

HEART HEALTH . . .

BACK TO THE FUTURE





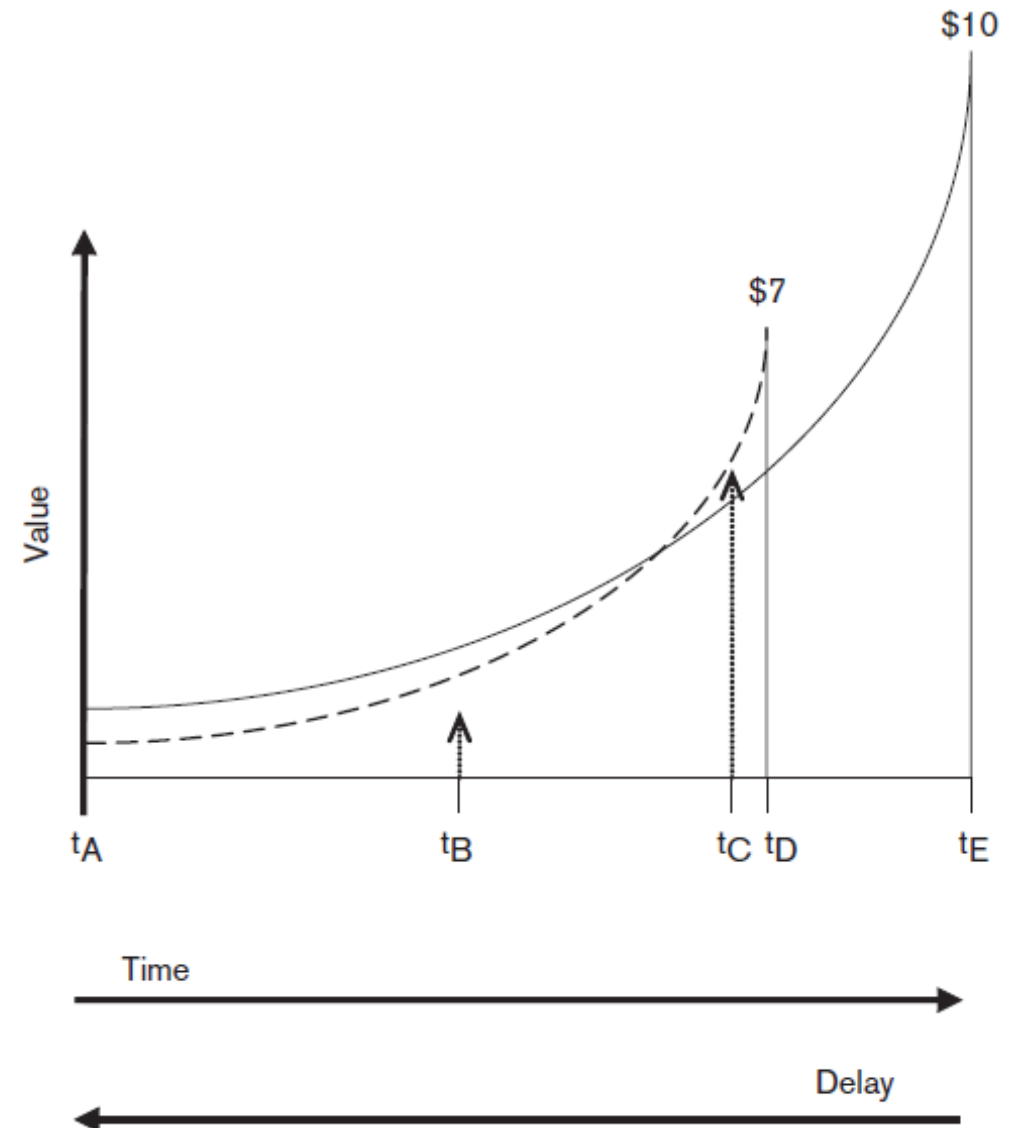
Our actions, even those that are seemingly insignificant, can have a huge impact on our future well-being.

Time Preference

- A preference for smaller, more immediate rewards over larger rewards for which you must wait
- a.k.a., “Delay Discounting”
- Dynamic Inconsistency
 - A preference-reversal occurs as you move in closer proximity to the receipt of the reward

Reynolds B. A review of delay-discounting research with humans: relations to drug use and gambling. Behav Pharmacol 2006;17(8):651-67.

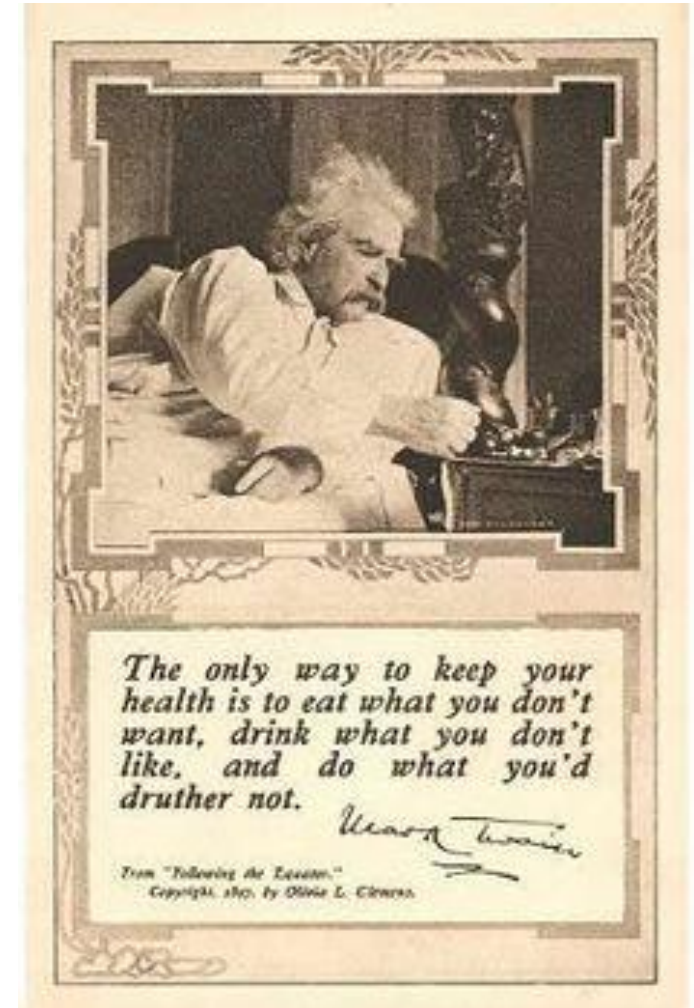
Fig. 1



Implications of Impulsive Choice

Most activities to improve your health result in long-term, rather than short-term rewards

- Associations have been demonstrated between greater delay discounting and:
 - Substance abuse (Vuchinich & Simpson, 1998; Madden et al, 1997)
 - Smoking (Bickel et al, 1999)
 - Sedentary lifestyle (Bradford et al, 2010; Garza et al, 2013)
 - Poor diet (Axon et al, 2009; Garza et al, 2013; Garza et al, 2016)





Designed by Jun Hua
www.infographics-design.ca

Ongoing Study

- Enrolled patients of a cardiac rehab program in Opelika, Alabama (n=51)
 - 51% male; 70% white; mean age = 66 years (range 35-87)
- Survey measuring degree of delay discounting
 - 10-item Three-option Adaptive Discounting Measure (Yoon and Chapman, 2016)
 - Which payoff option would you prefer?
 - Getting \$136.09 today
 - Getting \$226.55 in 32 days
 - Getting \$467.04 in 192 days
- Average time to completion = 136 seconds (range 59-417)
- Linking with health records to find associations at baseline and program completion



Interventions to Improve Behavior

- Commitment devices
- Reward substitution (Incentives)
- Social comparison

Financial Incentives

Making Us Behave

Employers and health plans are experimenting with behavioral insights to steer workers into healthier choices.

Some approaches:

■ **Lotteries** - Patients are enrolled in daily lottery for sticking to drug regimen or losing weight.

■ **Deposit contracts** - Participants put small, daily amounts of money toward weight-loss goal.

■ **Financial incentives** - Participants receive series of payments for enrolling in program and staying smoke free.

Behavioral principles applied:

People tend to give greater weight to small probability of winning a big reward.

People tend to be strongly averse to loss. (If they don't hit the goal, they lose their money.)

Regular incentives play to people's bias toward immediate, instead of future, gains.

WSJ, Fuhrmans, 2009

A Randomized Controlled Trial of Financial Incentives for Smoking Cessation

Kevin G. Volpp,^{1,2,3,4,5} Andrea Gurmankin Levy,^{9,10} David A. Asch,^{1,2,3,4,5,6} Jesse A. Berlin,⁶ John J. Murphy,^{2,3} Angela Gomez,¹ Harold Sox,⁷ Jingsan Zhu,³ and Caryn Lerman^{5,8}

Cancer Epidemiol Biomarkers Prev 2006;15(1):12–8

JAMA[®]

Online article and related content
current as of November 24, 2009.

Financial Incentive Based Approaches for Weight Loss: A Randomized Trial

Kevin G. Volpp; Leslie K. John; Andrea B. Troxel; et al.

JAMA. 2008;300(22):2631-2637 (doi:10.1001/jama.2008.804)

Research article


Open Access

A test of financial incentives to improve warfarin adherence

Kevin G Volpp*^{1,2,3,4}, George Loewenstein^{2,5}, Andrea B Troxel^{2,6},
Jalpa Doshi^{1,2,3,4}, Maureen Price⁶, Mitchell Laskin⁷ and Stephen E Kimmel^{2,3,6}

BMC Health Services Research 2008, **8**:272

Pilot Study to Test the Effectiveness of Different Financial Incentives to Improve Medication Adherence

Annals of Pharmacotherapy
2016, Vol. 50(1) 32–38
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DOI: 10.1177/1060028015609354
aop.sagepub.com


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Kimberly Braxton Lloyd, PharmD¹, Elizabeth A. Wood, BS¹,
and Richard A. Hansen, PhD¹

Table 2. Measured and Self-Reported Adherence.

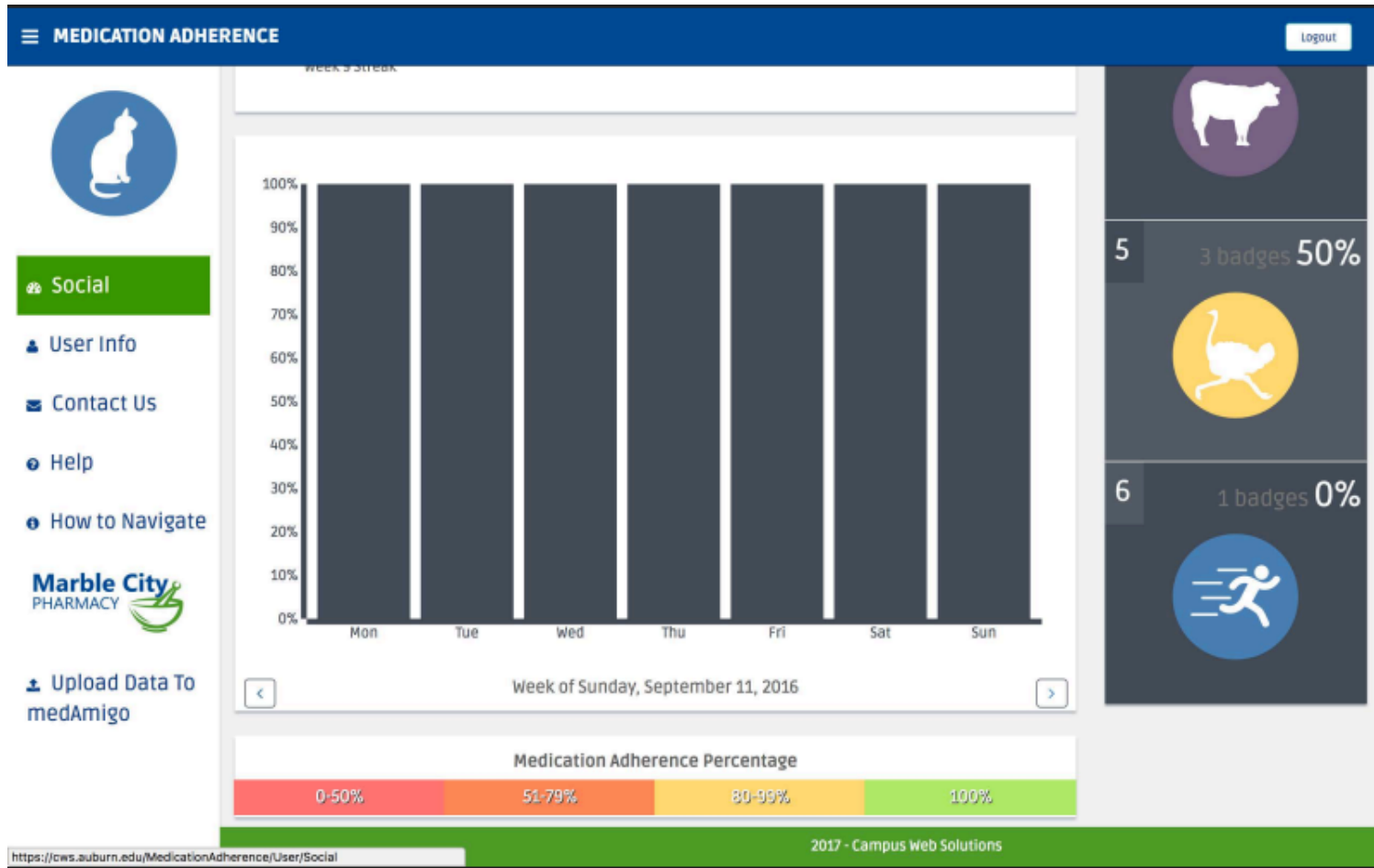
	Overall, n = 35, Mean (SD)	UC, n = 10, Mean (SD)	GPO, n = 14, Mean (SD)	Lottery, n = 11, Mean (SD)	<i>p</i> ^a
Percentage of days adherent during days 1-30 (lead-in)	96.5 (5.0)	97.0 (3.3)	96.4 (6.7)	96.1 (3.9)	0.915
Percentage of days adherent during days 31-90 (incentive period)	94.6 (7.5)	93.8 (8.5)	93.8 (8.5)	96.4 (5.2)	0.657
Δ Measured adherence	-1.9 (5.8)	-3.2 (7.4)	-2.6 (5.0)	0.3 (5.2)	0.335
Self-reported adherence (baseline)	97.8 (5.6)	98.1 (3.2)	98.7 (7.0)	96.5 (5.6)	0.615
Self-reported adherence (90-day follow-up) ^b	98.0 (3.3)	99.4 (.9)	97.2 (3.1)	98.1 (4.5)	0.353
Δ Self-reported adherence	0.03 (6.1)	0.5 (1.9)	-1.5 (8.5)	1.6 (4.1)	0.442

Abbreviations: GPO, guaranteed pay-out group; UC, usual care group.

^aComparisons across study groups using ANOVA.

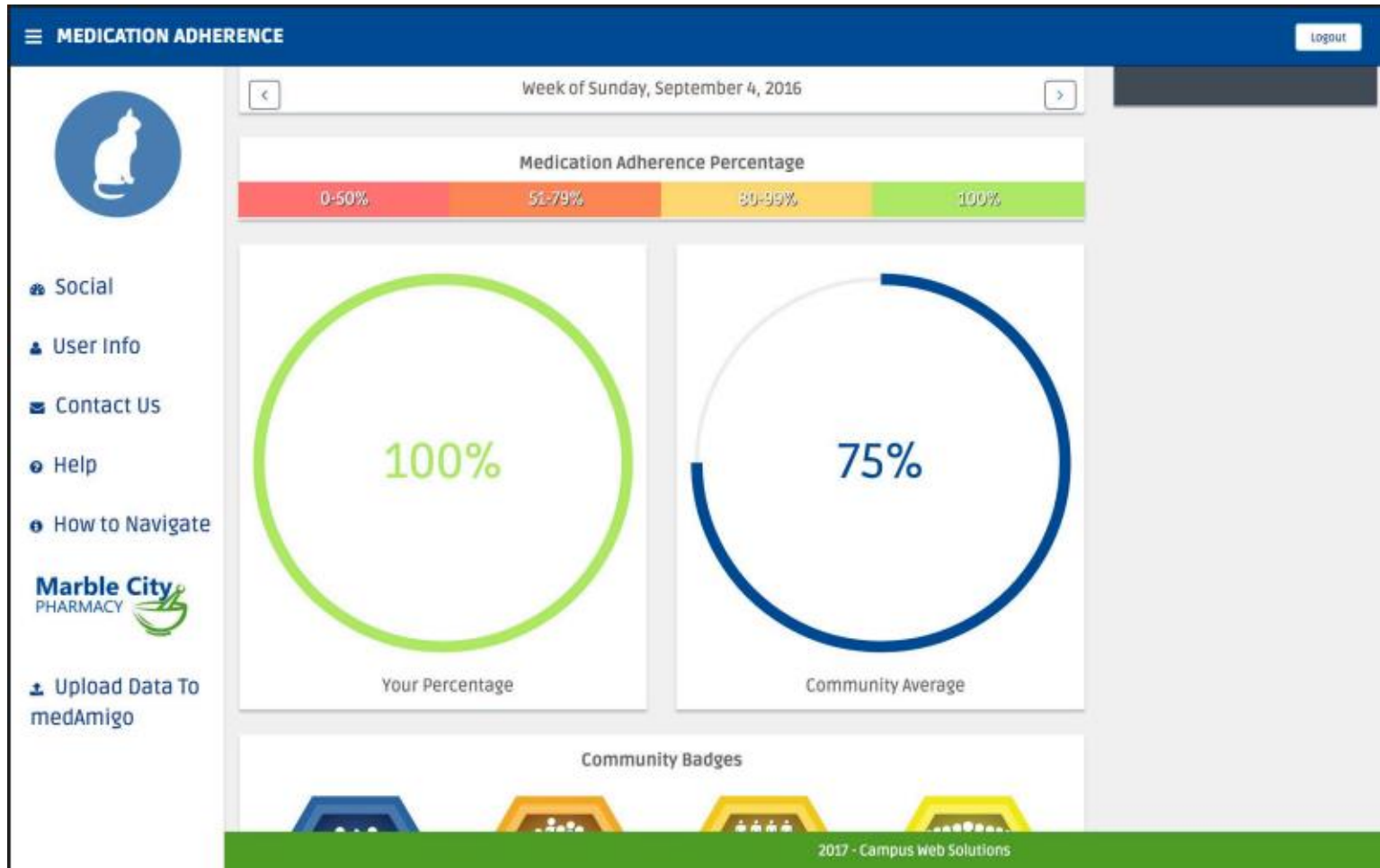
^bTwo participants in the UC group failed to complete the follow-up survey and were not included (n = 8).

Social Recognition for Med Adherence



Owensby JK et al, 2017

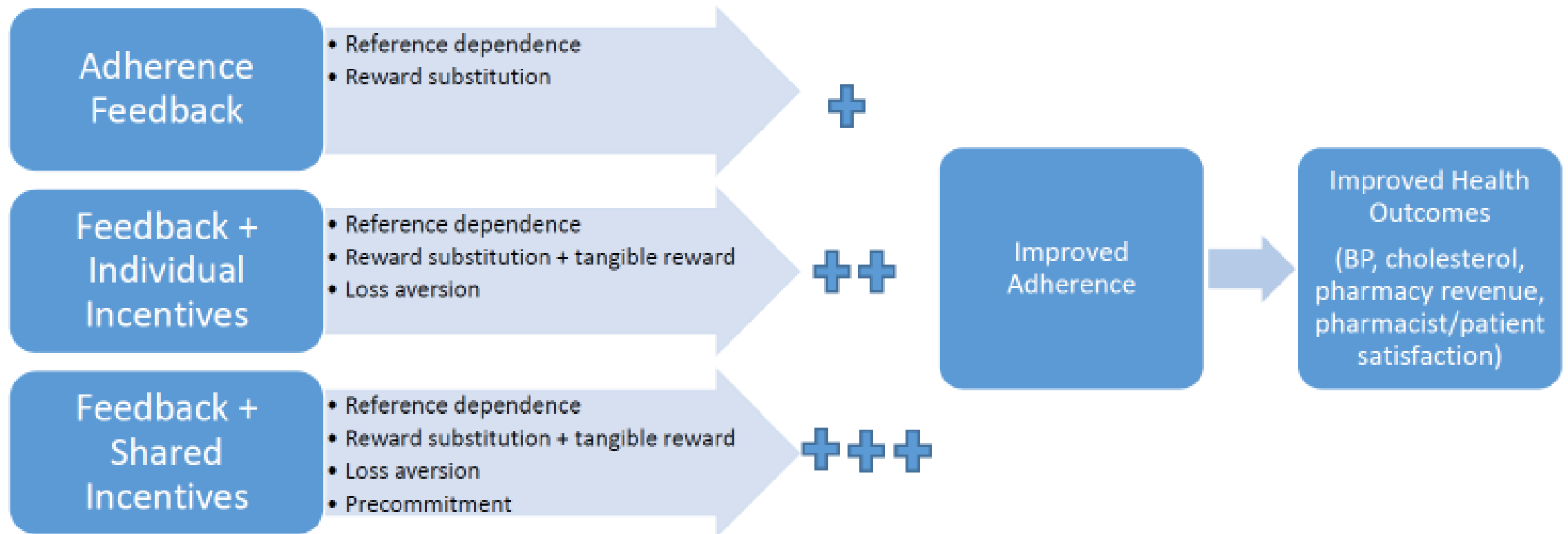
Social Recognition for Med Adherence



Owensby JK et al, 2017

A test of individual vs. shared incentives

Figure 1. Conceptual Model Based on Behavioral Economics Concepts



Delay Discounting – Stable or Modifiable?

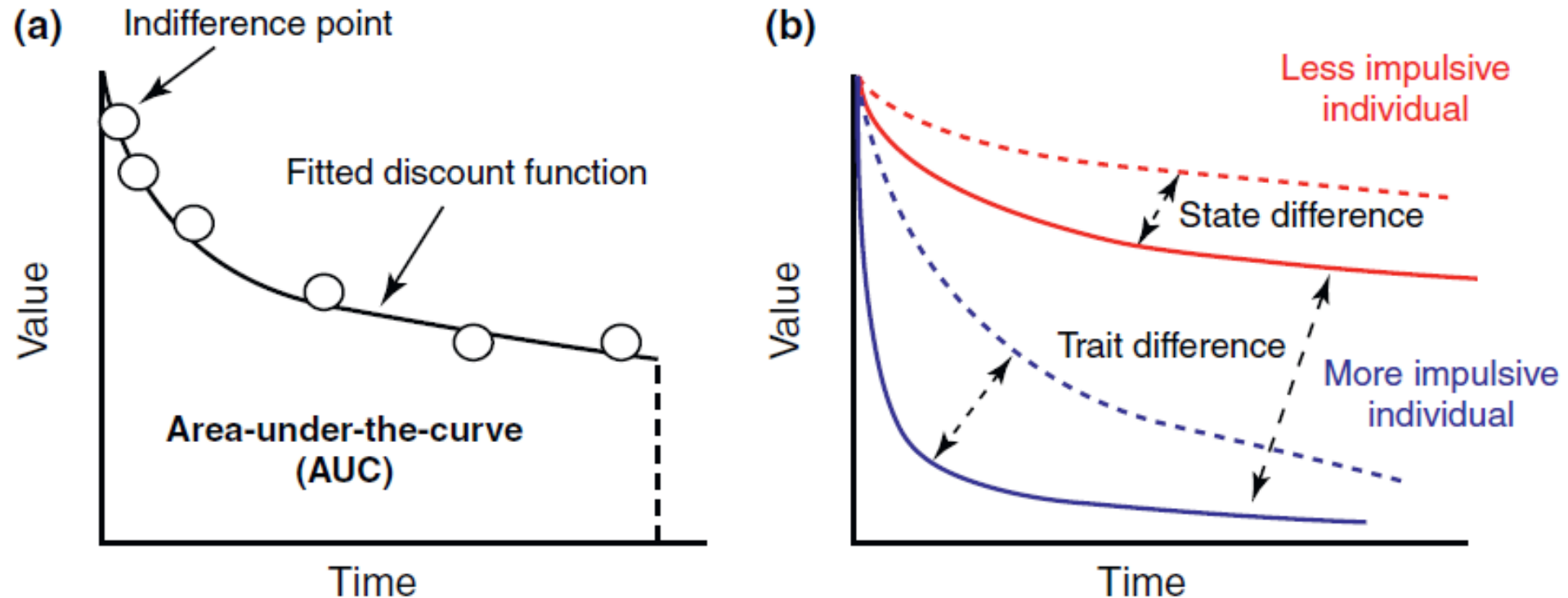


Figure 1. Peters J and Buchel C. The neural mechanisms of inter-temporal decision-making: understanding variability. Trends in Cognitive Sciences 2011;15(5):227-39.

DD – Stable or Modifiable?

Early-life adversity brings brain changes linked to risky health behaviors

Korrina Duffy, a CRTA fellow in the Basic Biobehavioral and Psychological Sciences Branch, and collaborators made the case that early-life adversity influences brain development in ways that increase the likelihood of engaging in health-risk behaviors, by altering neural circuitry behind cognitive control and emotional processing, thereby affecting emotional reactivity, reward responsivity, emotion regulation, and delay discounting, leading to an increased risk of smoking cigarettes, drinking alcohol, and eating high-fat, high-sugar foods.

Reference: Duffy, K.A., McLaughlin, K.A., Green, P.A. Early life adversity and health-risk behaviors: proposed psychological and neural mechanisms. *Ann NY Acad Sci* (2018).

Episodic Future Thinking (EFT) to Reduce Delay Discounting


- EFT involves mental self-projection to pre-experience future events
- Planned future events are used as cues and participants are then asked to make choices between smaller, sooner rewards and larger, later rewards to determine discount rate

Effects of EFT


- Lower rates of discounting compared to controls (Peters & Buchel, 2010)
- Decreased caloric intake (Daniel, Stanton, & Epstein, 2013; O'Neill, Daniel, & Epstein, 2016)
- Greater allocation toward retirement savings (Hershfield et al, 2011)

Possible Selves

- Definition: representations of the self in the future (Hoyle and Sherrill, 2006)
 - Components in the self-regulatory processes through which motivation and behavior are influenced
 - motivate the pursuit or avoidance of specific behaviors
- Two selves
 - “hoped for” self – thought to be based on observations of others
 - “feared” self – thought to be based on personal past experience
- Found that priming of a “feared” self led to engagement in self-regulatory behaviors related to health maintenance, whereas priming of a “hoped for” self did not



“Healthy”
“Independent”
“Well”



“Unhealthy”
“Dependent”
“Ill”



How can we make it seem "real"?



A: Actual Photo of First Author



B: Nonaged Computer-Generated Image



C: Future-Self Computer-Generated Images



Figure 1. Kaplan BA, Reed DD, Jarmolowicz DP. Effects of episodic future thinking on discounting: personalized age-progressed pictures improve risky long-term health decisions. *J Appl Behav Anal* 2016;49(1):148-69.

Incorporating Values into Behavior Change Interventions

A qualitative study of 30 cardiac rehab patients identified 17 life values and motivating factors related to program engagement

- Being active
- Independence
- Family
- Self care/Self exploration
- Health
- Challenge
- Work
- Spirituality
- Commitment
- Persistence
- Helping others
- Leisure
- Friends
- Acceptance
- Adaptability
- Social
- Responsibility

Ellis JM, et al. Life values as an intrinsic guide for cardiopulmonary rehabilitation program engagement: A qualitative analysis. J Cardiopulm Rehabil Prev 2018;38(5):309-13.

What's next?



Figure 3. Study procedure

