Science is a liar (sometimes):
questionable practices in research and communication

Blake Cavve and Matt Andreotta

Scenario

You're a PhD student. You get the opportunity to spend some time overseas in the lab of a famous, well regarded and prolific researcher. This is a good opportunity for you to publish some media friendly research (which is important for your future employment and funding prospects).

This academic gives you a large, detailed dataset from a self-funded, "failed" study which had null results and asks you to work until you find something interesting (and publishable) in this data set.

- Would you go?
- Assuming you decide to go, how would you approach finding an effect in this data set?

Scenario - IRL

- PhD student from Turkey (2013)
- Brian Wansink (prestigious Cornell Food and Brand Lab)
- Told to "find something interesting" about all-you-can-eat buffets
- "This cost us a lot of time and our own money to collect. There's got to be something here we can salvage because it's a cool (rich & unique) data set."

Questionable Research Practices (QRPs)

"exploitation of the grey area of acceptable practice."

- Researchers have to make many decisions, that do not have clear unambiguous answers:
  - How many participants do we test?
  - Who needs to be excluded from our data set?
  - Which (of a potential range of) DVs do we test?
  - What analyses best communicate our data/ results?

  - Make these decisions after looking at their effect on the *p*-value

QRPs:
Data Analysis

"Undisclosed Flexibility"

🚩 *Failing to report all of a study's dependent measures*
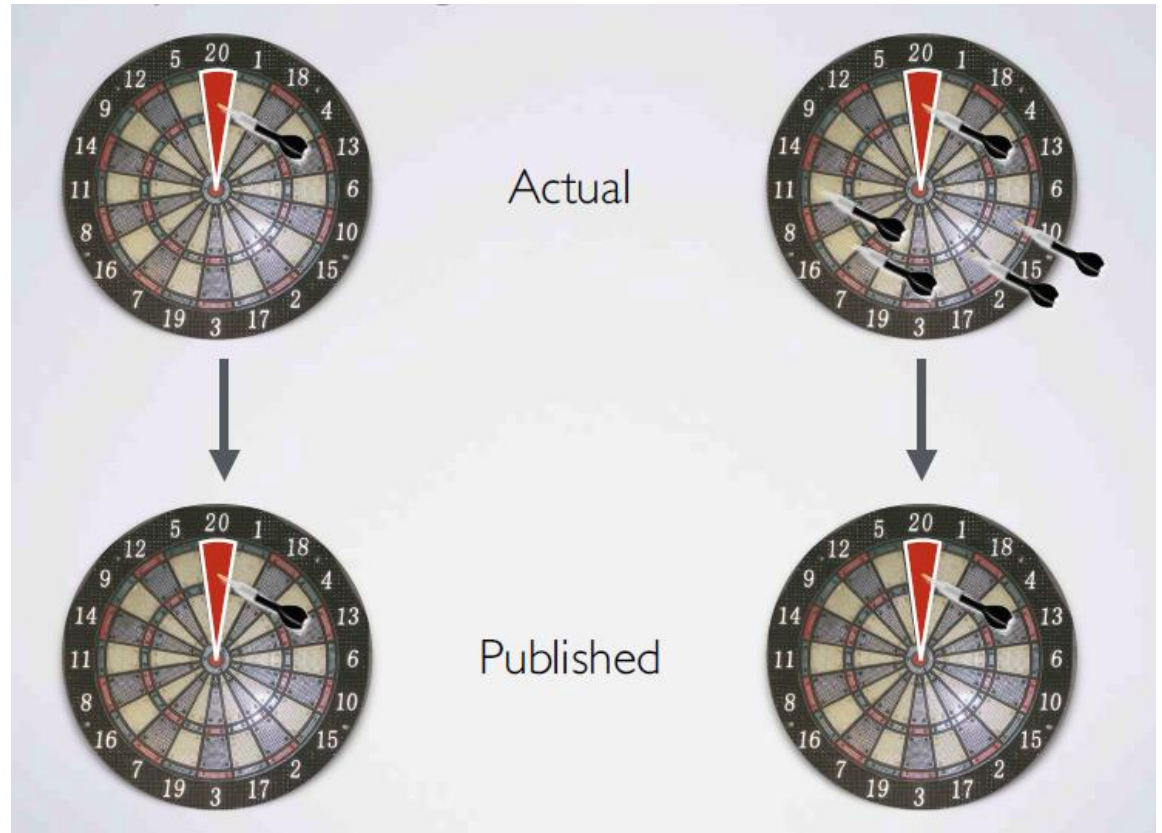
QRPs:
Data Analysis

🚩 *Failing to report all of a study's conditions*

🚩 *Selectively reporting studies that worked*

🚩 *Selective removal/ inclusion of outliers*

🚩 *Unplanned and undisclosed flexibility in analysis - running multiple analyses until you "find something"*

"I also ran — i am not kidding — 400 strategic mediation analyses to no avail..." Payne wrote. In other words, testing 400 variables to find one that might explain the relationship between the experiment and the outcomes. "The last thing to try — but I shutter to think of it — is trying to mess around with the mood variables. Ideas...suggestions?"

Two days later, Payne was back with promising news: By focusing on the relationship between two variables in particular, he wrote, "we get exactly what we need." (The study does not appear to have been published.)

Buzzfeed Report on Wansink's lab (Lee, 2018)
https://goo.gl/trQ62R

- This is also what Brian Wansink not only advocated, but praised the PhD student working with him for

- This is how a null result was turned into 4 (now retracted) papers

I would like you to really dig into this to find a number of situations or

First, look to see if there are weird outliers (in terms of how much they ate). If there seems to be a reason they are different, pull them out but specially note why you did so, so that this can be described in the method.

Here's some things to do.

I don't think I've ever done an interesting study where the data "came out" the first time I looked at it. The interesting stories come from seeing when things -- like the 1/2 price buffet -- works and when it doesn't.

Wansink's infamous blog entry
https://goo.gl/jF9Nki
Buzzfeed Report on Wansink's lab (Lee, 2018)
https://goo.gl/trQ62R

Second, think of all the different ways you can cut the data and analyze subsets of it to see when this relationship holds. For instance, if it works on men but not women, we have a moderator. Here are some groups you'll want to break out separately:

- Males
- Females
- Lunch goers
- People sitting alone
- People eating with groups of 2
- People eating in groups of 2+
- People who order alcohol
- People who order soft drinks
- People who sit close to buffet
- People who sit far away
- And so on ...

Third, look at a bunch of different DVs. These might include

- # pieces of pizza
- # trips
- Fill level of plate
- Did they get dessert
- Did they order a drink
- And so on ..

Wansink's infamous blog entry
https://goo.gl/jF9Nki
Buzzfeed Report on Wansink's lab (Lee, 2018)
https://goo.gl/trQ62R

This is really important to try and find as many things here as possible *before* you come. First, it will make a good impression on people and helps you stand out a bit. Second, it would be the highest likelihood of you getting something publishable out of your visit.

Work hard, squeeze some blood out of this rock, and we'll see you soon.

Best,

Brian

Implications

Public and communication:

- Accessible, inspiring message: weight loss is possible via small environmental changes, without need for intense diets
  - two self-help-style books
  - 200 journal articles
  - $10,000 kickstarter for a weight loss program (never delivered)

"Brian Wansink's discoveries might very well change your life." - O, The Oprah Magazine

From Mindless Eating to Mindlessly Eating Well: Brian Wansink at TEDxUVM 2012
TEDx Talks · 63K views · 5 years ago

NOTE: This new upload has improved audio; the initial upload had 245 views) BRIAN WANSINK Brian Wansink (Ph.D. Stanford)

17:19

THE WALL STREET JOURNAL.

HEALTH JOURNAL
Putting an End to Mindless Munching

By Melinda Beck
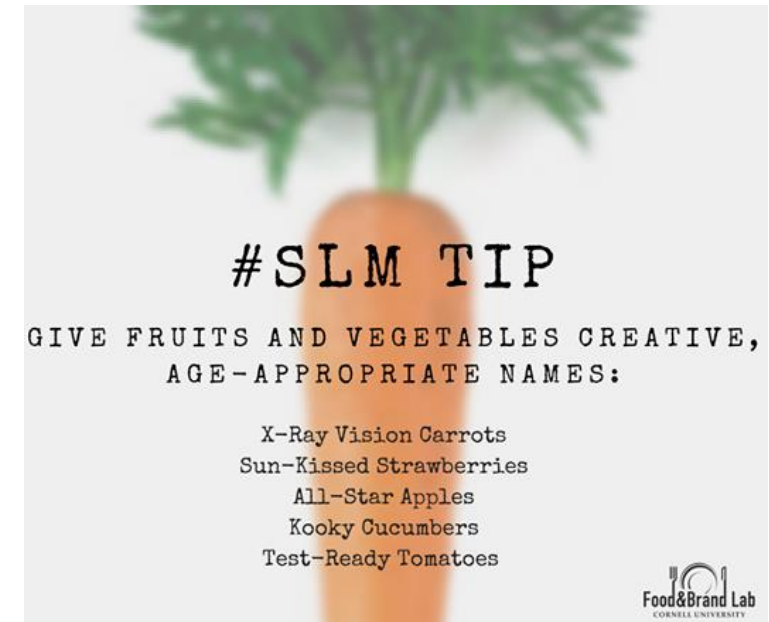Updated May 13, 2008 11:59 p.m. ET

The New York Times

5 Tips From 'Mindless Eating'

By DAVID LEONHARDT   MAY 2, 2007

Implications

Policy:

- Food and Brand Lab - Federal grants
  - National Institute of Health, the US Department of Agriculture, Private Industry, Not for Profits and Research Foundations.

- Research lead to the development:
  - Cornell Centre for Behavioural Economics in Child Nutrition Programs (BEN)
  - the Smarter Lunchrooms Movement (SLM)

- SLM - interventions inspired by Wansink's research
  - Tens of millions of dollars in state and federal funds
  - 30,000 schools
  - 7 years
  - Errors identified in specific studies cited on SLM website research, training, lesson plans, resources (several have been retracted) https://goo.gl/uv1hGD
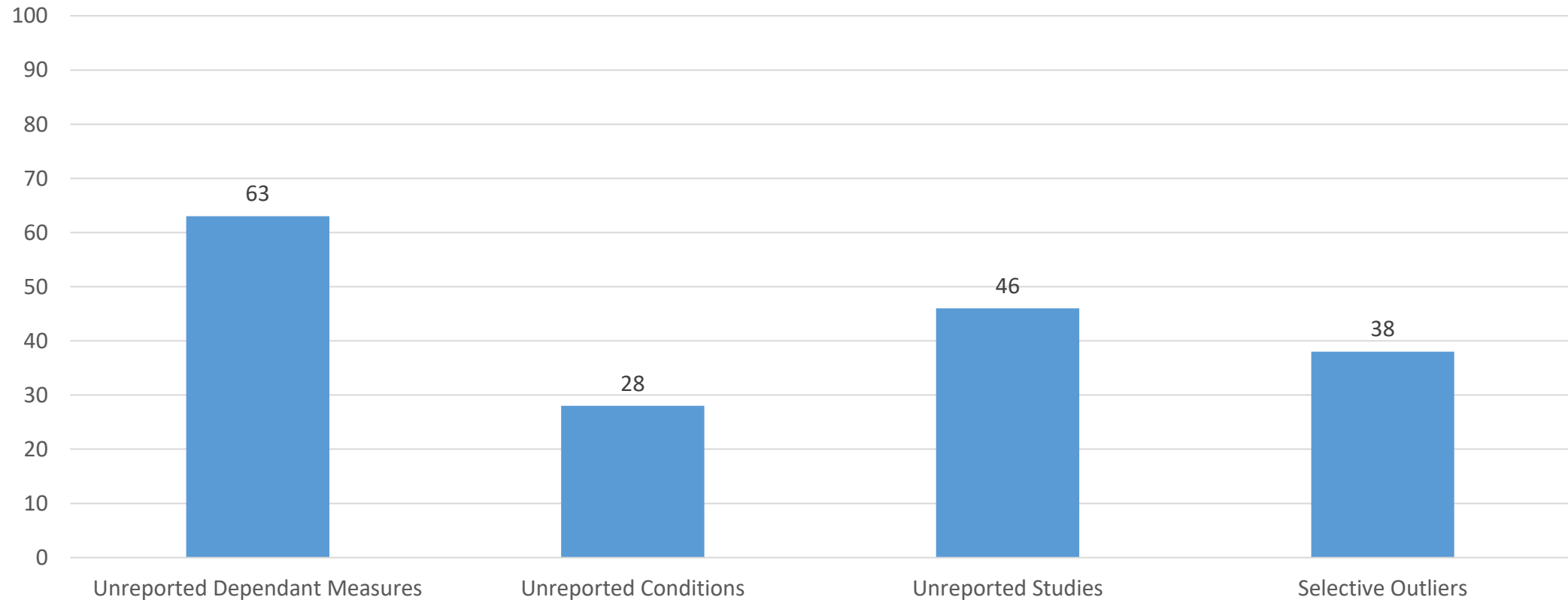

#SLM TIP
GIVE FRUITS AND VEGETABLES CREATIVE, AGE-APPROPRIATE NAMES:

X-Ray Vision Carrots
Sun-Kissed Strawberries
All-Star Apples
Kooky Cucumbers
Test-Ready Tomatoes

Food&Brand Lab
CORNELL UNIVERSITY

SLM Approach and Interventions
https://goo.gl/FpNSAe

p-hack your way to significance

https://goo.gl/zo518h
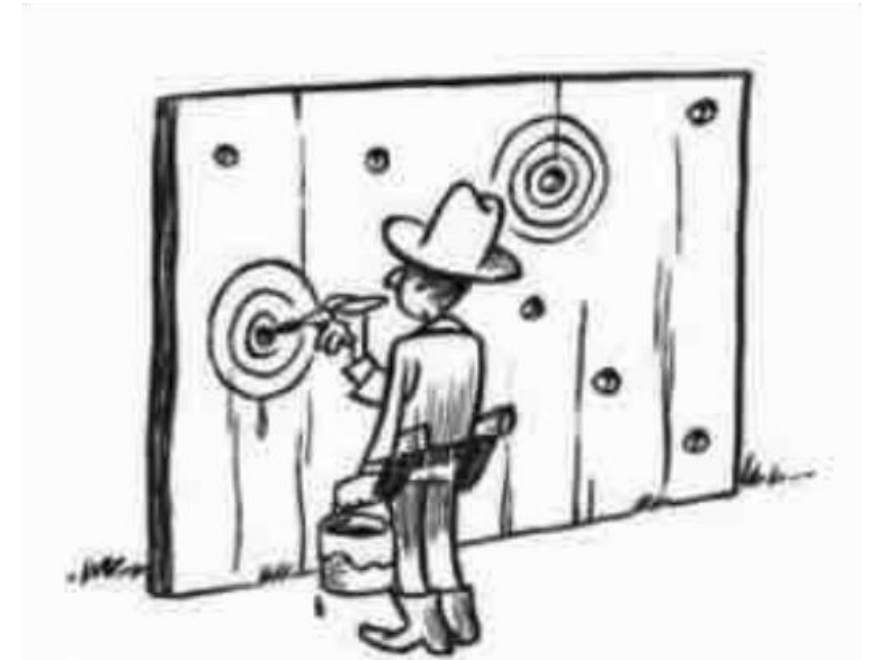
Estimating QRP prevalence:
Data Collection and Analysis

John et al., (2011)
2000 U.S.-based psychologists
Mean Self Admission Rate

QRPs:
Writing the study

- Round of p-values (0.054 to $p < 0.05$)
- HARKing
- Misleading abstracts
- Peer-reviewed?
- Conflict of interest

QRPs:
Writing the study

Conflict of interest

- Vested interest

- May be subconscious (confirmation bias)

- Investment in own theory

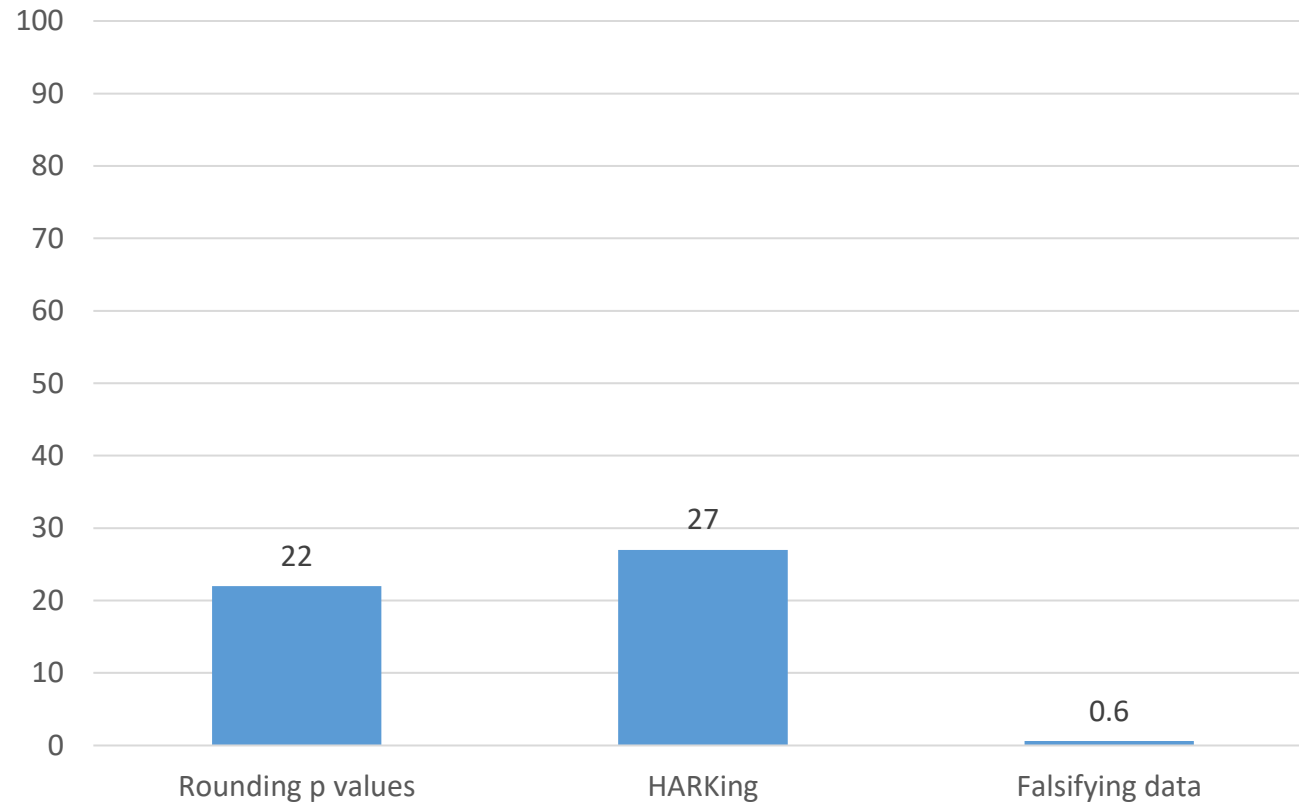This would not pass the muster of higher-level clinical studies — that's not the intent

We are not a research firm. We are trying to demonstrate how well we are providing our services to our clients.

Mark Murrison
CEO of Neurocore

Estimating QRP prevalence: Writing the Study

John et al., (2011)
Mean Self Admission Rate

Estimating QRP prevalence: John et al., (2011)

- 91% of participants admitted to engaging in at least one QRP

- Respondents who admitted to a QRP tended to think that their actions were defensible

- but 35% of respondents indicated that they had doubts about the integrity of their own research on at least one occasion.

Science says this type of red wine makes you more attractive

f Drinking Too Much

6 Reasons Why a Little Glass ~~Day May Do You Good~~

Low levels of alcohol good for the brain, study shows

SCIENCE SAYS DRINKING WINE MAKES YOU SMARTER, SO GO AHEAD AND UNCORK THAT BOTT

REATH OF FRESH AIR Drinking re ine could be the secret to banishir ad breath and avoiding the dentist

Science Says Wine Can Help You Lose Weight

Extra glass of wine a day' will shorten your life by 30 minutes'

NOT GOOD FOR YOU AFTER

Want to be better in bed? Science says you should drink more wine

Says That Red Wine And C ym

Drink Up! Science Says That Drinking Wine Can Make You Smarter

Group Activity

Group 1:

You are a lab of nutrition researchers, asked to provide a comment to reporters on a recent study linking chocolate consumption to weight loss. What are the main points in your comments?

Group 2:

You are PR for a chocolate company, asked to create a social media post about recent study linking chocolate consumption to weight loss. What are the main points in your post?

Group 3:

You are a group of under-resourced reporters, asked to write an article on a recent study linking chocolate consumption to weight loss. You do not have a lot of time to write your article, and can only skim other news articles for information. What are the main points in your article?

Sample size?

Study Participants

To obtain a genuine, non-preselected representation of the general public, the study participants were recruited without further requirements. On average, participants were 29.6 years old and weighed 81.5 kg. Their average BMI was 26.16; the lowest BMI was 19.15, the highest at 39.95.
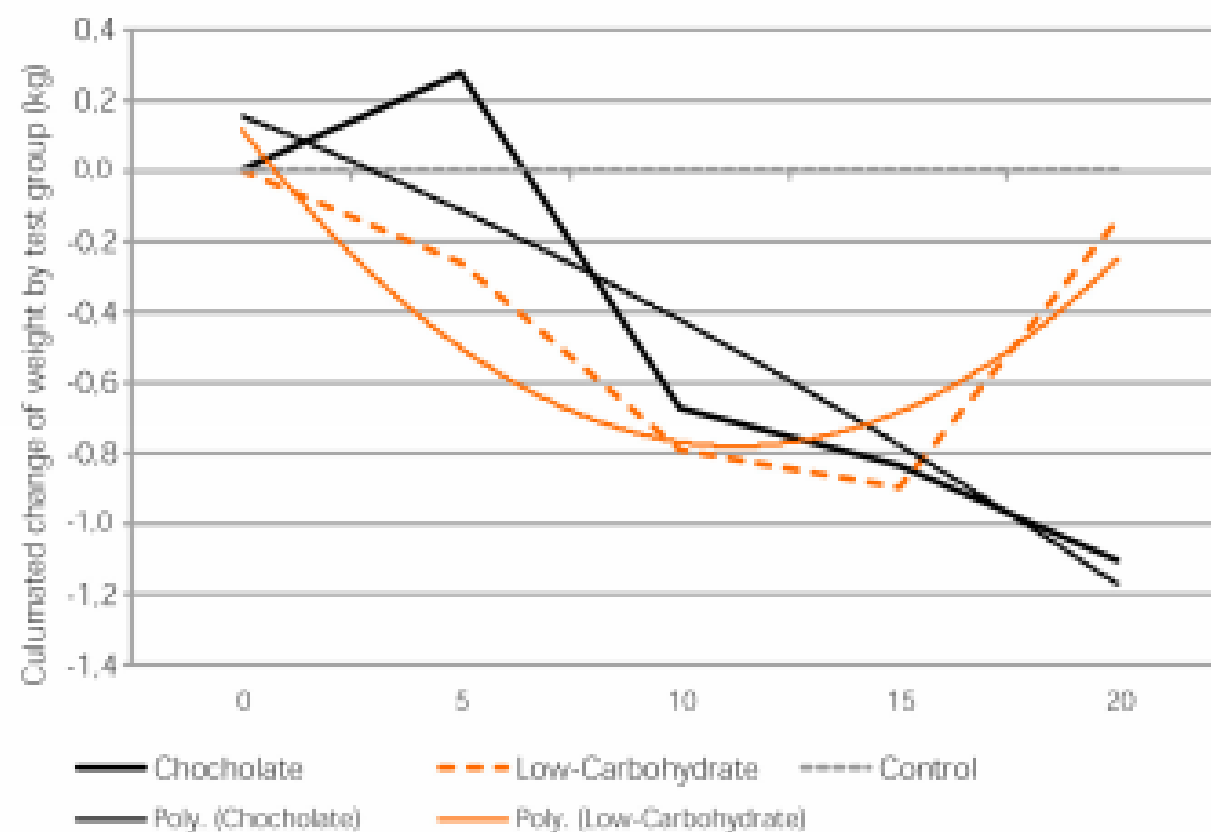
To represent the disproportionate number of female dieters in the general public, two-thirds of the participants were female, and one-third male.

The participants were healthy or had medical conditions for which a nutrition intervention represents a generally medically accepted form of therapy.

?

Figure 2: Culumated change of weight by test group.

Unsupported conclusions?

Lipid Levels

Cholesterol levels as well as triglycerides and LDL cholesterol concentrations improved significantly in participants of the chocolate group in comparison to the low-carb group.

Table 3. Absolute changes in lipid levels, liver values, and albumin values in an analysis that include data on all subjects in the relevant groups.

Variable	Chocolate Diet		Low-Carbohydrate		P-Value
Cholesterol (mg/dl). Day 21	-12,2	± 26,7	2,3	± 15,9	0,19
DTriglycerides (mg/dl) Day 21	-22,6	± 85,7	3,0	± 41,3	0,55
LDL cholesterol (mg/dl) Day 21	-17,4	± 22,8	-5,0	± 22,4	0,00

Contextualised in literature/Alternative explanations?

in this group. The initial slight weight gain is currently inexplicable to us. It may be related to the body's response to the flavanols or to other factors that were not the focus of this study. However, it is more important to consider the blood and fat levels. Thus, the values of the chocolate group on average improved not only considerably more than those of the low-carb group, but they even resulted in better LDL levels after just three weeks compared to levels participants reached after three months in diet groups graded by the professional associations with the quality level S3 (highest stage) and the recommendation grade A (the highest level).

Unsupported conclusions?

The albumin values of the study participants are also worth mentioning. Criticism of low-carb diets always broaches the issue of excessive protein intake. One suspects that this may lead to an increased risk of coronary artery disease. [25]

Unlike the participants in the low-carb group, however, the chocolate group showed hardly any increase of albumin degradation. It was lower by a factor of 6. The risk for coronary heart disease should therefore be much lower.

Albumin (g/dl) Day 21	0,0	± 0,4	0,1	± 0,3	0.23

Non-peer reviewed material?

Chocolate with high Cocoa content as a weight-loss accelerator

ORIGINAL

Johannes Bohannon[1],
Diana Koch[1],
Peter Homm[1],
Alexander Driehaus[1]

but recently changed hands. The new publisher's CEO, Carlos Vasquez, emailed Johannes to let him know that we had produced an "outstanding manuscript," and that for just 600 Euros it "could be accepted directly in our premier journal."

Although the Archives' editor claims that "all articles submitted to the journal are reviewed in a rigorous way," our paper was published less than 2 weeks after Onneken's credit card was charged. Not a single word was changed.

Conflict of interest

Johannes Bohannon[1],
Diana Koch[1],
Peter Homm[1],
Alexander Driehaus[1]

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I Fooled Millions Into Thinking Chocolate Helps Weight Loss. Here's How.

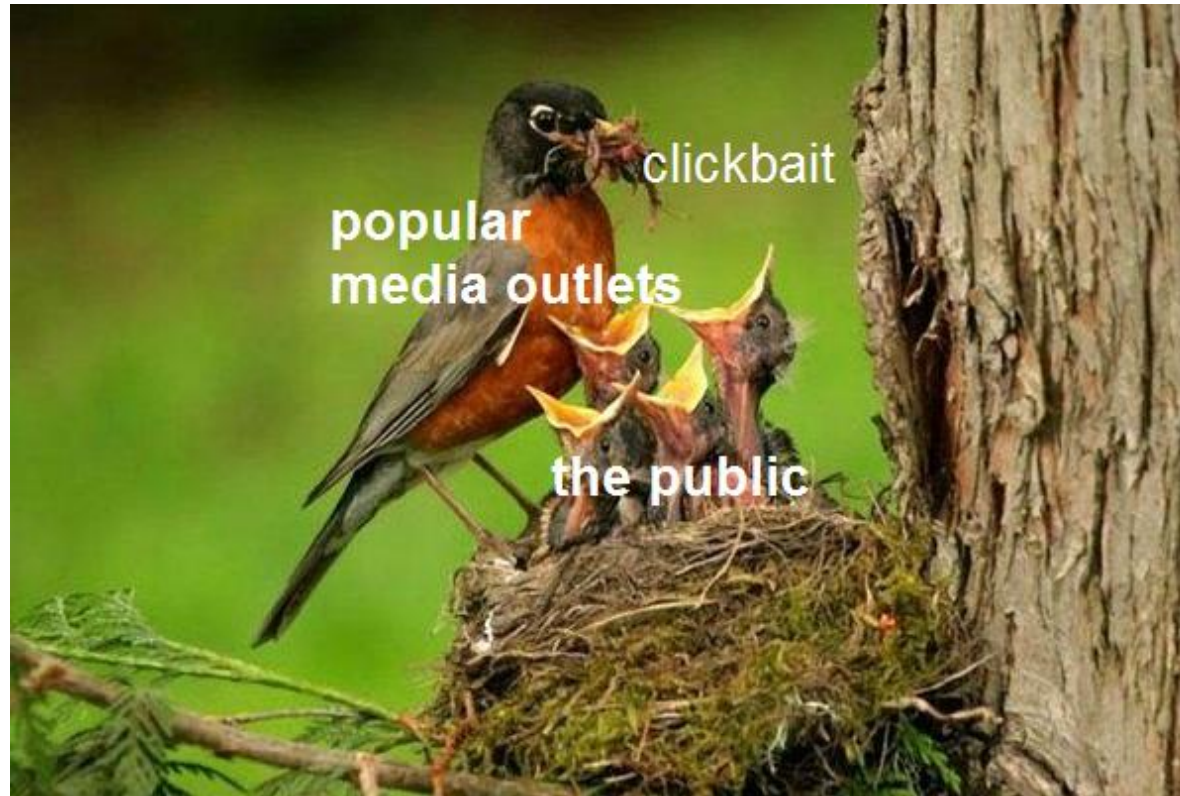John Bohannon
5/27/15 4:23pm · Filed to: DEBUNKERY ⌄

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Communication

Chocolate accelerates weight loss: Research claims it lowers cholesterol and aids sleep

CAN you indulge your sweet tooth and lose weight? If it's chocolate that you crave than the answer seems to be yes.

By SARAH BARNS
PUBLISHED: 10:31, Mon, Mar 30, 2015 | UPDATED: 20:28, Sat, Apr 4, 2015

SHARE f **TWEET** 🐦 G⁺ ✉ ⦉ 💬 ⁶

Chocolate can aid weight loss when combined with a low-carb diet, study claims

Score and ignore
A radio listener's guide to ignoring health stories

Study Quality	Standard of report
Just observing people?	Original information unavailable?
Yet another single study?	Headline exaggerated?
Might there be a different explanation you're not told of?	No independent comment?
Small?	Relative measures?
	Public relations puff?
	Half the picture?
	Applicability?

More "Yes" = More questionable

You = a consumer and producer of science

As a consumer

- Beware of red flags
- Dig deeper to find these
  - Google researcher names
  - Check conflicts of interest
  - Check journals
- Reflect. Is it too good to be true?

As a producer

- Write about the literature, not just a single study