

# Individual Predictors of Financial Outcomes: Parsing out the Predictive Roles of Time Discounting and Financial Literacy

Ivo I. Gyurovski and Marc G. Berman  
University of Chicago



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# Overview

Individual financial dynamics

People seem to struggle with financial decisions

Using temporal preferences to predict economic outcomes

Part I: Time Discounting

Examining potential mediators

Part II: Financial Literacy

Education

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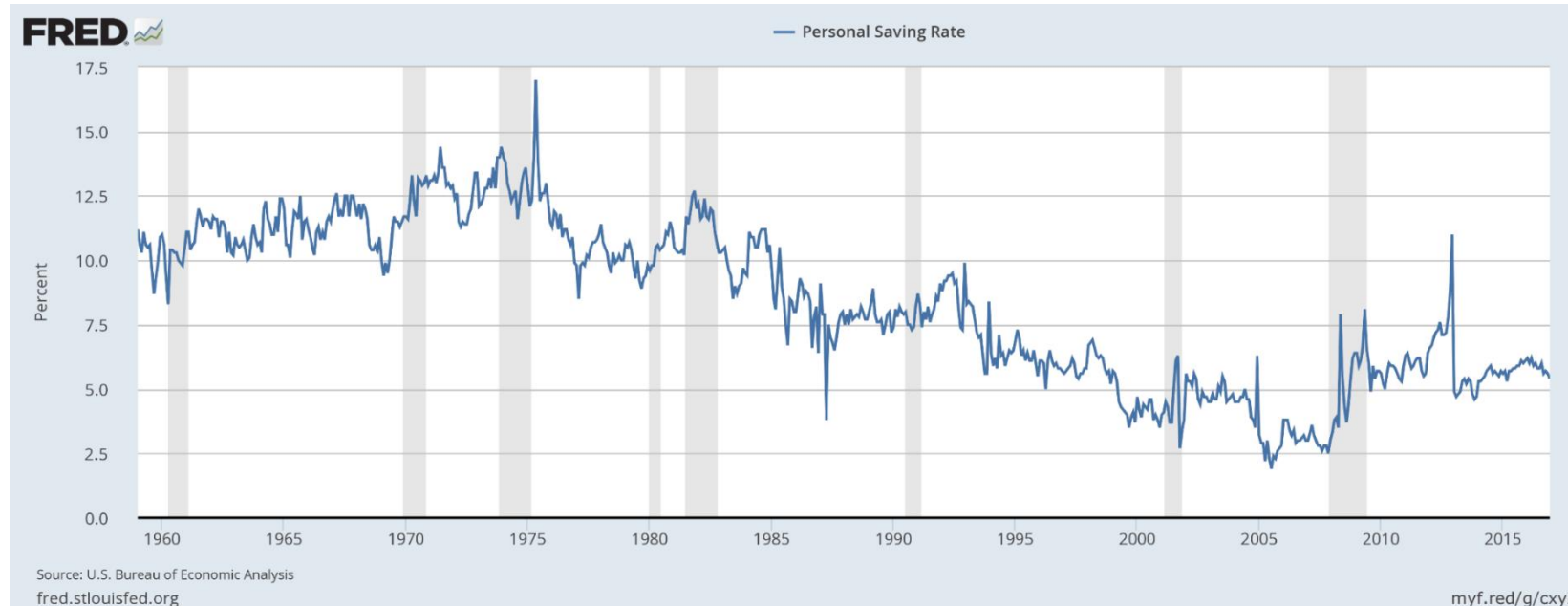
Part II: Financial Literacy

Education

# Individual Financial Dynamics

During the last 30 years the US has experienced a fivefold increase in bankruptcies.

Financial liabilities have grown to 129% of disposable personal income in 2009, compared to their level of 20% in 1945



# Why are people struggling to repay loans and save money?

Institutional or external factors

- Greater complexity of financial ecosystem

- Increase in lending to borrowers unable to repay their loans

- A shift towards self-management of finances

# Why are people struggling to repay loans and save money? (Cont.)

The understanding of how individual or internal characteristics impact financial dynamics remains elusive.

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Part III: Consumer Banking Competence

# Time Discounting

The tradeoff between now and later is called time discounting.

What is a dollar in the future worth to you today?



NOW

FUTURE



# Time Discounting (Cont.)

Do you prefer \$40 today or \$80 guaranteed in 1 month?

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Do you prefer \$40 today or \$80 guaranteed in 1 month?

Do you prefer \$75 today or \$80 guaranteed in 1 month?

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Do you prefer \$40 today or \$80 guaranteed in 1 month?

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Derive an individual discount factor

# Time Discounting (Cont.)

Predicting a host of beneficial to the individual behaviors

Scholastic Achievement

Intelligence

Executive Functions

Health-related behaviors

Crime

Energy consumption

Retirement savings

# Time Discounting Predicts Creditworthiness

What is creditworthiness?

Creditworthiness denotes a borrower's ability and willingness to pay back.

How is creditworthiness measured?

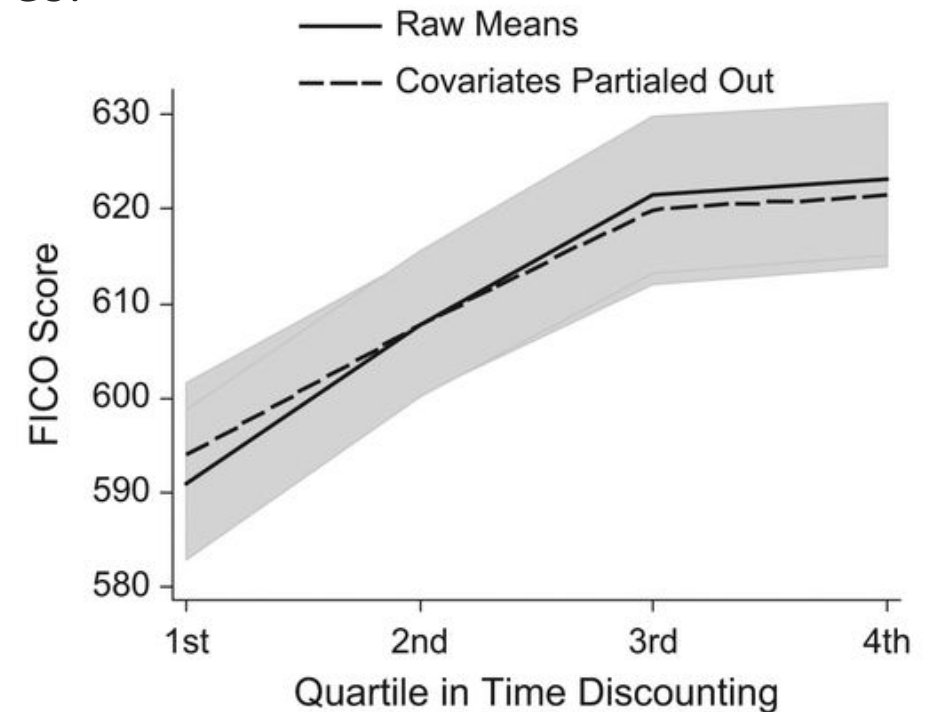
Fair Isaac Corporation (FICO\*) scores

Calculated by credit bureaus

Used by banks and other institutions

# Time Discounting Predicts Creditworthiness (Cont.)

Preference for sooner smaller (SS) rewards over later larger (LL) ones is associated with lower FICO scores.



What is the pathway through which TD influences individual financial outcomes?

# What is the pathway through which TD influences individual financial outcomes?

Individual financial outcomes

- Income

- Creditworthiness

Can we replicate the relationship between time discounting and financial metrics?

Extend past efforts by examining the role of possible mediators

- Education

- Financial Literacy

Why is knowing this important?



# Summary

People are faced with increasing indebtedness

Unfavorable climate for individual financial performance

Understanding of individual predictors of financial performance remains elusive

- Time Discounting

- Education

- Financial Literacy

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# Financial Literacy

The scale provides an assessment of a person's knowledge of:

Arithmetic

Interest rates

Inflation

Risk diversification

Bonds, stocks, mutual funds

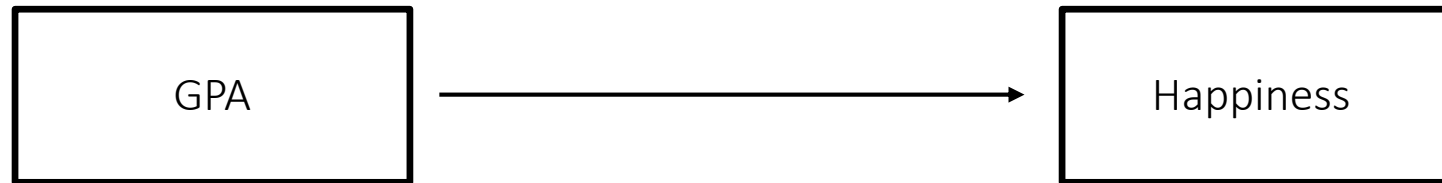
# Main Question

Does a preference for LL over SS rewards affect people's income and creditworthiness by nudging them to seek more education, and in particular to acquire finance-specific knowledge?

# Mediation

Generally we ask a question like  
“Does  $X$  predict or cause  $Y$ ?”

a) Direct Path

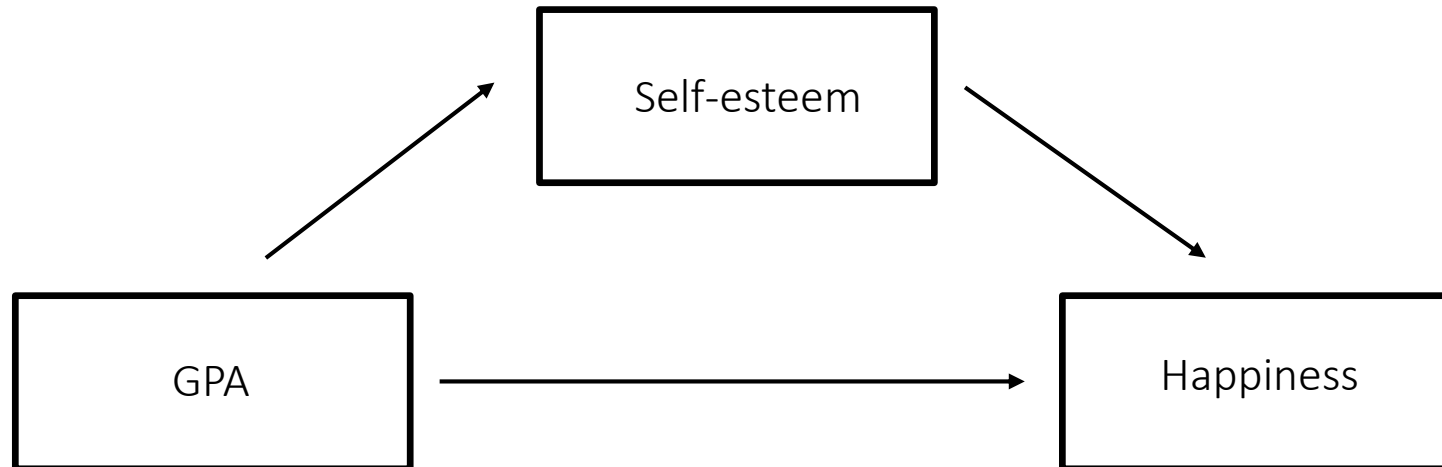


# Mediation

Mediator variables address the mechanism of the relationship between the two variables

“how” or “why”  $X$  predicts  $Y$ ?”

b) Mediated Path



# Testing Mediation

Step 1: IV  $\rightarrow$  DV

Step 2: IV  $\rightarrow$  Mediator

Step 3: Mediator  $\rightarrow$  DV

Step 4: Controlling for the mediator, the effect of IV on DV is:

Reduced: Partial Mediation

Not significant: Full Mediation

# Hypotheses Study 1

General education and financial literacy will mediate the relationship between time discounting and financial performance:

Income

Creditworthiness



# Method Study 1

## Participants

Income ( $N=245$ ), from ages 21 to 69 ( $M_{\text{age}} = 33.51$ )

Creditworthiness ( $N=131$ ), from ages 23 to 69 ( $M_{\text{age}} = 33.94$ )

## Income span:

Low - \$11,225 per household member (25<sup>th</sup> percentile)

Moderate - \$32,750 per household member (75<sup>th</sup> percentile)

All participants were recruited through Amazon's Mechanical Turk, and were compensated \$2 for participating in the study

# Method Study 1

## Materials

### IV - Time Discounting

*( $\beta$ ,  $\delta$ ) Model* – Individual Discount Factor (IDF) *across 3 time periods a month, 5 mos., 6 to 7 mos.*

### Mediators - Financial Literacy

*Financial Literacy Scale*

*Highest Level of Education*

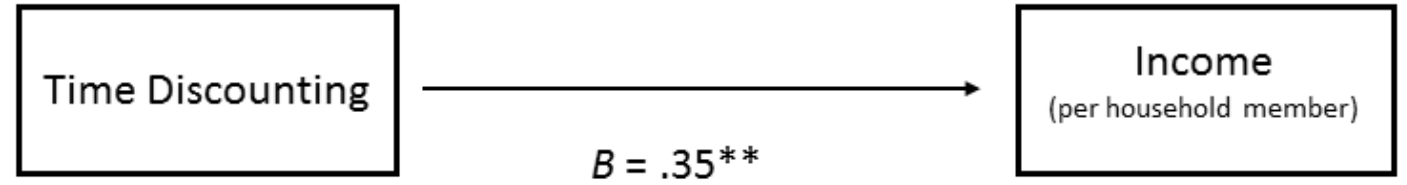
### Outcomes

*Income to Needs Ratio*

*FICO*

# Predicting Income

## a) Direct Path

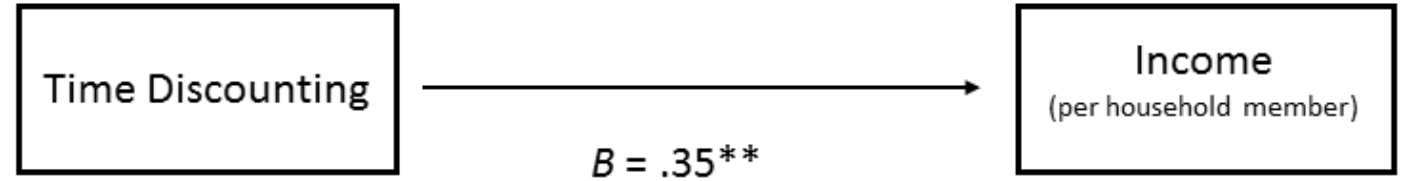


# Predicting Income

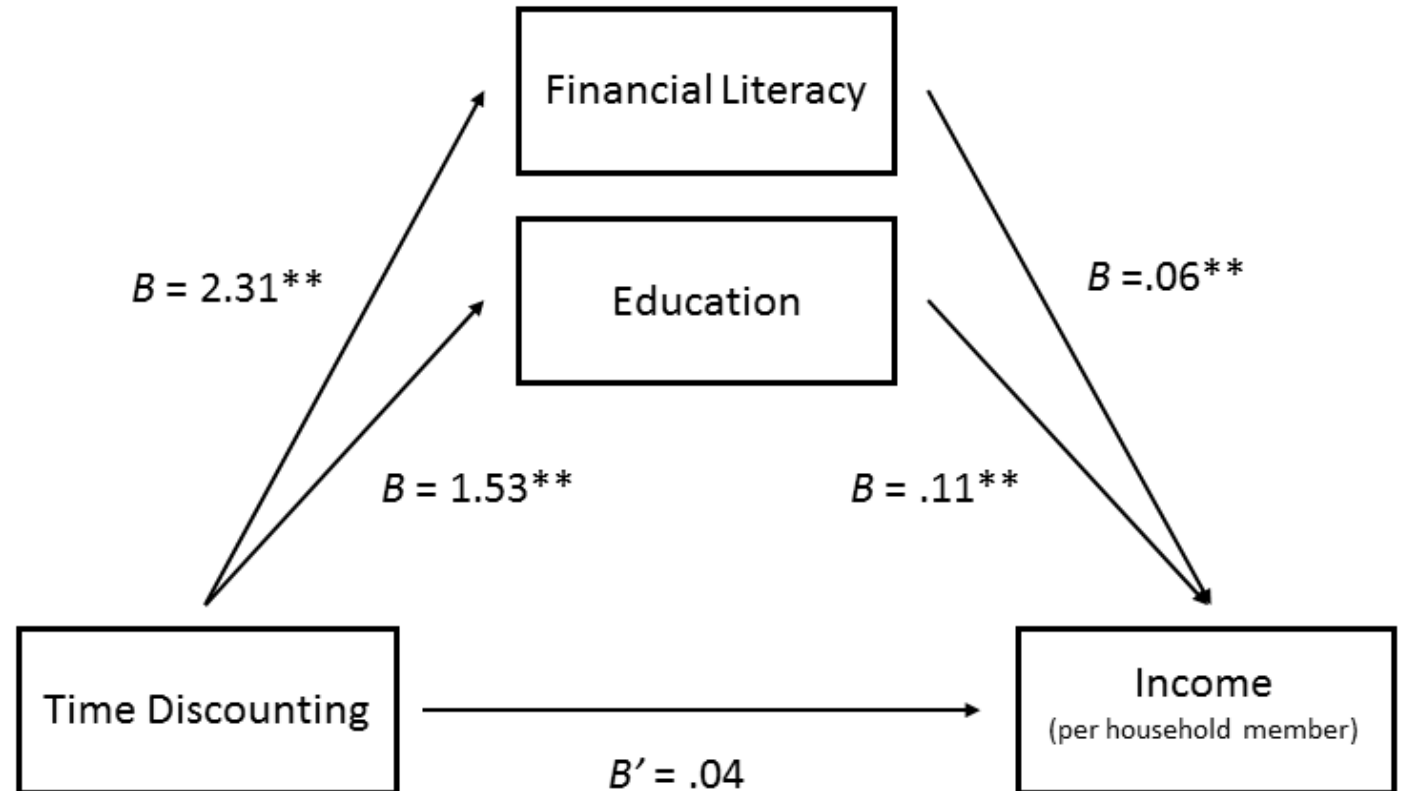
Financial Literacy and Education  
**Fully Mediate**  
the Relationship between  
Time Discounting and Income



## a) Direct Path

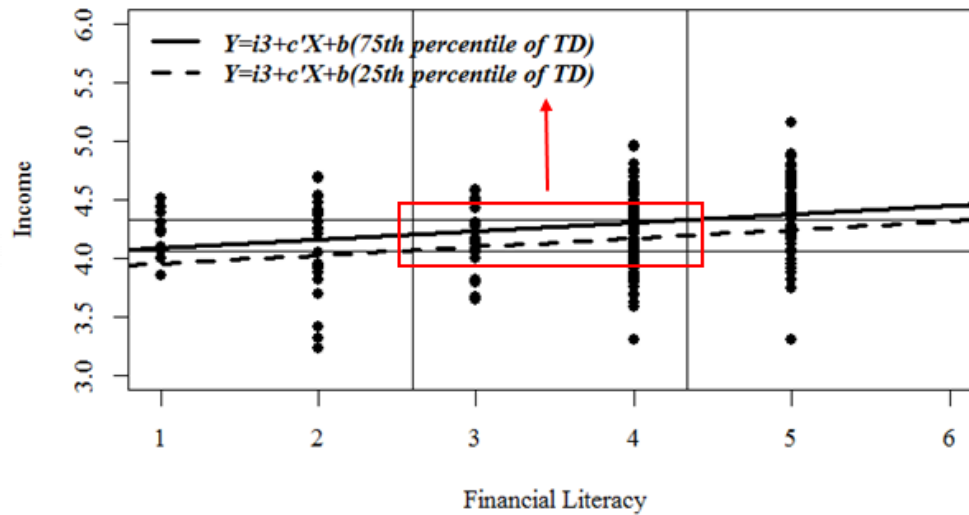


## b) Mediated Path

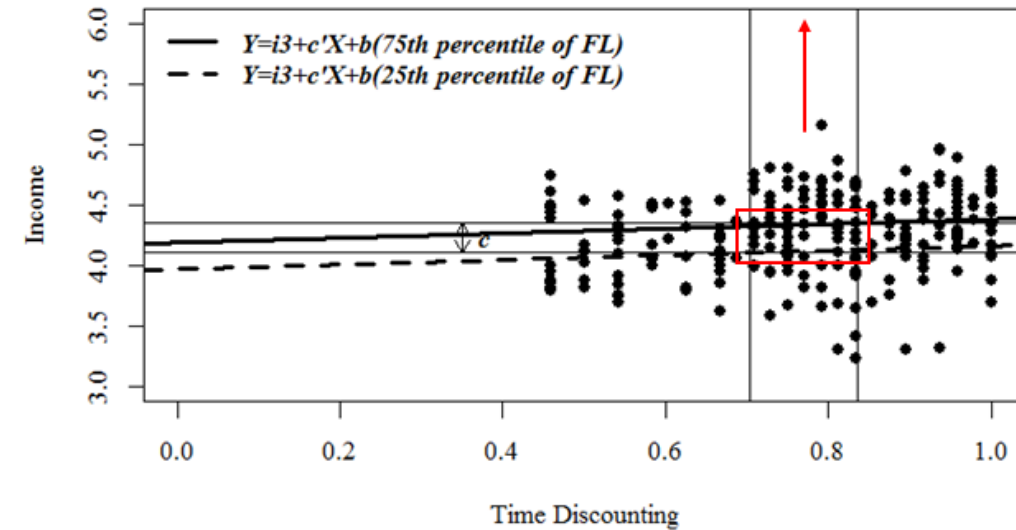
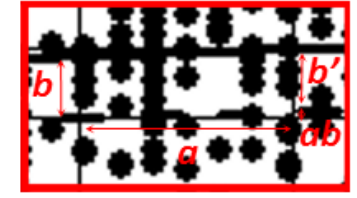


# Predicting Income

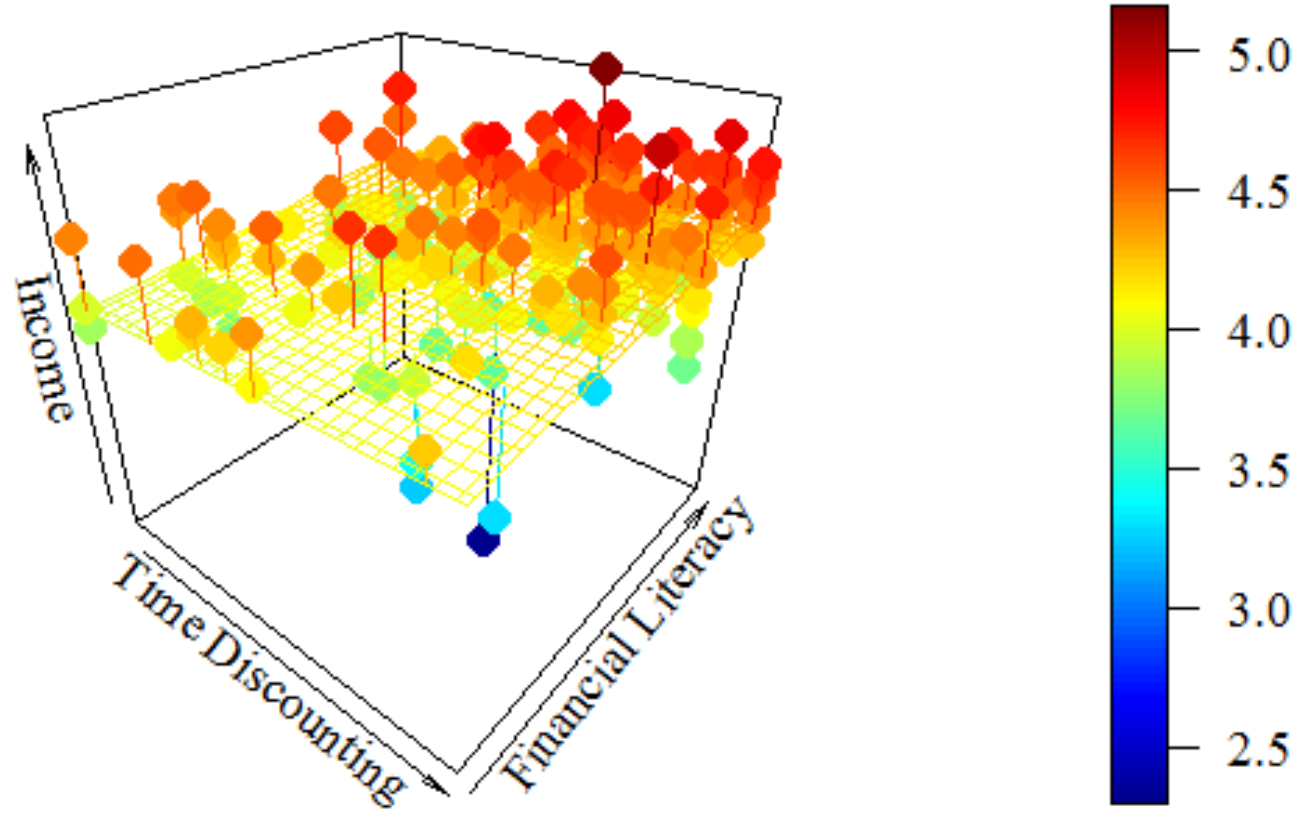
A. Financial Literacy mediates the relationship between time discounting and Income



B. Time Discounting does not mediate the relationship between financial literacy and Income



# Predicting Income



**Table 1**  
*Summary of Hierarchical Regression Analysis for Variables Predicting Income (N = 245)*

Variable	Level 1			Level 2			Level 3			Level 4		
	<i>B</i>	<i>SE(B)</i>	$\beta$	<i>B</i>	<i>SE(B)</i>	$\beta$	<i>B</i>	<i>SE(B)</i>	$\beta$	<i>B</i>	<i>SE(B)</i>	$\beta$
Time Discounting	.353	.148	.152*	.344	.149	.148	.160	.144	.069	.056	.148	.024
Race				.017	.052	.021	-.008	.050	-.010	-.004	.049	-.005
Sex				-.079	.046	-.109	-.087	.044	-.121*	-.065	.044	-.090
Age				.003	.002	.069	.001	.002	.039	.000	.002	.005
Education							.121	.022	.343**	.114	.022	.322**
Financial Literacy										.054	.021	.167**
$R^2$		.023			.038			.148			.171	
$F$ for change in $R^2$		5.72*			1.24			30.80**			6.54**	

*Note:* Income was log-transformed, and Education was standardized. Race assumes a value of "1" if non-white, and Sex assumes a value of "1" if the participant was female. \* $p < .05$ . \*\* $p < .01$ .

# Summary for Predicting Income

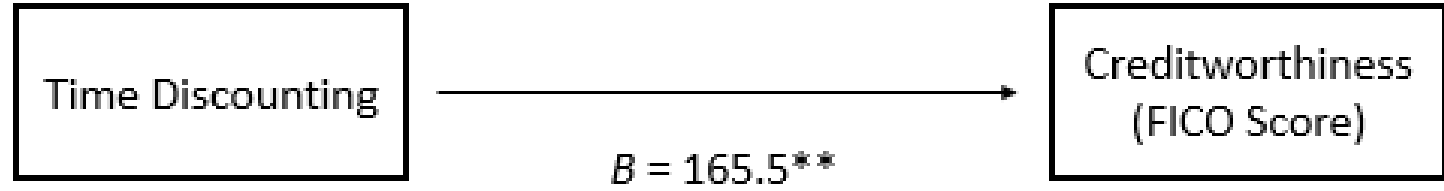
Financial literacy and general education fully mediate the relationship between time discounting and income

Variability in financial literacy and general education uniquely predict variability in income beyond known correlates of the construct



# Predicting FICO

## a) Direct Path

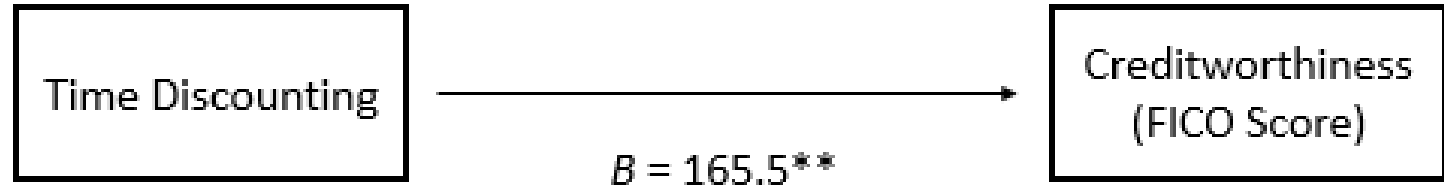


# Predicting FICO

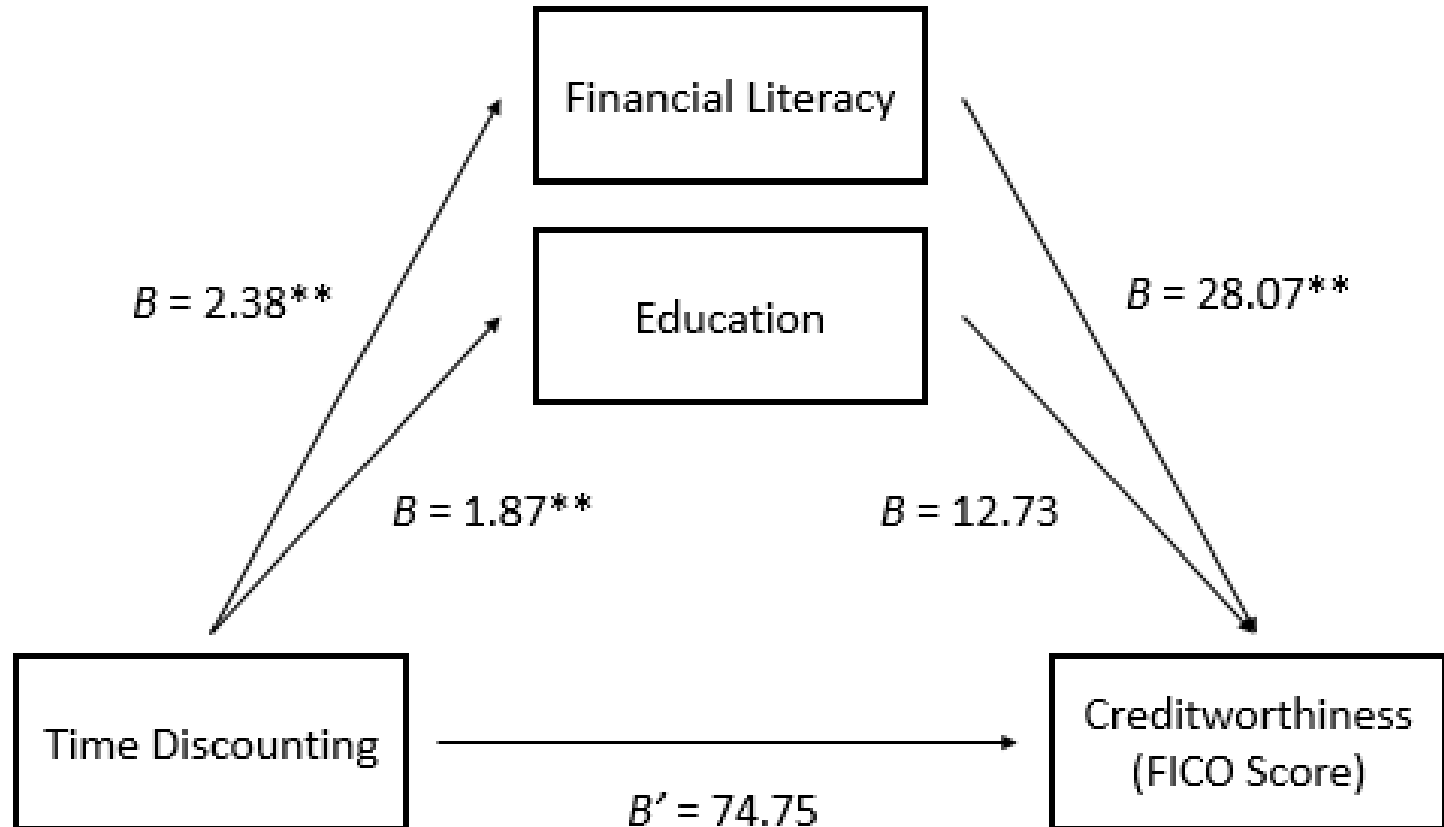
Only Financial Literacy  
Fully Mediates  
the Relationship between  
Time Discounting and FICO



## a) Direct Path

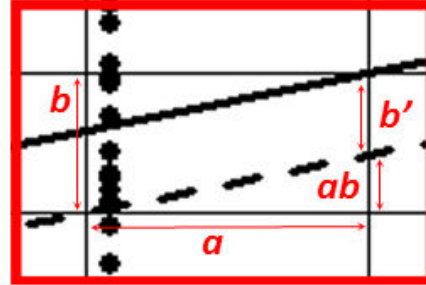


## b) Mediated Path

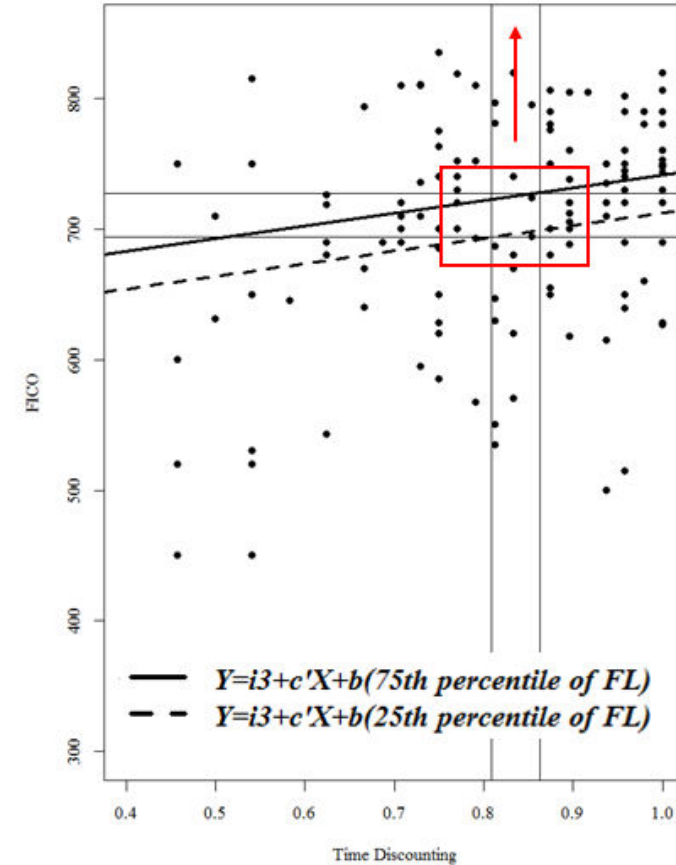
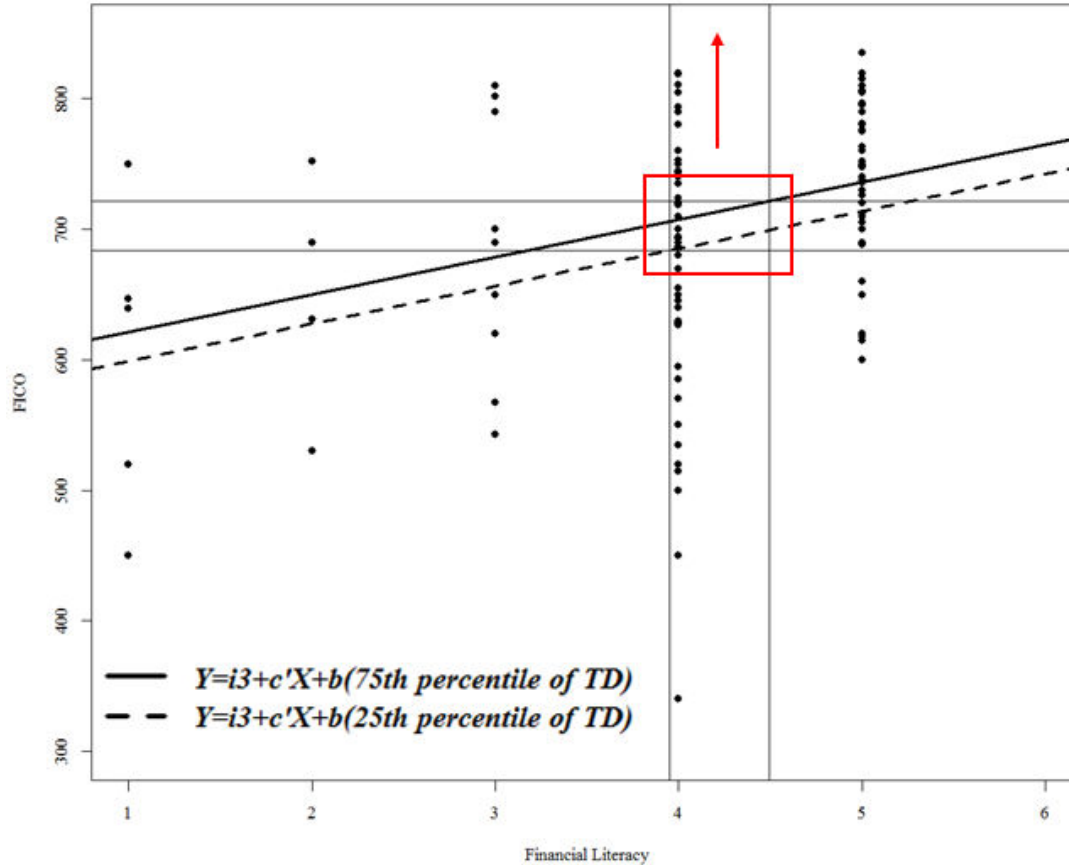
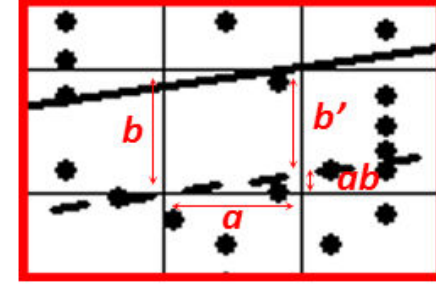


# Predicting FICO

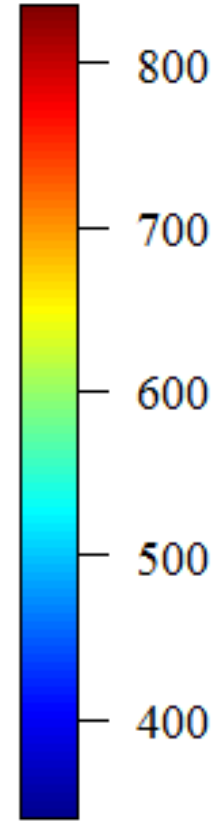
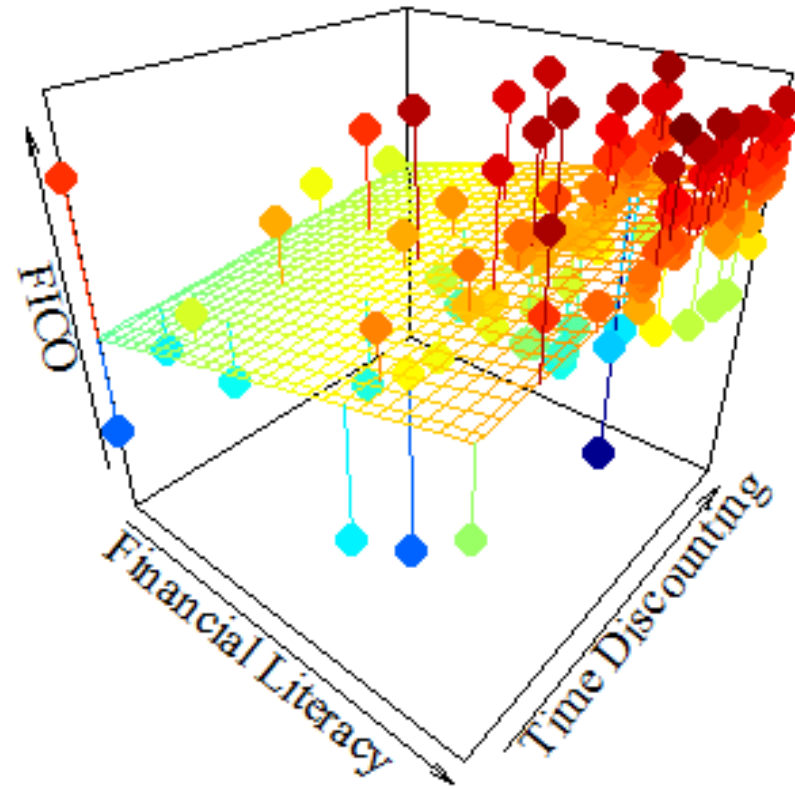
A. Financial Literacy mediates the relationship between time discounting and FICO



B. Time Discounting does not mediate the relationship between financial literacy and FICO



# Predicting FICO



**Table 2***Summary of Hierarchical Regression Analysis for Variables Predicting FICO (N = 131)*

Variable	Level 1			Level 2			Level 3			Level 4		
	<i>B</i>	<i>SE(B)</i>	$\beta$	<i>B</i>	<i>SE(B)</i>	$\beta$	<i>B</i>	<i>SE(B)</i>	$\beta$	<i>B</i>	<i>SE(B)</i>	$\beta$
Time Discounting	165.51	50.41	.278*	131.94	50.39	.221	114.04	51.92	.191	60.65	52.61	.102
Race				-16.71	18.16	-.077	-24.16	18.85	-.111	-22.62	18.16	-.104
Sex				-26.08	14.77	-.150	-27.85	14.77	-.160	-13.90	14.85	-.080
Age				.524	.740	.060	.662	.744	.075	.063	.740	.007
Income				64.50	24.14	.226**	50.64	25.99	.177	55.22	25.07	.194*
Education							12.63	8.98	.138	9.268	8.71	.101
Financial Literacy										26.72	8.17	.296**
$R^2$		.077			.148			.161			.229	
$F$ for change in $R^2$		10.78**			2.60*			1.98			10.69**	

*Note:* Income was log-transformed, and Education was standardized. Race assumes a value of "1" if non-white, and Sex assumes a value of "1" if the participant was female. \* $p < .05$ . \*\* $p < .01$ .

# Summary for Predicting FICO

Financial literacy fully mediates the relationship between time discounting and FICO

Variability in financial literacy uniquely predicts variability in FICO scores beyond known correlates of the construct

# Implications

Being financially savvy is a complex and multiply-determined phenomenon

Valuing the future is critically important for achieving better financial outcomes

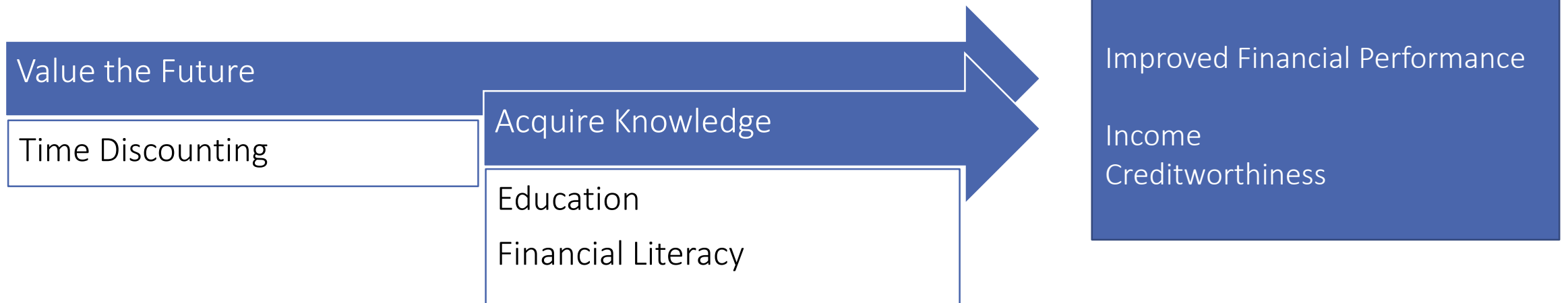
Time discounting may represent a building block:

- General education

- Acquiring financial literacy

Interventions for building financial expertise

# Takeaways





# Shout Outs!

Global Financial Literacy Excellence Center

Environmental Neuroscience Lab

Department of Psychology

Social Sciences Division

Michael & Ling Markovitz Dissertation Fellowship

University of Chicago



NATIONAL ENDOWMENT FOR  
FINANCIAL EDUCATION



**ENL**

Environmental Neuroscience Lab

Questions?

Thank You!

