

# Self-Control, Willpower, and Ego Depletion

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# What is Self-Control?

- Overriding responses, changing oneself
  - *Thoughts, emotions, impulses, performance*



# What is Self-Control?

- Overriding responses, changing oneself
  - *Thoughts, emotions, impulses, performance*
- Regulate: Change based on idea (standard)
- Vital for human social life (culture)
- Managing motivational conflict
- Key to understanding self
- Psychological basis of morality
  - Not the moral rules, but the ability to *abide by* rules
- Basis for free will

# Value of Self-Control

- Longitudinal studies
- Positive correlations with good outcomes ...
- Cf. self-esteem

# Value of Self-Control

- Success in work, school
- Good relationships
- Happy, low stress
- Adjustment, mental health
- Physical health
- Money problems, debt
- Good behavior (vs. crime, abuse, prejudice)
- Longevity
- *Most major personal problems include self-control failure*



# How Self-Control Works

# Three Ingredients of Self-control

- Standards
  - Ideas of how one should be
  - Motivation/commitment
- Monitoring
  - Keeping track of target behavior
- Capacity to change
  - Willpower, strength

# Willpower is limited

- Idea of willpower implies limits
- “Ego depletion” effects



# First Hints

- Pattern noticed common to multiple literatures ( Quitting smoking, dieting, alcohol, possibly sex, aggression )
- Self-control deteriorates during use
  - Also following other demands
  - Dieters trying to quit smoking at same time do badly at both
    - Also poor affect regulation

# Ego Depletion Theory

- Limited resource (willpower)
- Performance declines as willpower depleted
- Linked to blood glucose
- Same willpower is used for choice, intelligent thought, initiative, planning
  - *Also non-behavioral functions, such as immune system*

# Perseverance Despite Frustrating Failure

Radish

Chocolate

No-Food Control



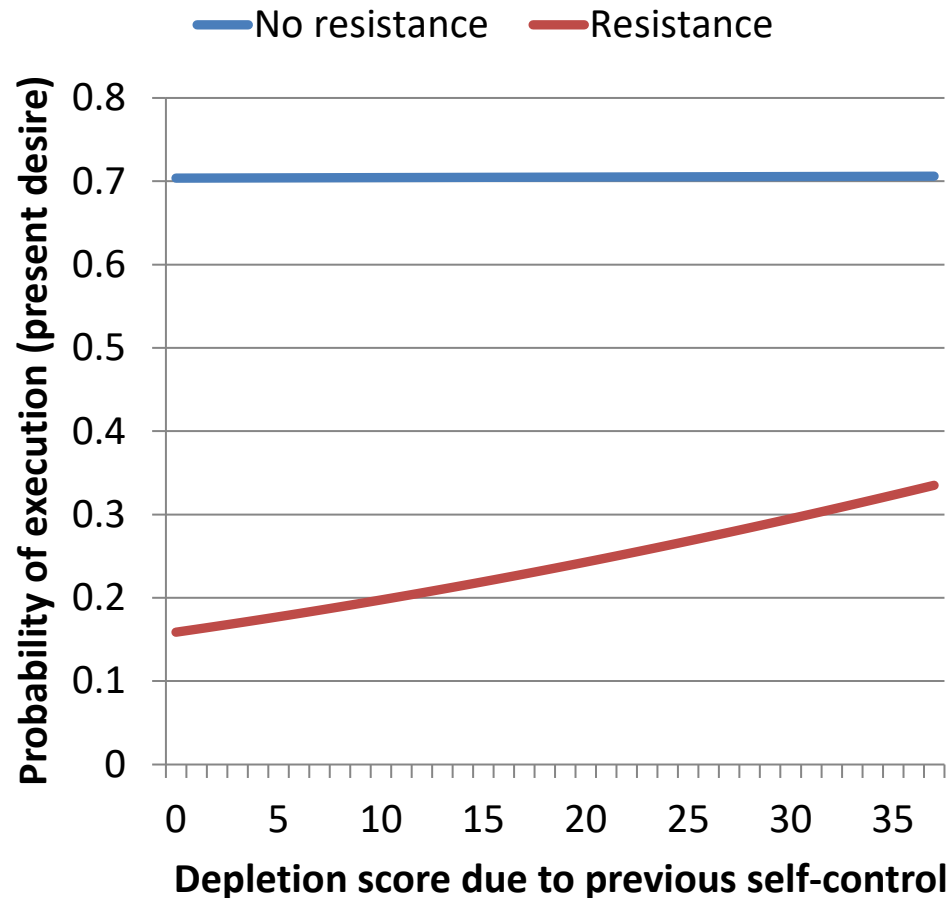
# Perseverance Despite Frustrating Failure

Radish	8.35 <i>minutes</i>
Chocolate	18.90
No-Food Control	20.86



# Ego Depletion in Daily Life

- Depletion score: sum of previous resistance attempts on same day, weighted by temporal distance



# Ego Depletion as Best Replicated Finding in All Social Psychology

- 600-800 significant published findings
    - None in opposite direction
    - Many different laboratories
  - Pre-registered replications
  - Real-world findings
  - Multi-site replications
    - One clear complete success
- Dang et al., 2021
- Two others with some supportive evidence

# First Revisions

- Initial idea: running out of fuel. Suspected as like muscle tiredness, insufficient energy to perform task
- Problem findings: depletion could be overcome with incentives
- Revised: depletion is conservation, not exhaustion
  - You can overcome it
  - But then you're super depleted
  - Mimic depletion when anticipating future
- (Turns out muscle tiredness is like that too.)

# Muscle Metaphor

- Tired following exertion
- Conservation, not exhaustion
- Exercise increases strength
  - *Building character*



# One Willpower, not Many

- Control thoughts
- Control feelings
- Impulse control
- Task performance



# Various consequences

- Intelligence, reasoning
- Interpersonal
- Aggression
- Impulse spending
- ...Automatic responses remain intact and gain in relative control over behavior

# Applied to Morality

- More immoral behavior
  - Cheating, lying

# Moral Judgment?

- Moral muscle assumes constant judgment
- Trolley problem, etc
- No reliable effects of depletion or low self-control
- BUT: process dissociation studies
  - E.g., smother baby to save group from death, or only from non-fatal manual labor conscription
- Avoid harm (D) vs. maximize total outcomes (U)
- High trait self-control folks are higher on both

# Strength Beyond Self-Control

- Choice is depleting
  - Decision fatigue
  - Free will

# Decision Fatigue: Keeping Hand in Ice Water

Choices (Depln)	27.7
No Choices	67.4

*Vohs et al. (2008) J. Pers. Soc. Psy.*

*Measure: Seconds holding hand in ice water*  
*Source: Vohs et al. 2008*

# Decision Fatigue Summary: *Choosing While Depleted*

- Postpone/avoid decision
- Less compromise
- Default option, passive, status quo
  - Note Banker studies on dictator game: status quo bias, not selfishness
- Impulse, self-indulge
- Irrational bias (asymmetric dominance decoy effect)

# Nature of Decision Fatigue

- Note depletion effects on decisions cannot precisely parallel self-control
- Shift toward low-effort styles
- Avoid risk, no compromise, irrational bias, short-term, status quo bias (conservative)





# Obama interview

- “You’ll see I wear only gray or blue suits,” he said. “I’m trying to pare down decisions. **I don’t want to make decisions about what I’m eating or wearing. Because I have too many other decisions to make.**” He mentioned research that shows the simple act of making decisions degrades one’s ability to make further decisions. “You need to focus your decision-making energy. You need to routinize yourself. You can’t be going through the day distracted by trivia.”

# Strength Beyond Self-Control

- Choice is depleting
  - Decision fatigue
- Active vs. passive (initiative)...

# Depletion Causes Passivity?

- Absence of top-down control
- Possible disinhibited activity
- But reduces taking initiative

*Vonasch et al. (in press). Motivation Science.*

# Depletion & Passivity

- Attention control manipulation: watched video of person, words at bottom, instructions to ignore or not
- Second task, seated at computer for instructions. Blue screen only.
- Measure: How long did they sit there without doing anything, as opposed to fetching the experimenter?

# Duration of Passive Sitting

Attention Regulated      5.6 minutes

No Depletion Control      2.7 minutes



# Thus,

Depleted people are more passive.  
More prone to do nothing and to  
choose “default” option.

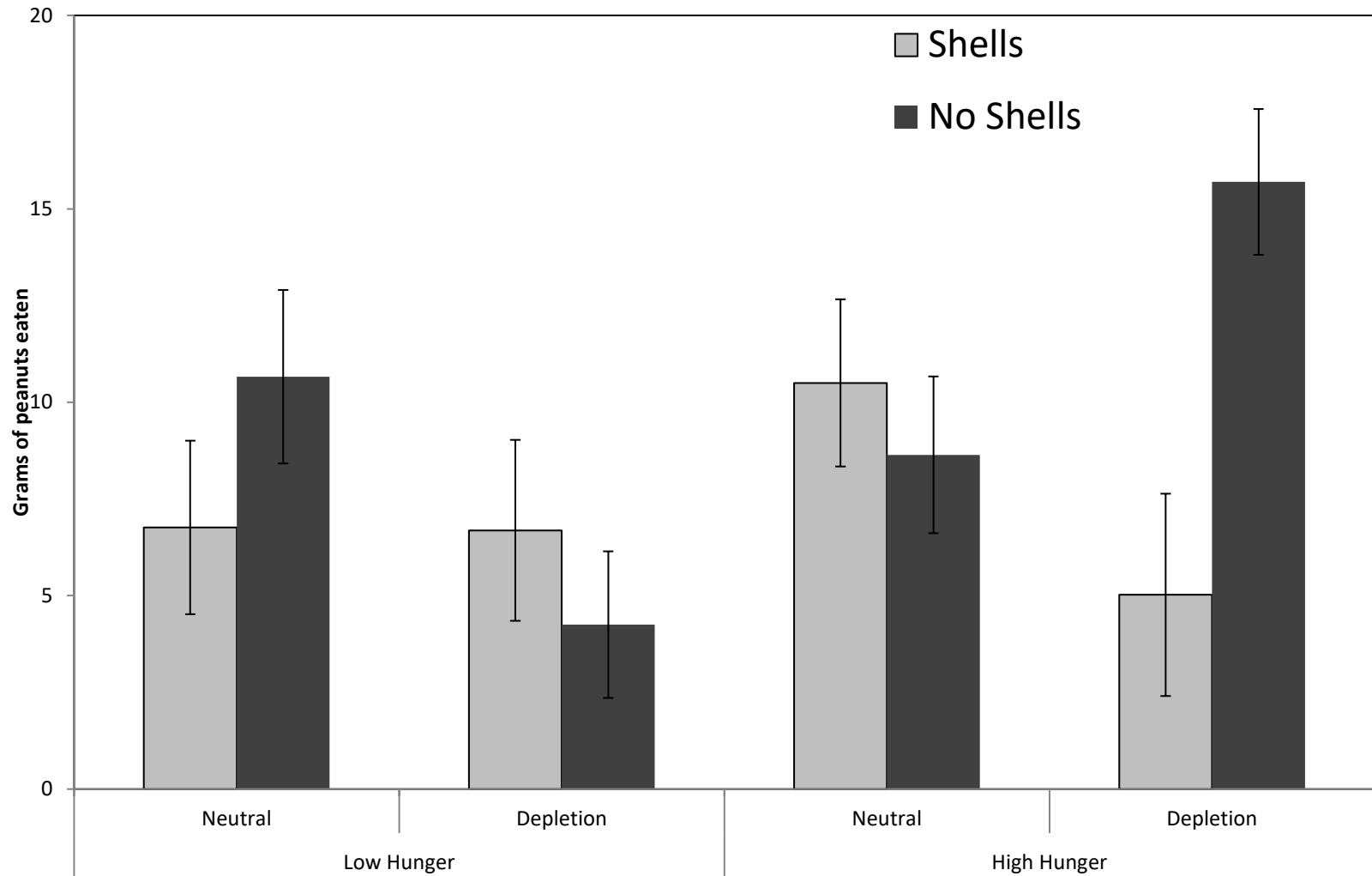


# Taking the Easy Way Out

- Depletion reduces top-down mental control
- So the automatic, unconscious mind takes over... and does whatever is simpler
- Experiment on eating nuts: Eat all you want
  - People who got peanuts without shells ate *more* when depleted
  - People who get peanuts still in shells ate *less* when depleted



# Depletion in a Nutshell



# Free Will Revisited

- Unlikely that free will exists independent of these processes of self-control, rational choice, planning, and initiative
- ***If there is free will, this is it***
- ***If there is no free will, this is what is mistaken for it***

# Strength Beyond Self-Control

- Choice is depleting
  - Decision fatigue
  - Free will
- Active vs. passive (initiative)...
- Planning
- Uncertainty
- Keeping secrets

# Trait Self-Control

- Note, no interaction with depletion in lab
- But in life, much more reports of feeling depleted among the low TSC
  - In lab, everyone does the same task, so it's equally depleting
  - Outside, mismanaged life means many more depleting experiences
- High trait SC not more willpower, just used better
- Manage habits; also more planning

# High on Trait Self-Control

- Less frequent resistance!
- Fewer problematic desires
- Less guilt
  - *From other work: lower life stress*
- Implications: Playing offense, avoiding problems



# Trait Self-Control

- Many positive outcomes
  - Cf. self-esteem
- Opposites attract (but don't last)
  - And can two undercontrolled lovers find happiness together?

# What Gets Depleted?

Is willpower just a metaphor...or  
something real?

Can energy models be revived?

How are mind and body linked?



# Willpower More than Metaphor?

- The Mardi Gras Effect study
- Glucose is relevant
- Allocation rather than running out

# Self-Control Burns Glucose?

- Glucose as fuel for brain
- Some psychological processes consume more glucose than others
- Glucose deficiencies have been found among people with self-control deficits (e.g., juvenile delinquents)

# Lab Studies on Glucose

- Acts of self-control might reduce levels of glucose in bloodstream (?)
- Low levels of glucose predict poor performance on subsequent self-control tasks
- Administering glucose counteracts effects of depletion
  - (Though so does mere taste)

# Glucose and Decisions

- Asymmetric dominance effect
- Probability matching
- Delay discounting

# Understanding Glucose

- Self-control
- Allocation
- Immune system
- Premenstrual Syndrome (PMS)

# New Emerging View

- Glucose is a big part of willpower
  - Body conserves naturally
- “Central governor” does not have inventory of body’s energy reserves
  - Estimates consumption from byproducts (adenosine), “counting the ashes”
  - Errs on side of conserving
- Evolved to protect immune system, etc.

# So...

- Mind and body *act as if* a resource is being depleted by self-control
- AND a physical energy resource is *genuinely* being depleted
- But those two facts are only loosely related
  - Cf. physical muscles

# Improvement via Depletion?

- Interracial interaction
- Leadership studies



# Challenges, Alternative Theories

- Selective allocation of glucose
- Just motivation and attention
  - But self-reported motivation doesn't change
- All in your head/ expectations

# Ego Depletion Controversial?

- Alternative explanations
- No effect
- (Contradictory)

# Does Ego Depletion...

- Always occur under all circumstances?
- Sometimes occur under some circumstances?
- Never occur under any circumstances?

# Conclusion for Part One

- Energy
- Conservation
- Building character
- Trait and state
- Decisions
- Initiative, active/passive
- Glucose

***End of  
Part One***



# Depletion Lets the Unconscious Take Over

- When depleted, we rely on automatic, unconscious processes to drive our behavior, rather than relying on controlled, conscious decision making
- Study measured automatic attitudes toward candy (IAT-like measure)
- Also measured conscious attitudes toward candy: dietary restraint, concern about health and weight
- Findings: when not depleted, the conscious attitudes toward candy predicted behavior
- When depleted, the unconscious attitudes predicted how much candy they ate

# Ego depletion and alcohol consumption 1

- Lab study
- Participants expect they will have to take a driving test (incentive to stay sober)
- Depleted (by suppressing thoughts) or non depleted
- Asked to sample beer
- Depleted people consumed more alcohol (and had higher Blood alcohol content) than non-depleted people
- (especially true for those tempted by alcohol)
- Depleted people less able to control drinking even when they should compared to nondepleted people



# Ego depletion and alcohol consumption 2

- Daily real world reports
- Ask people to report daily on their plans to consume alcohol, their urge to consume alcohol, and how much alcohol they actually consumed
- Also report their daily self-control demands
- On days with higher than average self-control demands, they were more likely to violate self imposed drinking limit
- exerting self-control in nondrinking areas undermines individuals' capacity to exert self-control of drinking in daily life.

# Practicing self-control and smoking cessation

- Self-control is like a muscle
- Practicing self-control in one sphere helps improve self-control in other spheres
- People planning to quit smoking either practiced small acts of self-control for 2 weeks or worked on other tasks (feelings of confidence, etc) before quitting
- Smoking was assessed by self-reports and biochemically
- Individuals who practiced self-control remained abstinent longer than the others

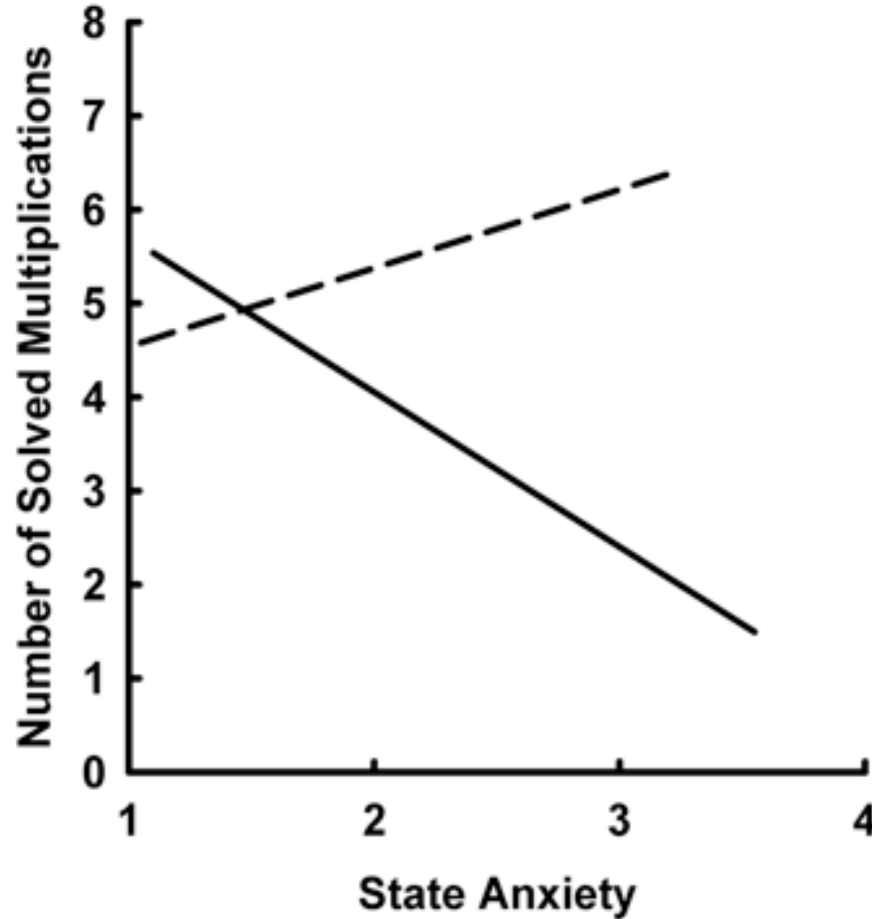
Does Test Anxiety Impair Performance  
on Tests?

*... Do Anxious People Give More Wrong  
Answers?*

# Anxiety and Performance

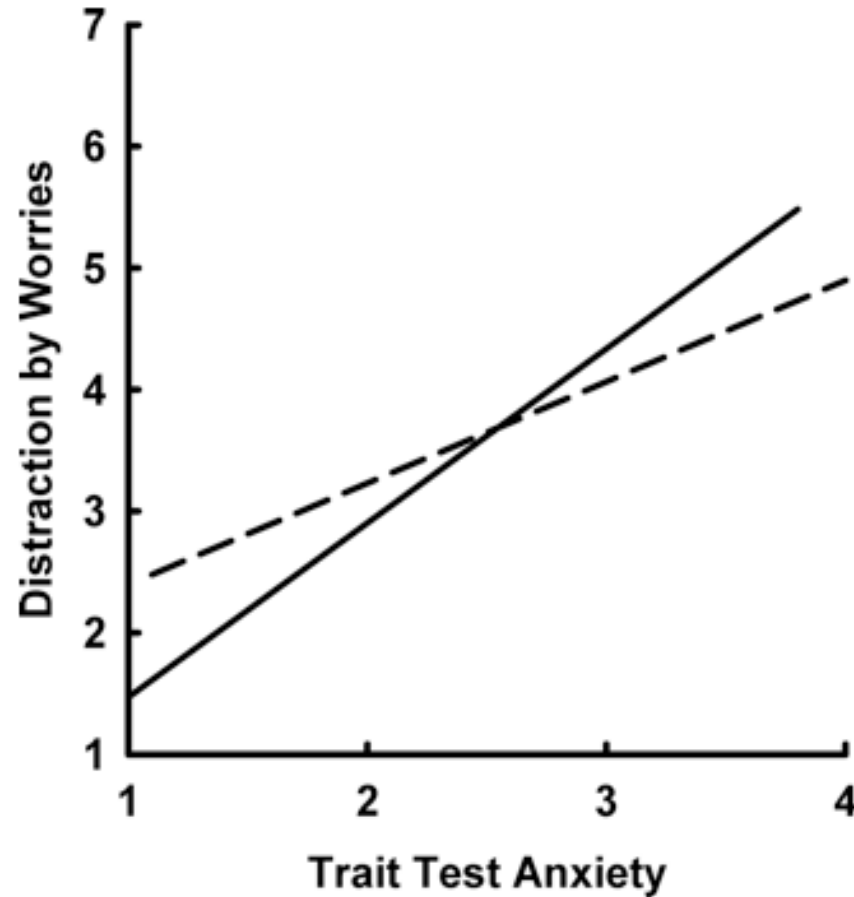
- Effects of anxiety on performance are inconsistent
- Possibly self-regulation accounts for the difference?
  - Normally people overcome their anxiety and perform well
  - But when depleted, they are unable to keep anxiety at bay

# Depletion Moderates Anxiety



Depleted — Not Depleted - - - -

# Depletion Moderates Trait Anxiety: Self-reported Distraction During Task



Depleted — Not Depleted - - - - -

# Anxiety and Self-Regulation: Summary

- State anxiety impaired performance
  - Only when depleted
  - On both verbal learning and mental arithmetic
- High trait anxiety people performed worse
  - Only when depleted
- High trait anxious reported more distraction by worries
  - Only when depleted
  - Worries mediated poor performance

# Anxiety: Conclusion

- Sometimes anxiety impairs performance, sometimes not
- When self-regulation is strong, people can keep anxieties and worries at bay and perform well
- When self-control is weak or depleted, anxiety intrudes, distracts, and performance suffers



# Outside the Laboratory

# But Are They Happy?

- Good self-control produces many benefits
- But could be unpleasant: sacrifice, discipline, restraint. Low self-control might be more fun!

# Conclusions: Self-Control and Happiness

- High self-control does increase happiness
- Both momentary emotion and life satisfaction
- The emotion helps mediate life satisfaction
- Less frequent goal conflict and less stress also mediate
- Better at managing vice-virtue conflict



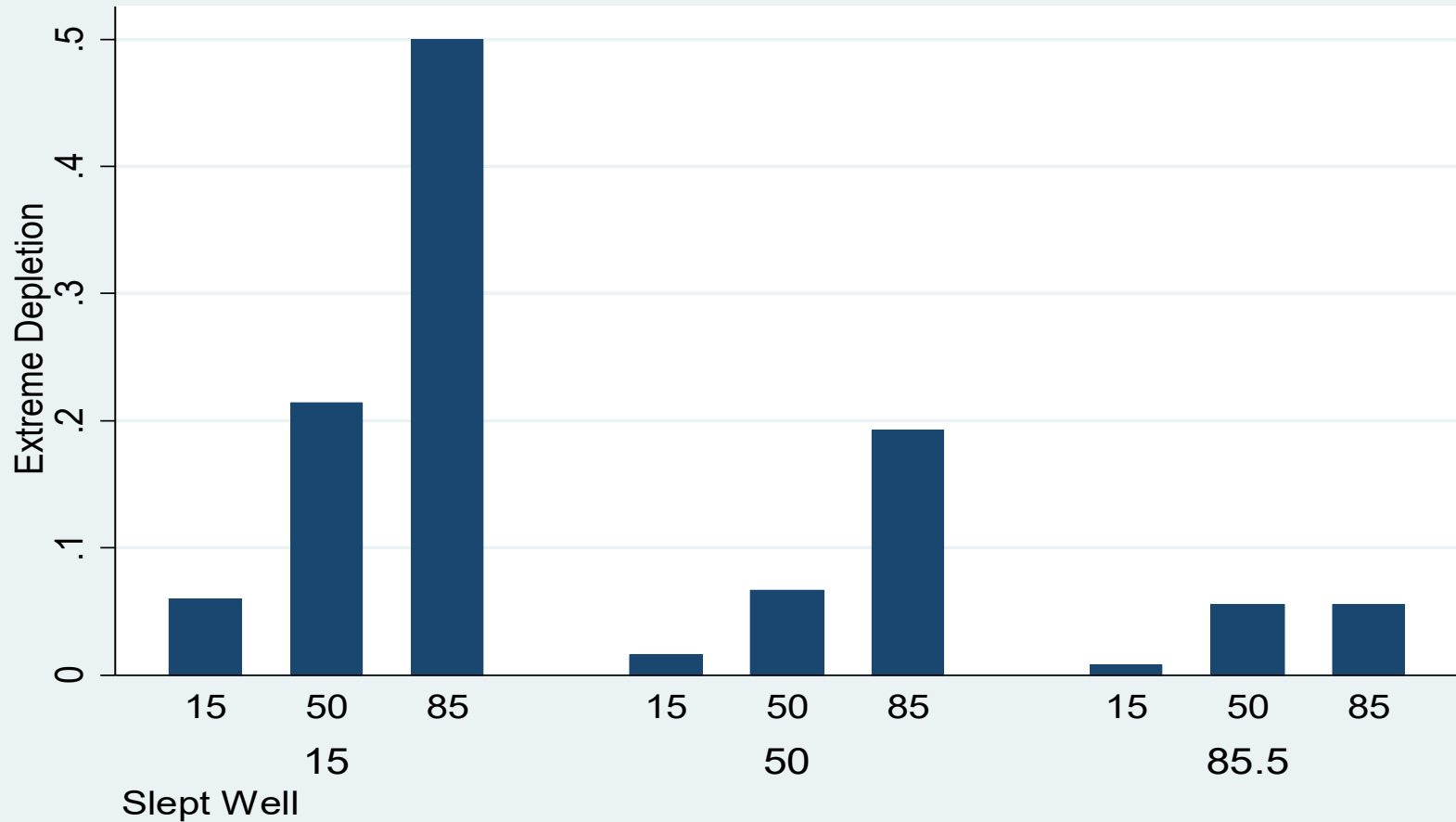
# Who Feels Extremely Depleted?

- 3x3 design yields nine means
  - Sleep quality x interpersonal conflict
- Most opposite cells, look at frequency of extreme depletion:
- **Slept very well and no interpersonal conflict:**  
1% of reports indicate severe depletion
- **Slept badly plus high interpersonal conflict:**  
**50% (!!)** report extreme depletion

# Extreme Depletion: Who?

## *Conflict x Sleep Quality*

Figure: Extreme Depletion by Conflict by Sleeping Well



# Ego depletion and the strength model in sports: a few examples

- Dart throwing (McEwan et al, 2013): only throw when green light flashes: depleted participants were less accurate and were also less adept in controlling their impulses (i.e., they threw on red and yellow lights)
- quality of the sprint start in track and field:
  - depleted experienced athletes displayed slower reaction times after the starting signal compared to a non-depleted series of sprint starts (Englert and Bertrams, 2014)
  - Depleted inexperienced participants were less adept in controlling their motor impulses and displayed a higher number of false starts

# Depletion in medical care (one example)

- Most people get depleted as the day goes on
- Including medical doctors and surgeons (decision fatigue might be especially problematic)
- Patients randomly assigned time slots to see orthopedic surgeons
- patients who met a surgeon toward the end of work shift were 33 % less likely to be scheduled for an operation compared with those who were seen first
- the odds of operation were estimated to decrease by 10.5% for each additional patient appointment in the doctors' work shift
- Because long shifts are common in medicine, the effect of decision fatigue/depletion could be substantial and may have important implications for patient outcomes.
- Many examples in the medical setting, also auditors, etc.









# Self in Psychopathology: How the Self Goes Wrong

# “Defective” Piece

- Low self-esteem as main candidate
- Delusions of self-identity

# Dis-Organization

- Bipolar: divided self
- PTSD: poor self-organization is risk factor
  - Dissociation as reaction to trauma
- Obsessive-compulsive disorder
  - Tension between surface self and hidden self
- Depression: coherence, continuity threatened
- Borderline personality disorder
- Dementia: loses connection to time
- Schizophrenia: not 'owning' own thoughts, etc
- Addiction: again, problem with integration over time
- Overvaluing one part of self
  - Hoarding, body dysmorphic, some eating disorders, trichotillomania

# Deficient Self-Control

- Addiction, not using present to build future
- Fear of losing control: PTSD, OCD, eating disorders
- Problems with setting goals: hoarding disorder, social anxiety disorder, bipolar, some eating disorders
  - Perfectionism

# Too Much Self-Control?

- Tangney: searched for any downturn
- (None found)
- Eisenberg, “overcontrolled” children
- Misregulation?



# Chronic Depletion?

- Ongoing state of lower ability, lower efficiency
- Lacking willpower to deal with challenges
- Symptoms
  - Feelings of emptiness, exhaustion
  - Loss of motivation
  - Difficulty concentrating, persevering

# Three Pathways

- Recurrent depletion
  - Chronic pain, struggle with addiction, bad relationship, ongoing work stress, money problems, caregiver burden
- Inadequate recovery
  - Poor sleep, inadequate food, lack of vacations
- Weakness, low willpower to start
  - Aging, illness, poor socialization, sedentary lifestyle; learning histories (expecting fatigue)

If Time Permits...

# Project on Depletion and Thinking

- Goal: Show that people rely more on intuition & short-cuts (heuristics) when depleted
- Goal: Show that using heuristics conserves resources
- Goal: Show that people use more heuristics when they want to save mental energy

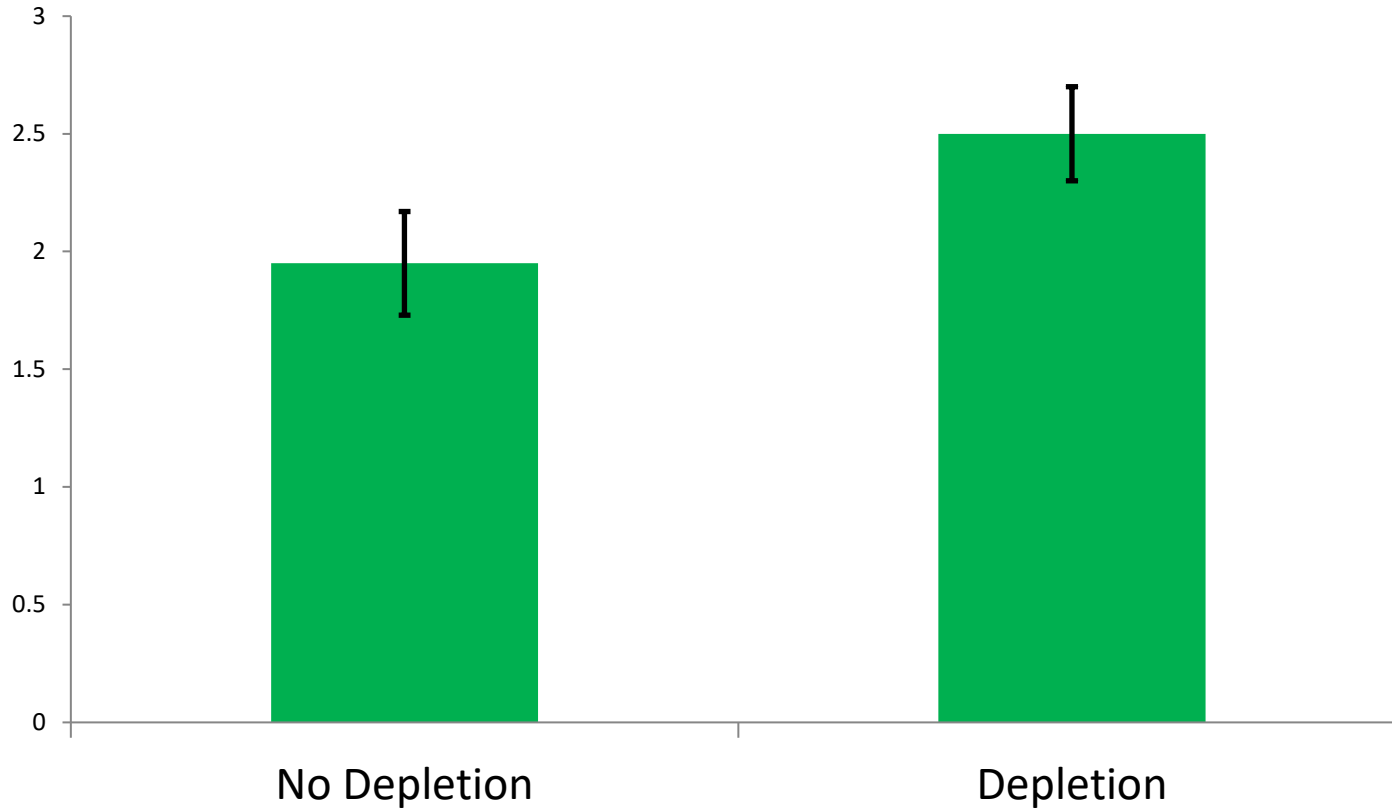
# Thinking Fast and Slow

- Sample CRT problems
  - A bat and a ball together cost \$1.10. The bat costs \$1.00 more than the ball. How much does the ball cost?
  - 5 machines take 5 hours to make 5 widgets. How long does it take 100 machines to make 100 widgets?
- Intuition vs. Reflection
  - Algorithms, logical reasoning vs heuristics



# Study 1: Depletion Increases Reliance on Intuition

Heuristic CRT Answers



# Study 2: Intuition Conserves Resources

- Reversal of causal direction from Study 1
- Random assignment to 2 conditions (intuition, controlled thinking)
  - 10-item extended CRT using intuition OR controlled thinking
- Then measure Incongruent Stroop RT

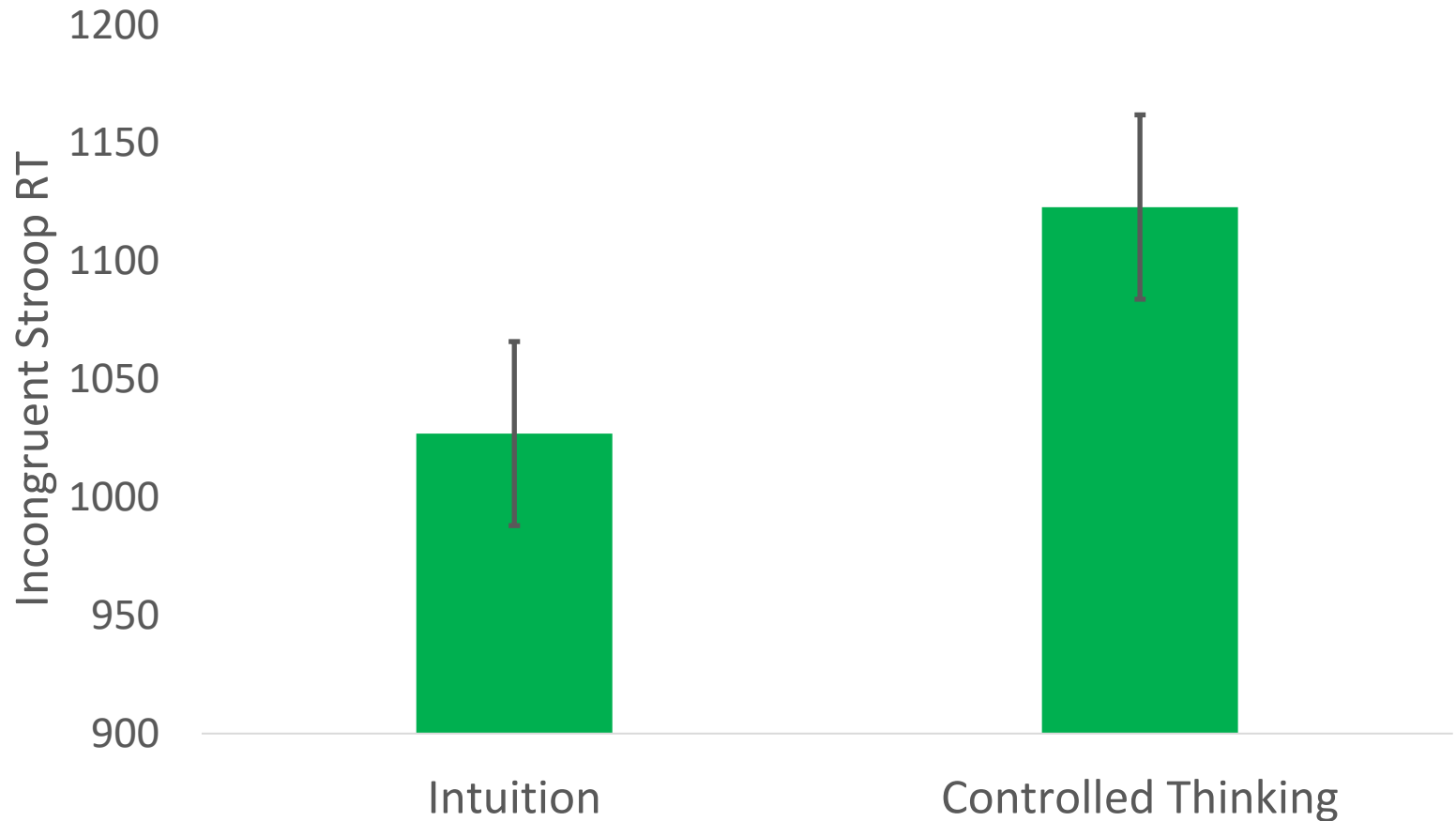
PURPLE YELLOW RED  
BLACK RED GREEN  
RED YELLOW ORANGE  
BLUE PURPLE BLACK  
RED GREEN ORANGE

# Stroop Task

- Red
- Green
- Yellow



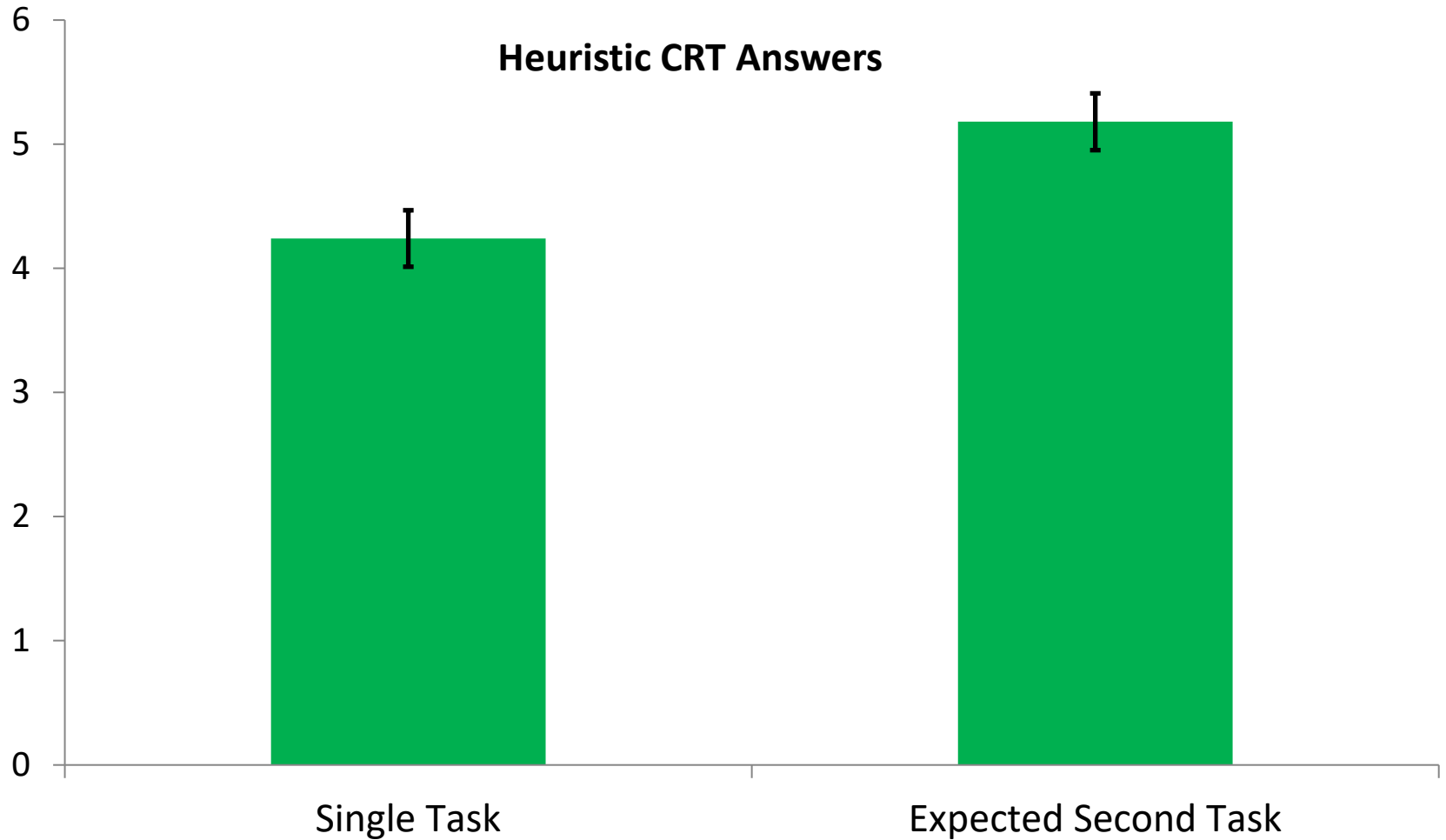
# Thinking Carefully Impairs Later Performance



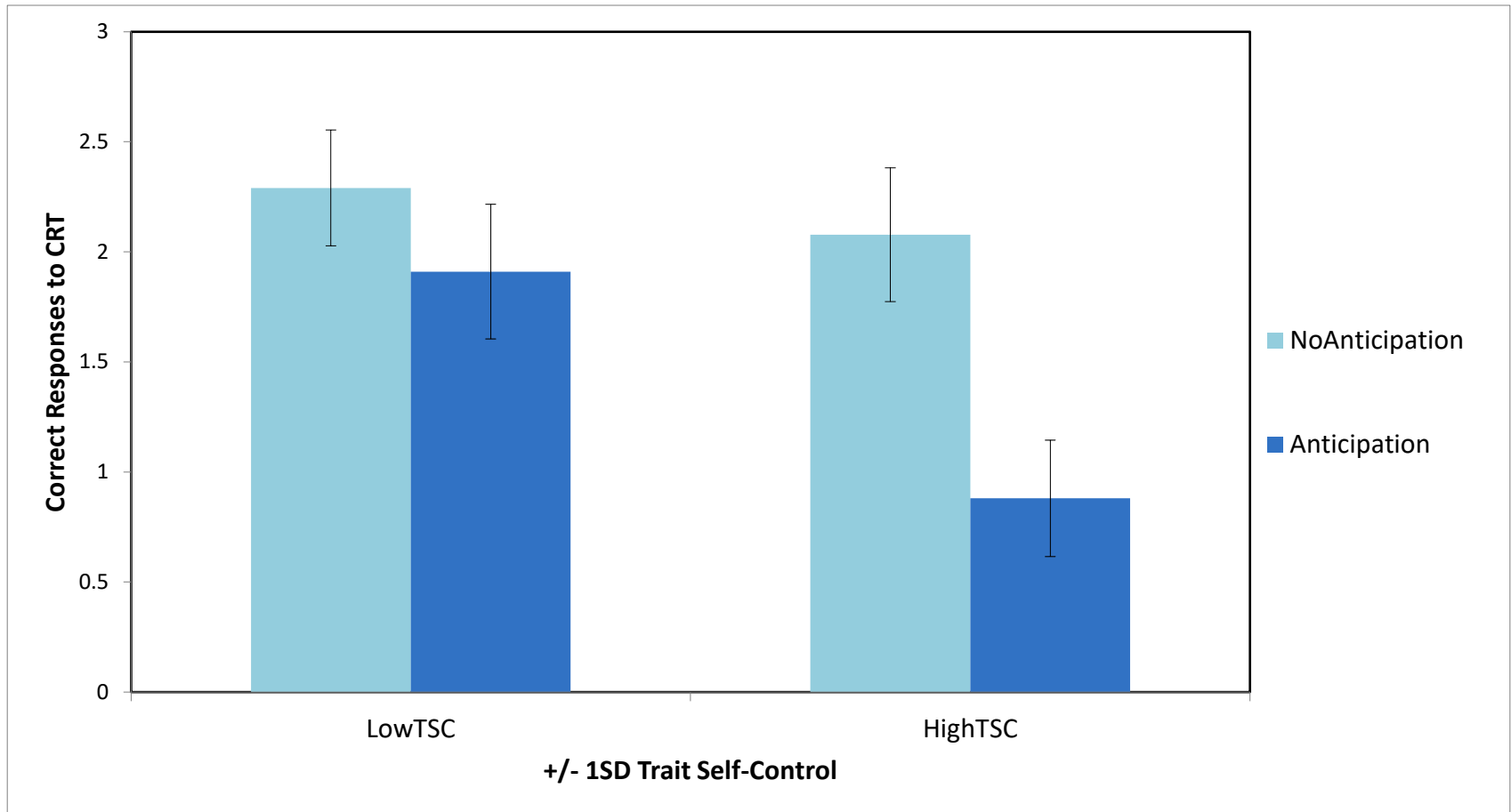
# Study 3: Expecting Future Demands

- Participants completed a 10-item CRT.
- Half of the participants were told that this was the only task, and that they would receive 10 cents for each correct answer. (No future demands)
- Half of the participants were told that there would also be a second task, worth \$1 per correct answer, but that those problems would be more difficult and would require effort to solve. (Future Demands)
- Measure: problem solving strategy

# Expected Future Demands Increase Relying on Intuition



# ...Especially Among People with Good Self-Control !



# Project on Intuitive Thinking: Conclusions

- People use mental short-cuts (intuition, heuristics) to conserve mental energy
- Ego depletion increases reliance on short-cuts
  - Anticipated demands also do
- Using them does effectively conserve resources



# Self-Control “in the Wild”: Experience Sampling

Roy F. Baumeister

Brad Wright

# Brief Measure of Depleted Feelings

- In the past couple of hours, have you felt that...
  - It's hard to make up your mind about even simple things?
  - Things are bothering you more than they usually would?
  - You have less mental and emotional energy than you normally have?

# Brief Measure of Depleting Events

- In the last 60 minutes, have you...
  - Forced yourself to do something that you really didn't want to do?
  - Used self-control to stop yourself from doing something that you wanted to do (e.g., have you resisted desire or temptation)?
  - Exerted mental effort to make decisions?

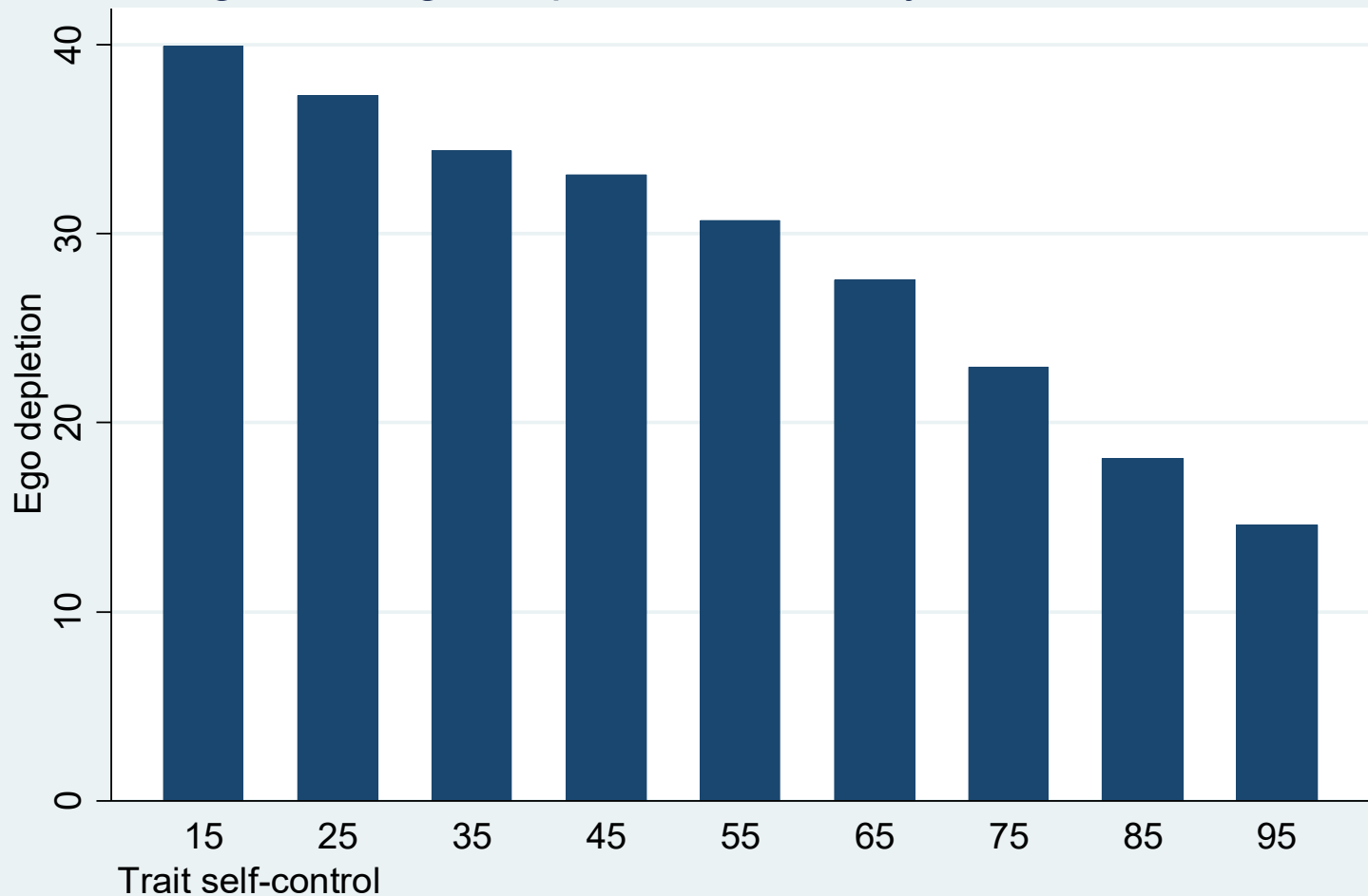


- People with low trait self-control rush through life, reacting automatically, thinking about something other than what they are doing ... and all these things go with feeling depleted

(correlations)	Rushing	On automatic	Thinking about something else
SC trait	-.178	-.160	-.131
Depleted feelings	.389	.405	.330
Depleted events	.366	.274	.280

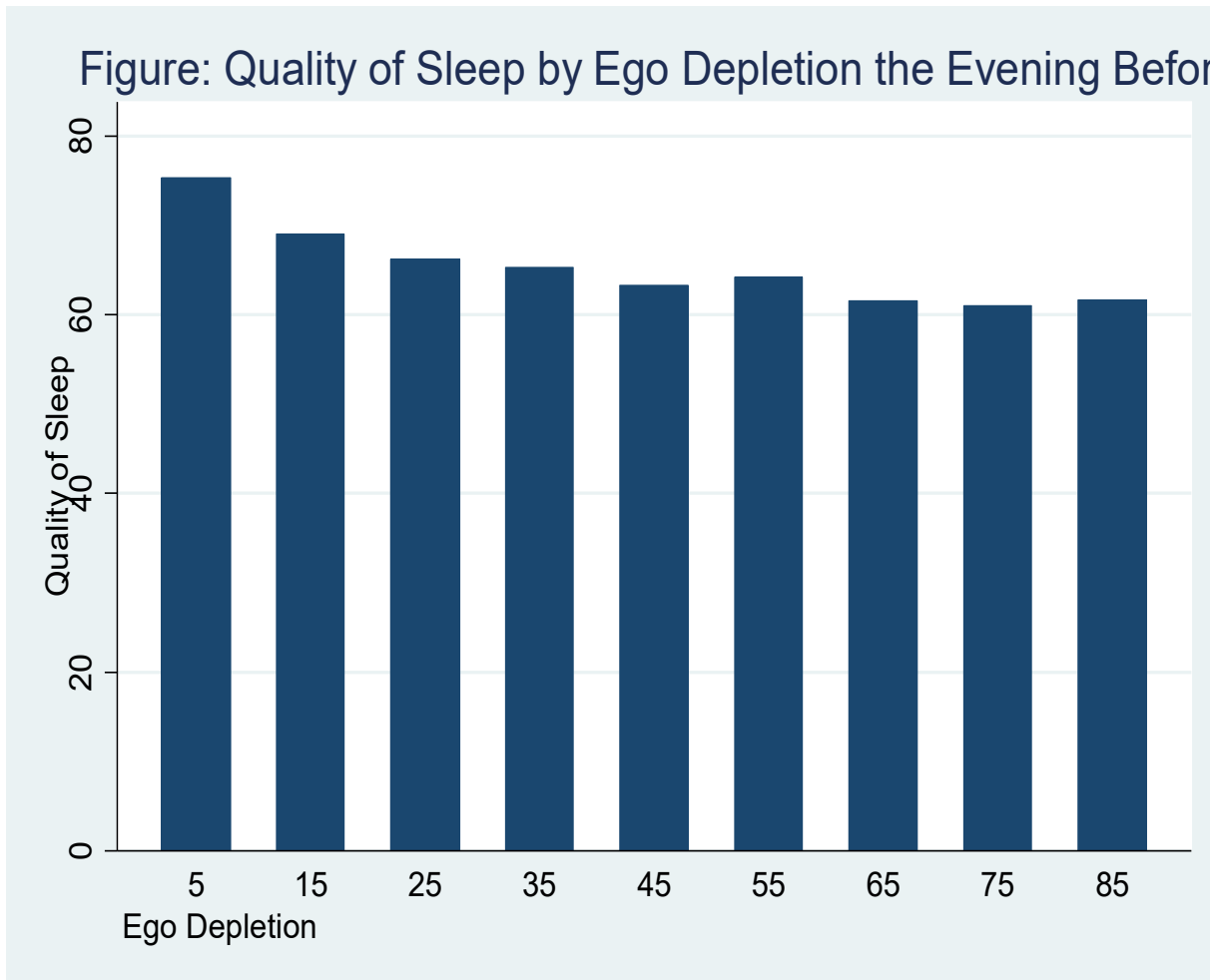
# Who Feels Depleted?

Figure 2: Ego Depletion Levels by Trait Self-Control



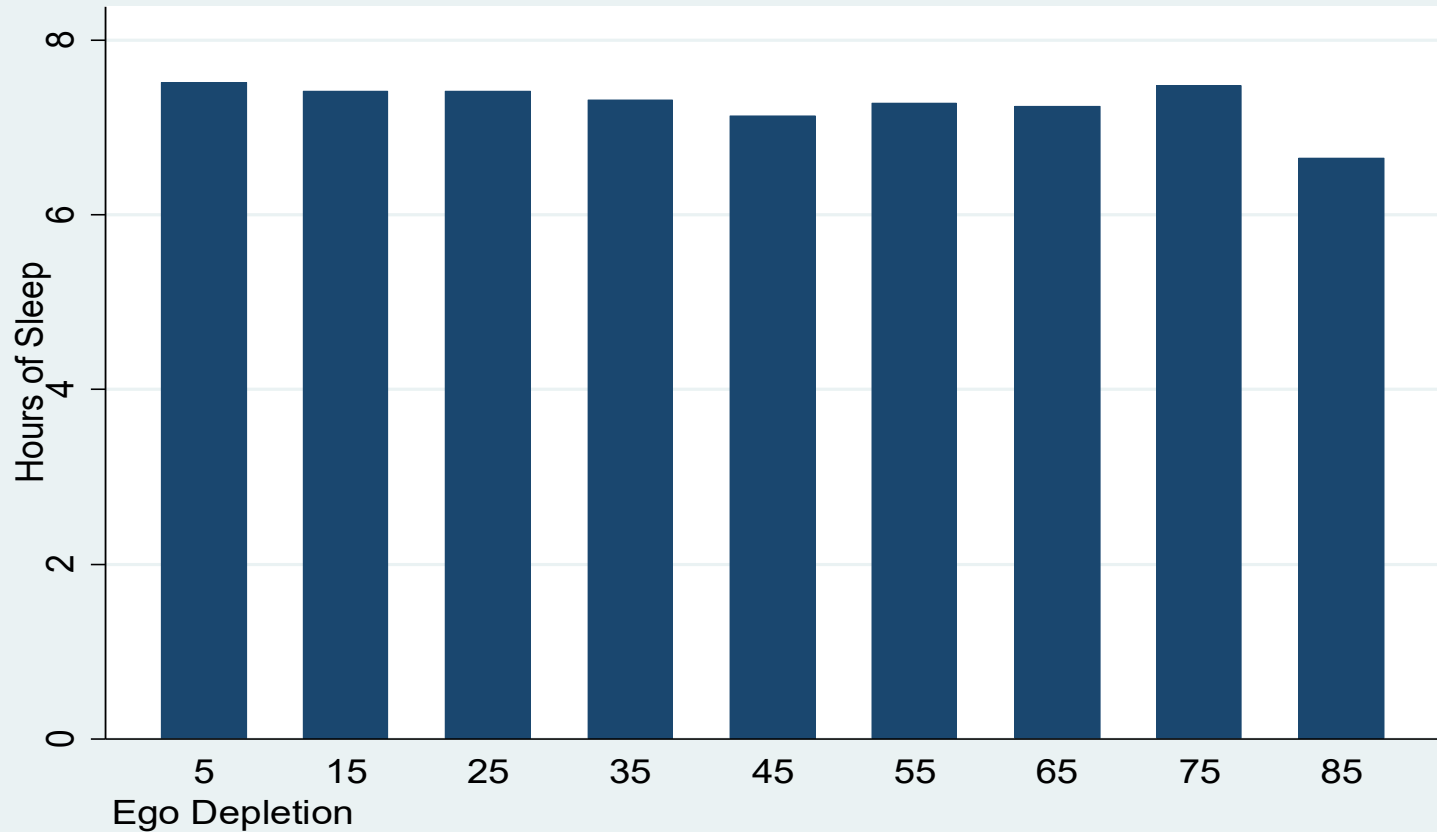
**SLEEP**

# Feeling Depleted Hurts Sleep

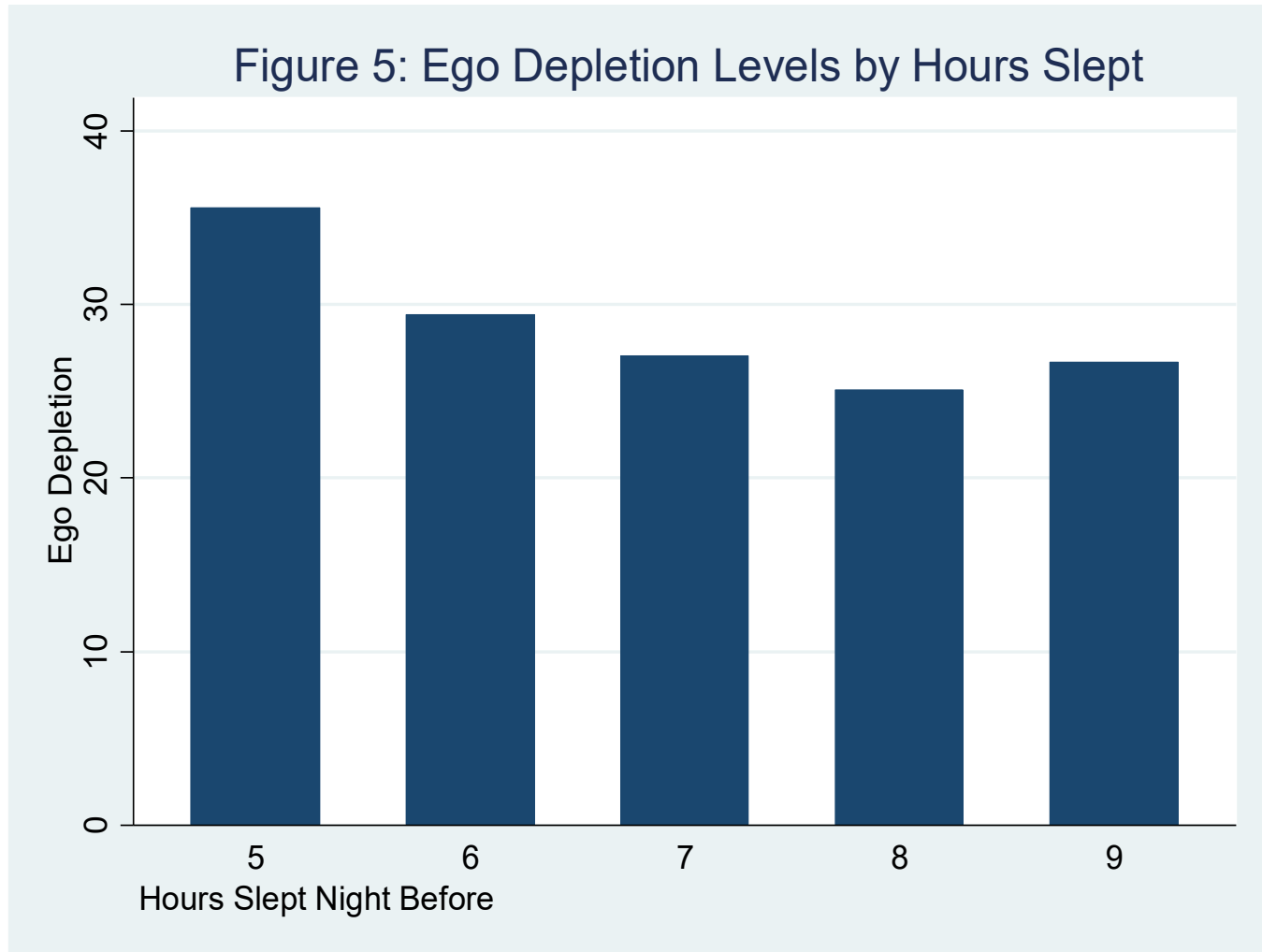


# Not Quantity (but Quality)

Figure: Hours of Sleep by Ego Depletion the Evening Before

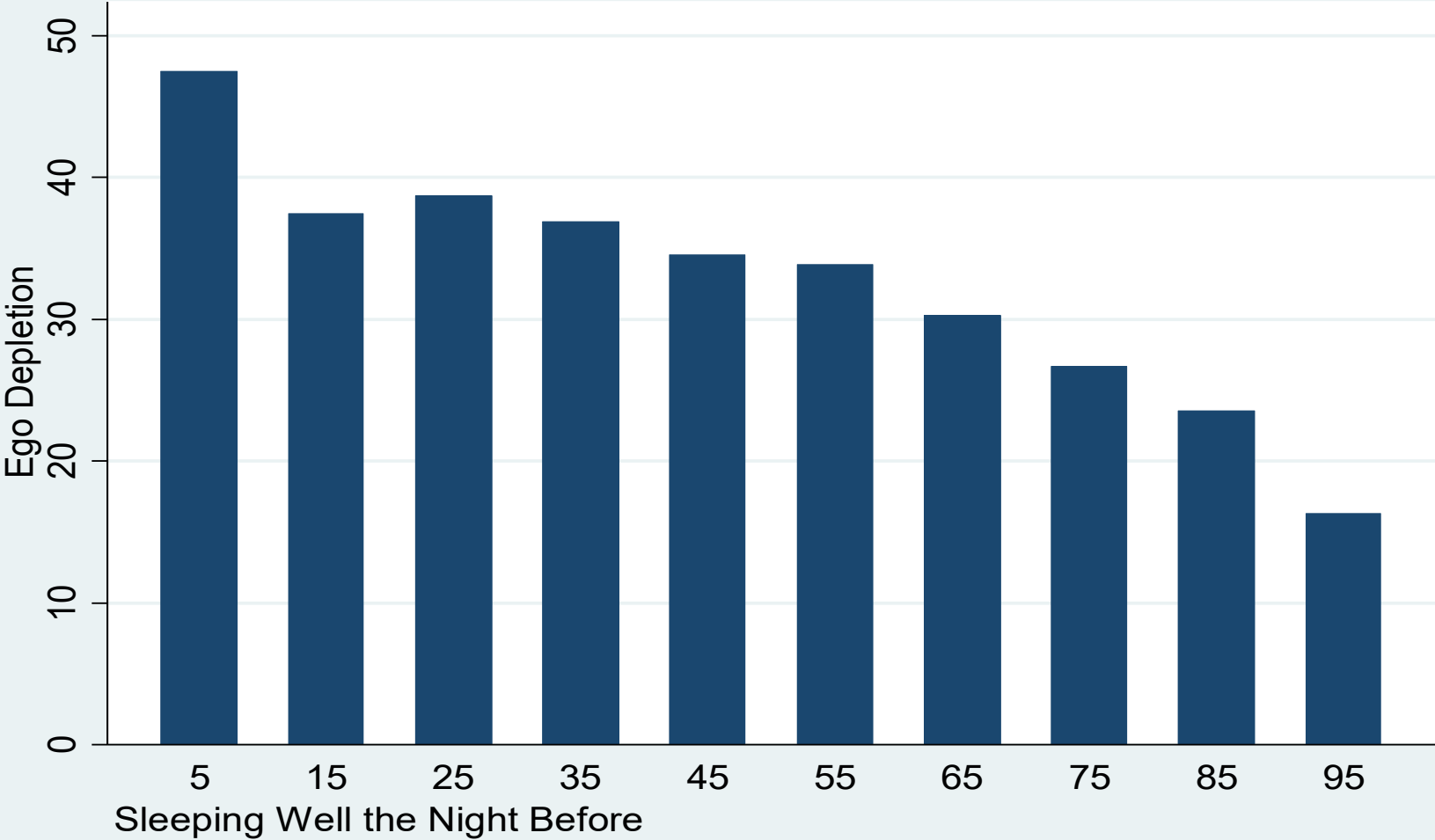


# Less Sleep Leads to More Depletion



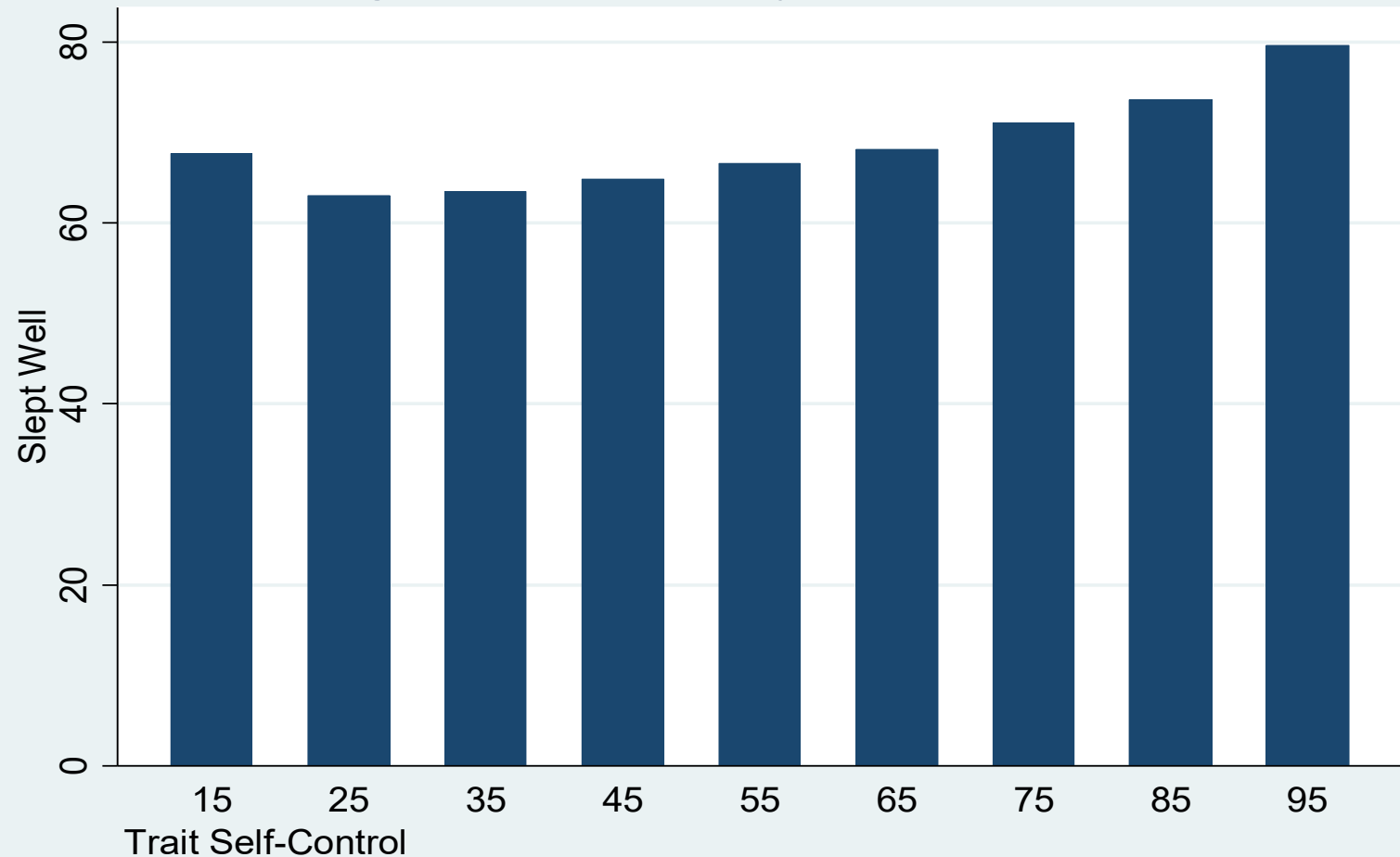
# Quality Really Matters

Figure 6: Ego Depletion Levels by Sleeping Well



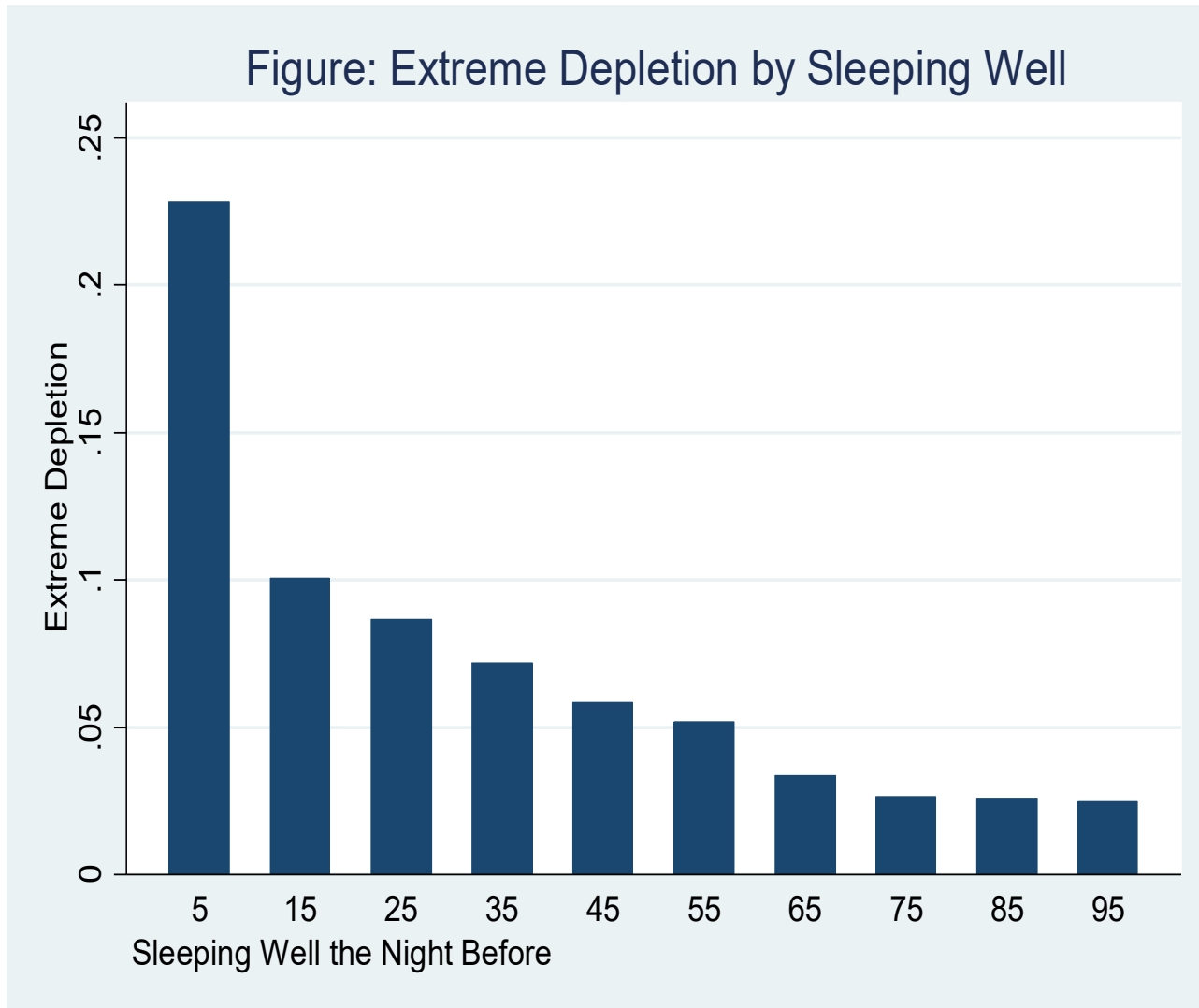
# People with High Self-Control Sleep *Better* !

Figure: Slept Well by Trait Self-Control





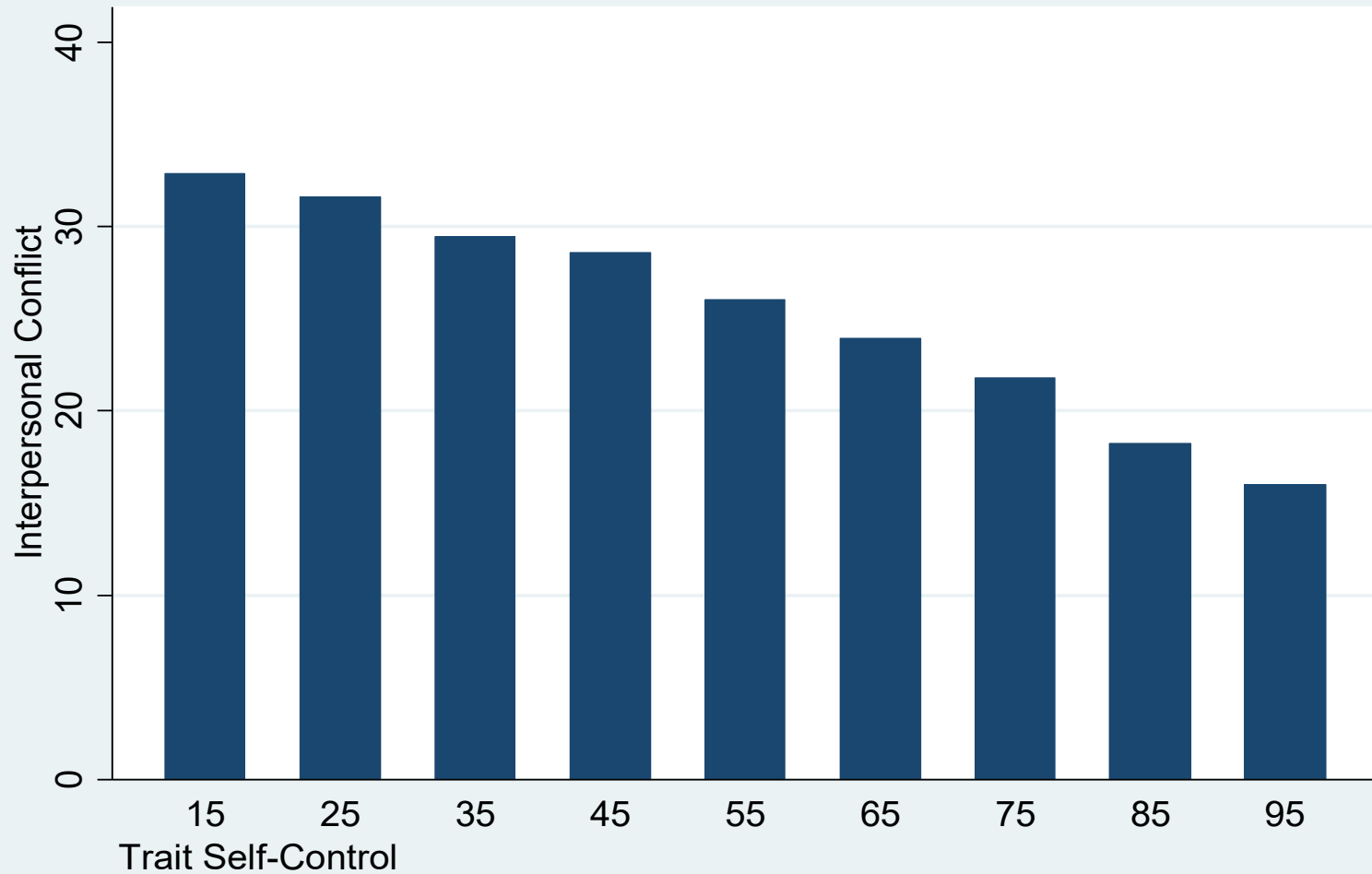
# Quality of Sleep and Extreme Depletion



# Self-Control and Interpersonal Conflict

# Interpersonal Conflict: Who?

Figure: Interpersonal Conflict by Trait Self-Control



# Similarity or Complementarity in Relationship Success: Or, Can Two Undercontrolled Lovers Find Happiness Together?

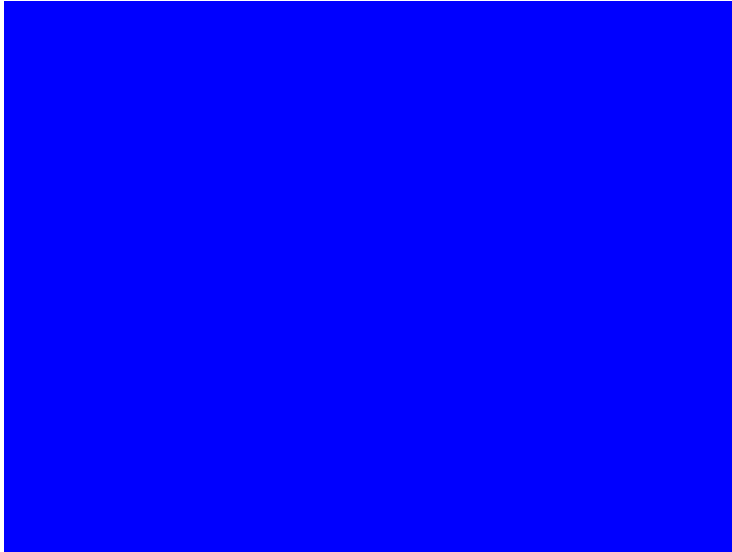
- 3 Studies of relationship satisfaction
- What combination of trait self-control scores is best?
  - Low difference (similarity)
  - High difference (complementarity)

# Sum, Not Difference

- The more self-control in both, the better
- No sign of similarity effects
- Partners showed some complementarity, only in romantic relationships (mainly dating)
  - *Per self-control, opposites attract*

# Uncertainty Causes Depletion?

# Study 1: Manipulation



Please complete the equation associated with the color you just saw:

Blue:  $3 \times 5 =$

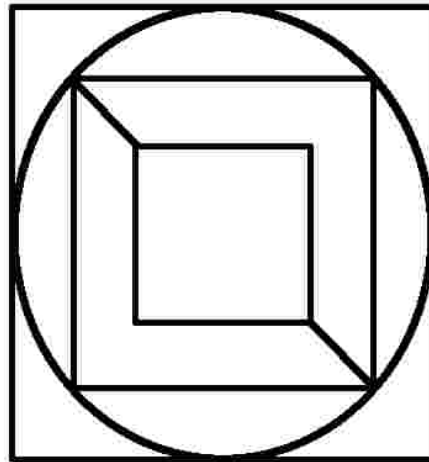
Green:  $6 \times 7 =$

Yellow:  $7 \times 9 =$

Red:  $3 \times 8 =$

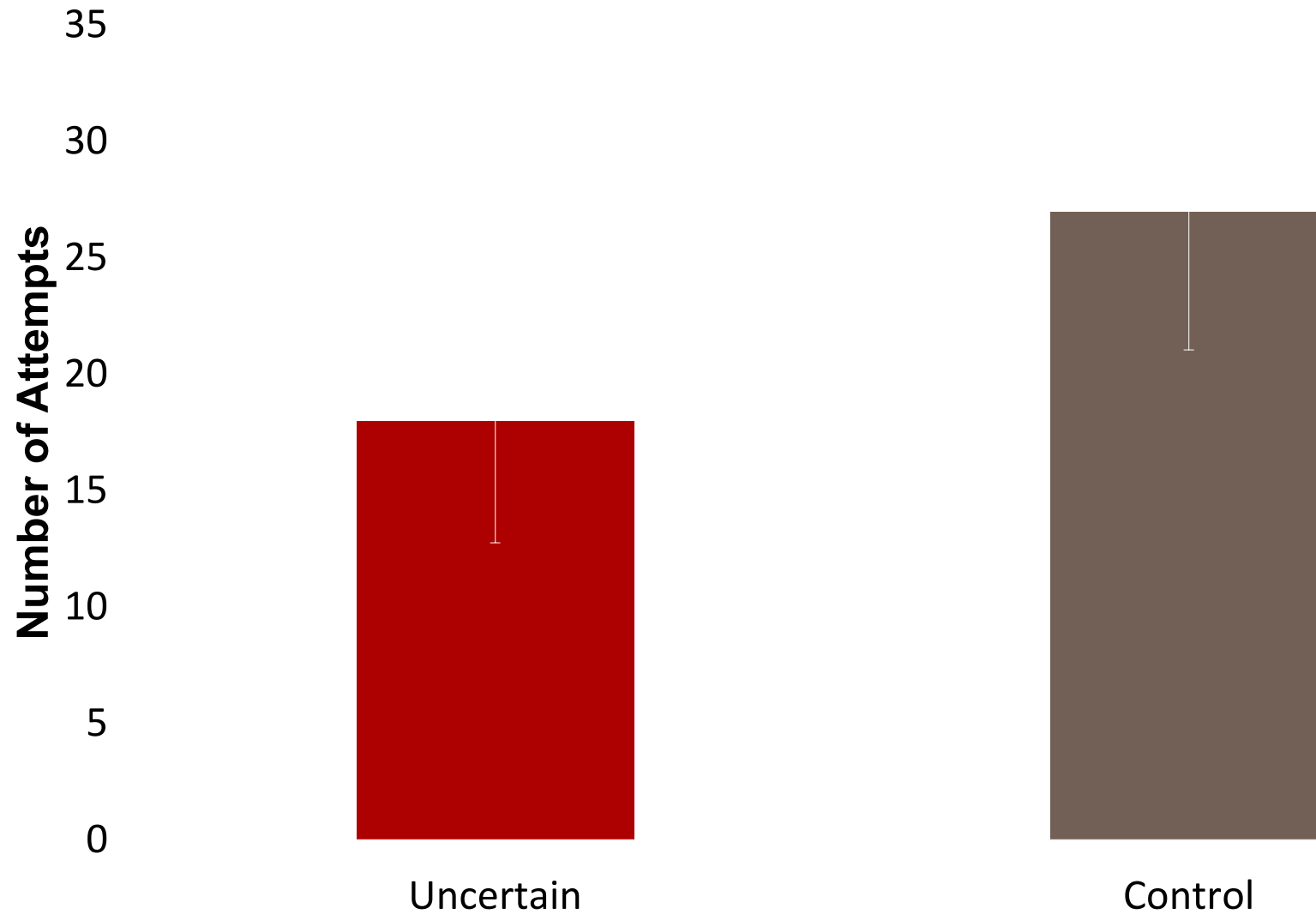
# Study 1: Measure

- **DV Persistence on Unsolvable Tracing Puzzles**  
(Baumeister et al., 1998)





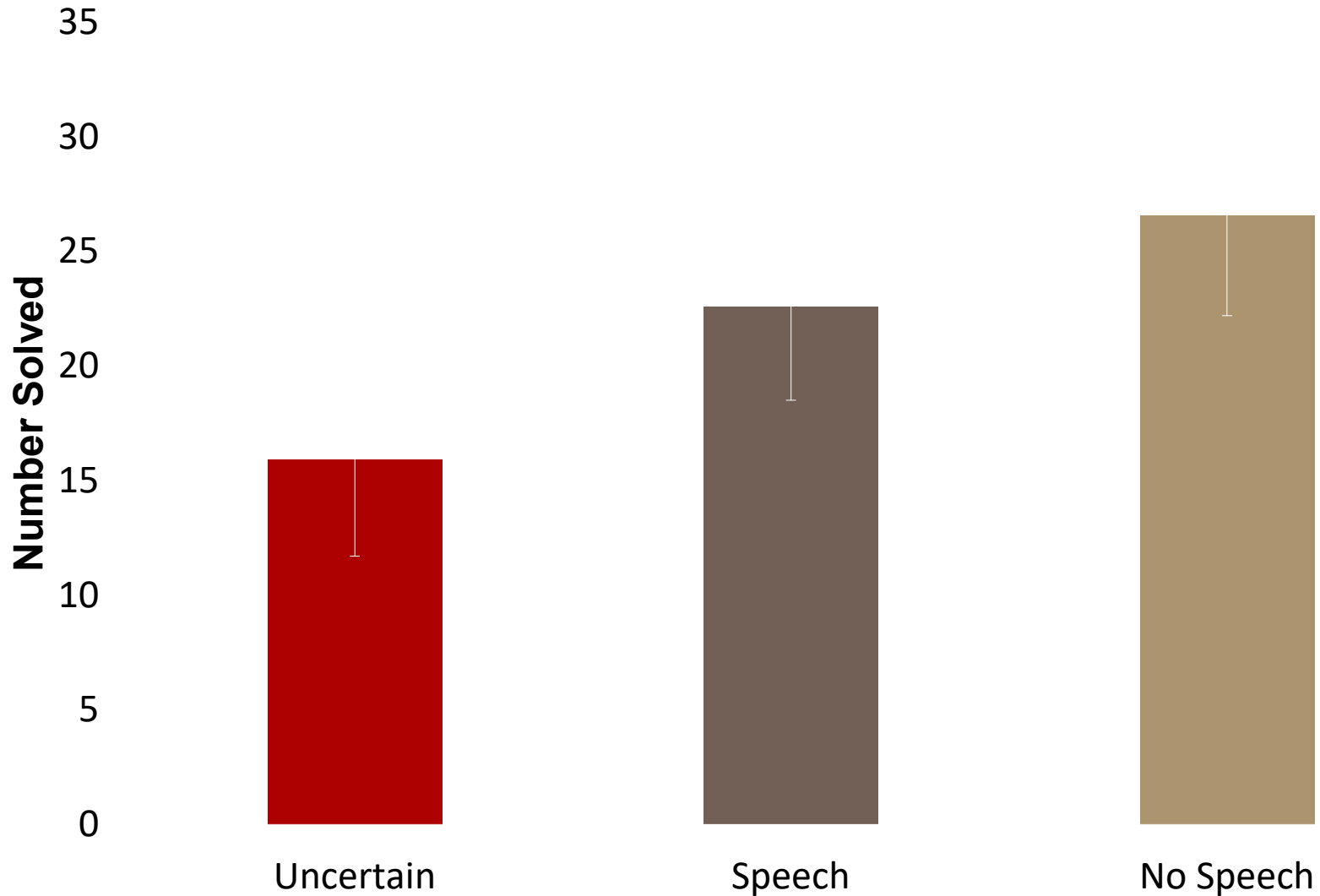
# Number of attempts



# Study 2

- Communication and Personality
- Three conditions
  - Speech
  - No Speech
  - Uncertain
- Measure: Solvable Anagrams  
(Baumeister, Bratslavsky, Muraven, & Tice, 1998)

# Results: Number Solved



*The End*