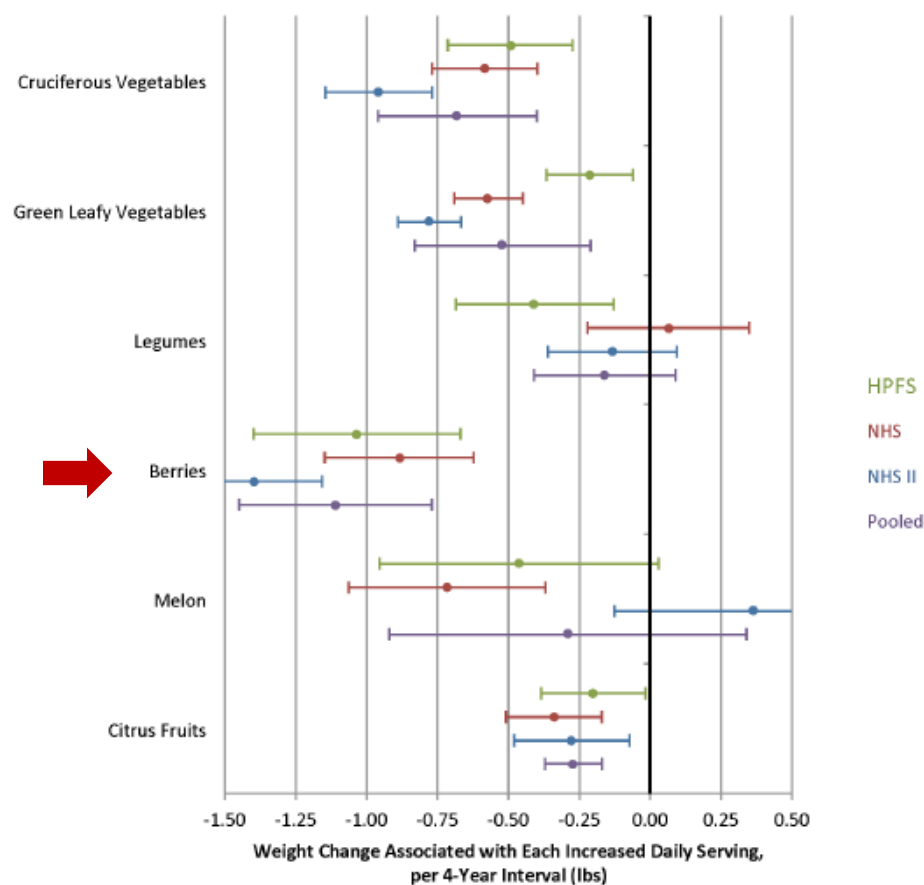


# Changes in Intake of Fruits and Vegetables and Weight Change in United States Men and Women Followed for Up to 24 Years: Analysis from Three Prospective Cohort Studies

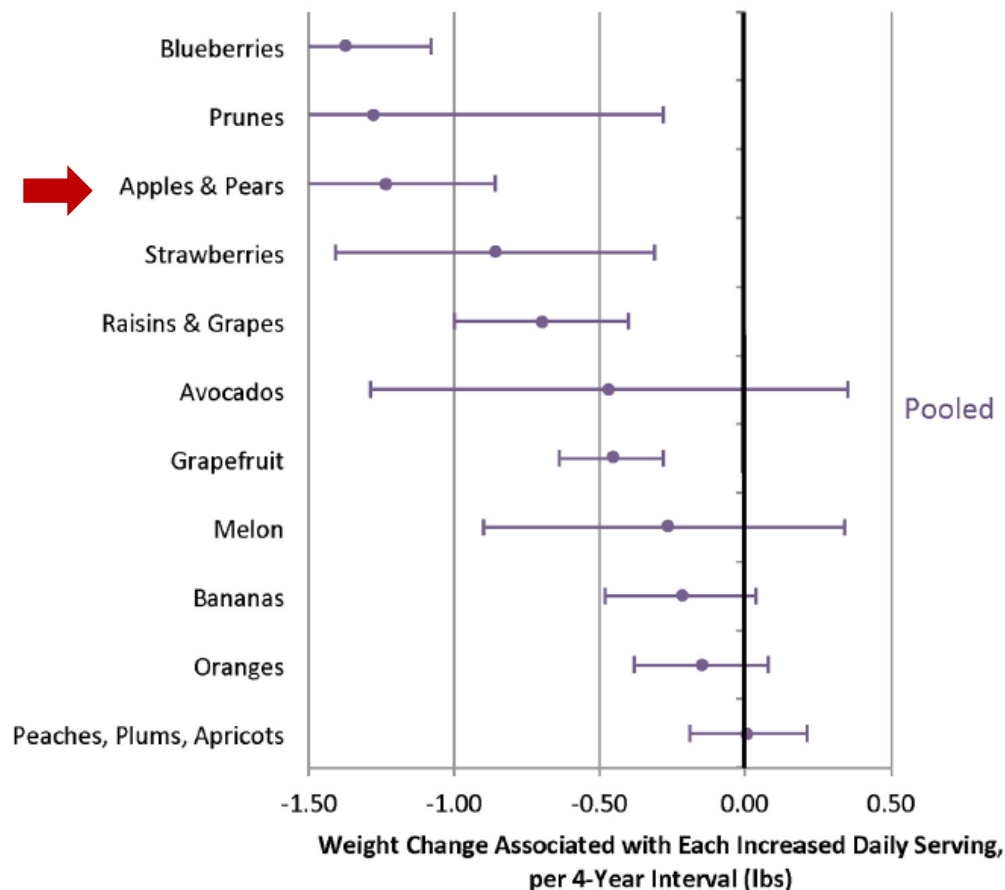
3 large, prospective cohorts of **133,468** United States **men** and **women**. From 1986 to 2010, (24 y follow-up) these associations were examined within multiple 4-y time intervals, **adjusting** for simultaneous changes in other lifestyle factors, including other aspects of **diet, smoking status, and physical activity**. Results were combined using a random effects **meta-analysis**



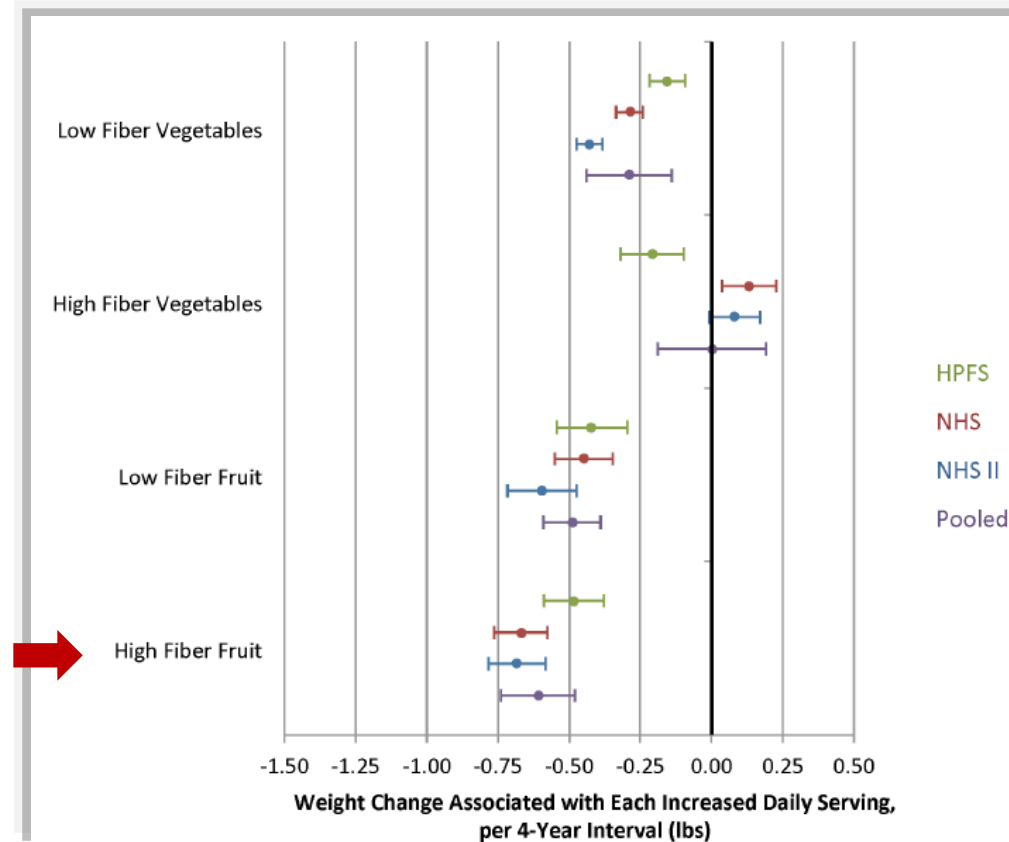
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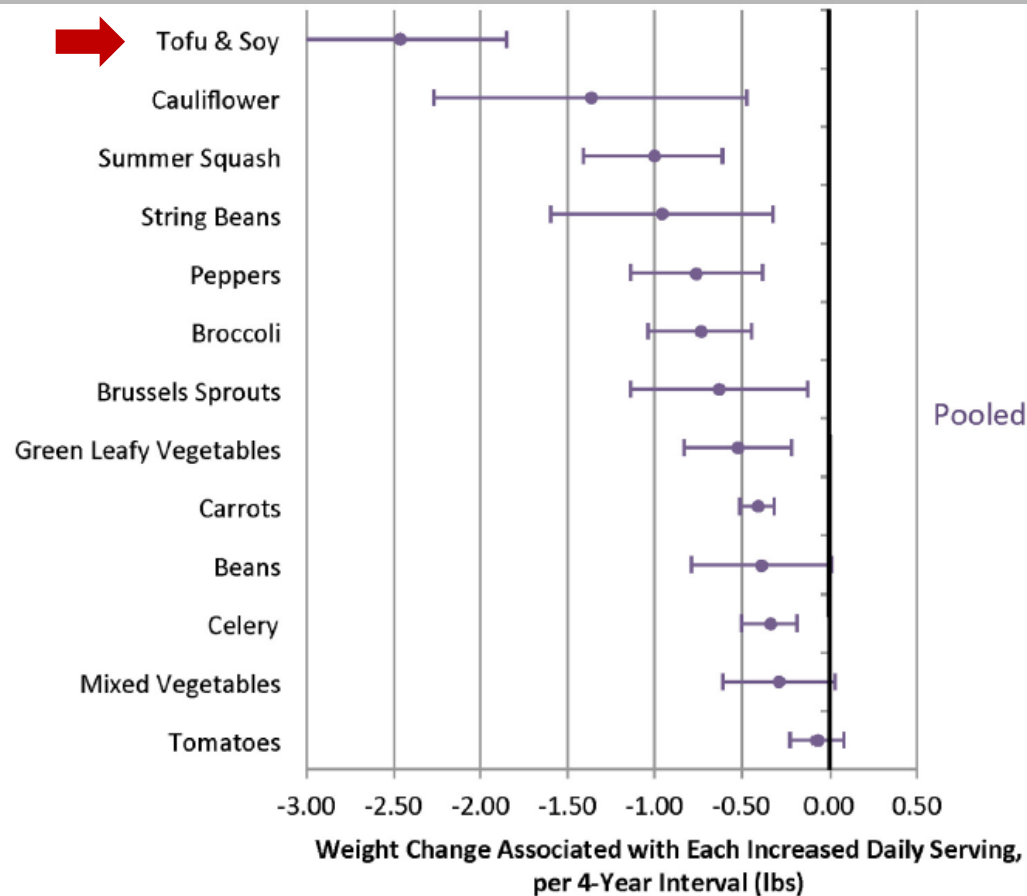
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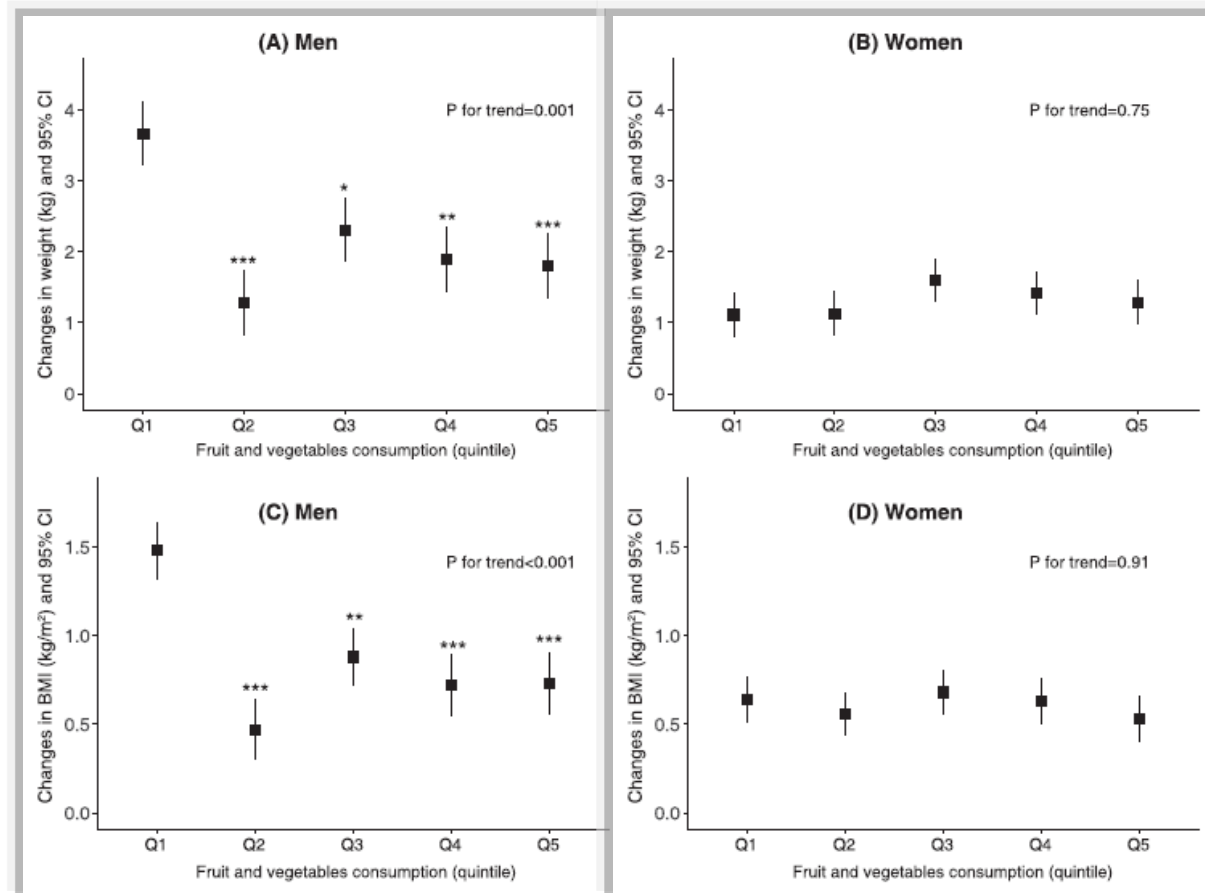




# The association of fruit and vegetable consumption with changes in weight and body mass index in Chinese adults: a cohort study



## Sex-specific weight and BMI change according to FV intake change quintiles





# MECHANISMS RESPONSIBLE OF WEIGHT LOSS INDUCED BY FRUIT AND VEGETABLES CONSUMPTION

One potential explanation for weight reduction by FV consumption may be a **decrease in the total energy intake**

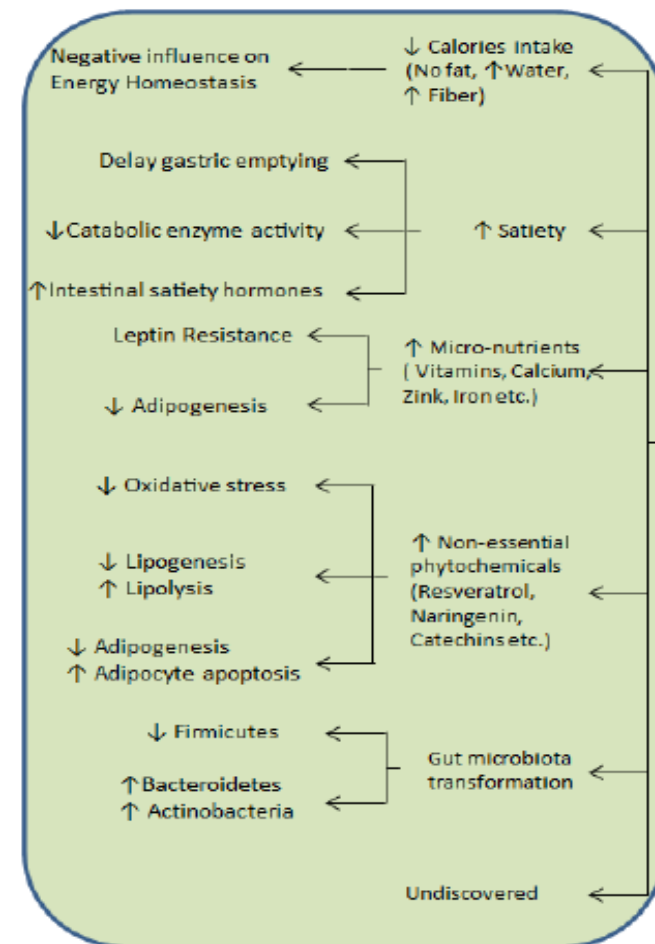
Several components of FV, such as **fiber content**, **glycemic load** (GL) and **polyphenols**, might be responsible for their anti-obesity effects

**Fibers** in FV **increase satiety**, **reduce hunger** feeling and **energy intake**, and then prevent weight gain

**Lower-GL** of FV produces fewer and smaller postprandial glucose spikes that may **decrease insulin levels and hunger**

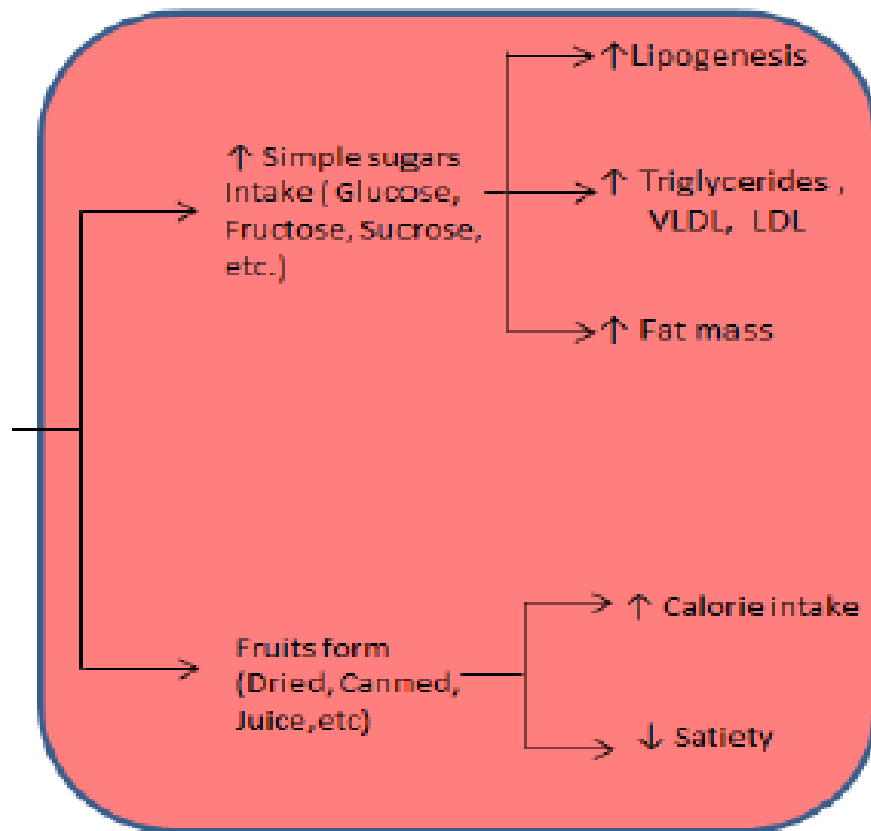
Diets with **low-GL** or low-glycemic index (**GI**) may **increase resting energy expenditure**, promoting weight maintenance

**Polyphenols** may influence **insulin sensitivity**, **gut microbiome**, and **adipose tissue metabolism**



Anti-obesity mechanisms

## Paradoxical Effects of Fruit on Obesity



### Pro-obesity mechanisms

Sharma SP et al, Nutrients, 2017



## How Much Sugar Is in Your Favorite Fruit?



## RECOMMENDATIONS TO APPLY IN DAILY PRACTICE

To eat not less than 5 daily portions of FV

To eat FV of different color

To keep in mind that juice is not fruit: fruit juice is a sweet drink

To eat whole grains and legumes, with fruit and vegetables



## Review

# Paradoxical Effects of Fruit on Obesity

