

Aggregating evidence on the effectiveness of financial education

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November 18th, 2021

Asia Pacific Financial Education Institute 2021

Main question and relevance

- Do financial education interventions (generally) work?
- More than 70 countries have designed or are designing national strategies for financial literacy
- Purpose of this talk is to derive empirical benchmarks for the effectiveness of financial education interventions and to learn from effective interventions

THE QUEST TO IMPROVE AMERICA'S FINANCIAL LITERACY IS BOTH A FAILURE AND A SHAM

Financial literacy promotion may sound perfectly sensible—who wouldn't want to teach children and adults the secrets of managing money?—but in the face of recent research it looks increasingly like a faith-based initiative.

HELAINE OLEN • JAN 7, 2014

PostEverything • Perspective

More states are forcing students to study personal finance. It's a waste of time.

Study after study shows that financial-literacy courses don't change behavior.

ECONOMIC VIEW

Financial Literacy, Beyond the Classroom

By Richard H. Thaler

Oct. 5, 2013



TIME

FINANCIAL EDUCATION

Financial Education Is All the Rage but Does it Work?

Reaching consumers with advice and information just before making a financial decision is the new target. But is that really more effective than teaching personal finance in K-12?

By Dan Kadlec @dankadlec | Oct. 25, 2013

HOME / MONEY / PERSONAL FINANCE / MY MONEY

Why Investor Education Doesn't Work – And How to Change That

Employer-sponsored 401(k) meetings aren't always effective.

BUSINESS // MICHAEL TAYLOR

Taylor: Is financial literacy a bad thing?



Michael Taylor | Dec. 6, 2019 | Updated: Dec. 6, 2019 1:05 p.m.

Why financial literacy programs don't work

BY ATTY. DODO DULAY

© JANUARY 01, 2019

HOME / OPINION / OP-ED COLUMNS / WHY FINANCIAL LITERACY PROGRAMS DON'T WORK

CPFB head misguided in reliance on consumer education

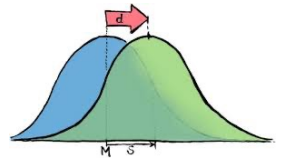
BY LAUREN E. WILLIS, OPINION CONTRIBUTOR — 09/07/19 03:30 PM EDT

THE VIEWS EXPRESSED BY CONTRIBUTORS ARE THEIR OWN AND NOT THE VIEW OF THE HILL

This talk

Summary of meta-analytic evidence on the effectiveness of financial education

- Interventions **improve financial knowledge and behaviors**. Effect sizes are similar to educational interventions in other domains.
- Decreasing marginal returns to increased instructional time: **Intensity matters** for effect on knowledge.
- Effects **remain positive up to 1.5 years after treatment**. Substantial uncertainty around the estimated longer-term effects.
- Are there or contextual features associated with greater effectiveness?



Previous literature

- Meta-analysis on the **general** financial education literature (including adults and non-school settings):
 - Fernandes, Lynch, and Netemeyer, 2014
 - „Maybe zero effects on average?“
 - Miller et al., 2015
 - „Positive effects for some outcomes!“
 - Kaiser & Menkhoff, 2017
 - „Possibly positive effects on average, but consider the high heterogeneity!“

Two of our recent meta-analyses



Contents lists available at [ScienceDirect](#)

Journal of Financial Economics

journal homepage: www.elsevier.com/locate/jfec



Financial education affects financial knowledge and downstream behaviors

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ARTICLE INFO

Article history:

Received 26 August 2020

Revised 7 June 2021

Accepted 5 July 2021

JEL classification:

D14 (personal finance)

G53 (financial literacy)

I21 (analysis of education)

Keywords:

Financial education

Financial literacy

Financial behavior

RCT

Meta-analysis

ABSTRACT

We study the rapidly growing literature on the causal effects of financial education programs in a meta-analysis of 76 randomized experiments with a total sample size of over 160,000 individuals. Many of these experiments are published in top economics and finance journals. The evidence shows that financial education programs have, on average, positive causal treatment effects on financial knowledge and downstream financial behaviors. Treatment effects are economically meaningful in size, similar to those realized by educational interventions in other domains, and robust to accounting for publication bias in the literature. We also discuss the cost-effectiveness of financial education interventions.

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Two of our recent meta-analyses

Economics of Education Review 78 (2020) 101930



Contents lists available at [ScienceDirect](#)

Economics of Education Review

journal homepage: www.elsevier.com/locate/econedurev



Financial education in schools: A meta-analysis of experimental studies

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Keywords:

Financial behavior
Financial education
Financial literacy
Meta-analysis

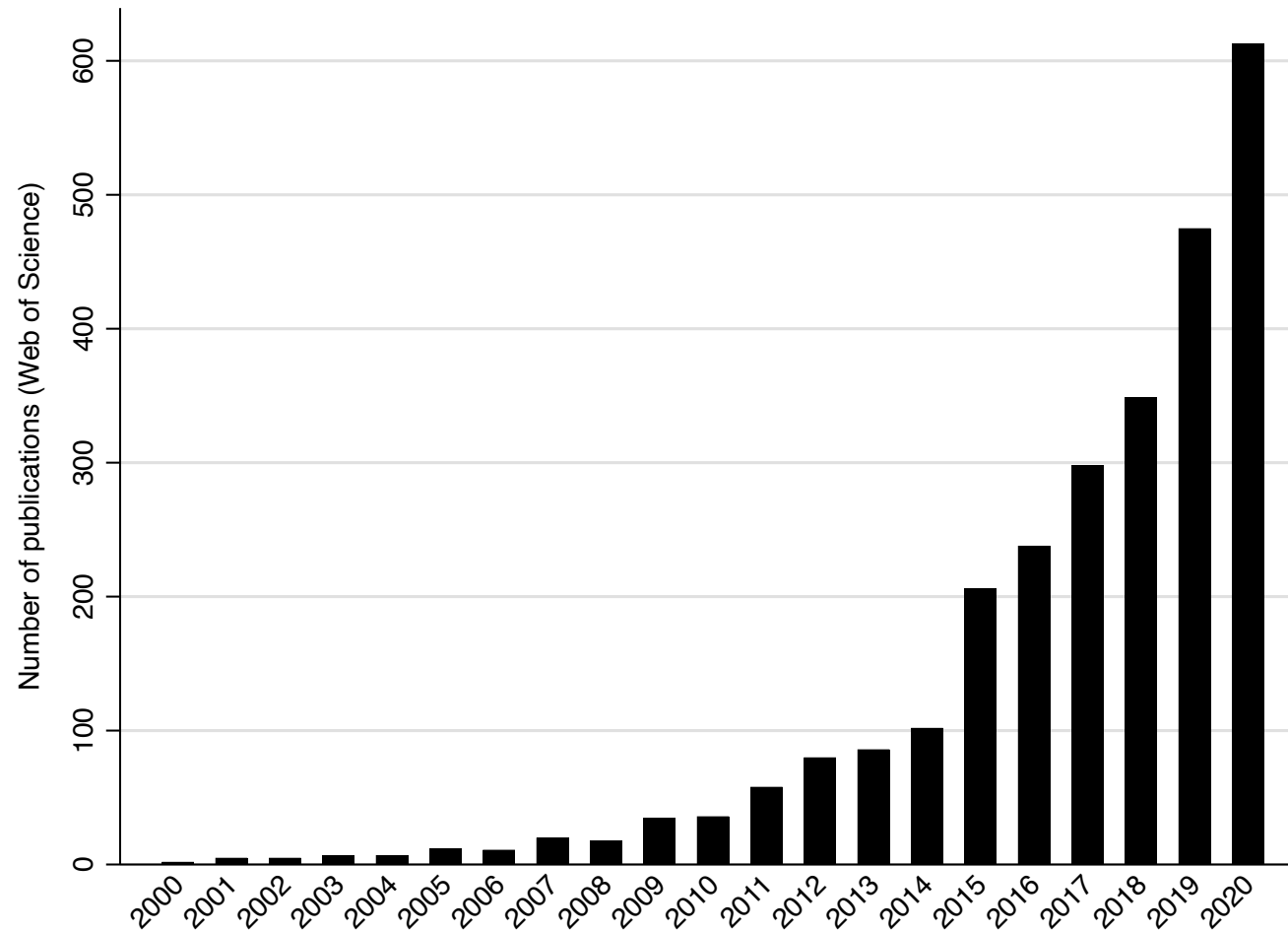
JEL classification:

I21, analysis of education
A21, pre-college economic education
D14, personal finance

ABSTRACT

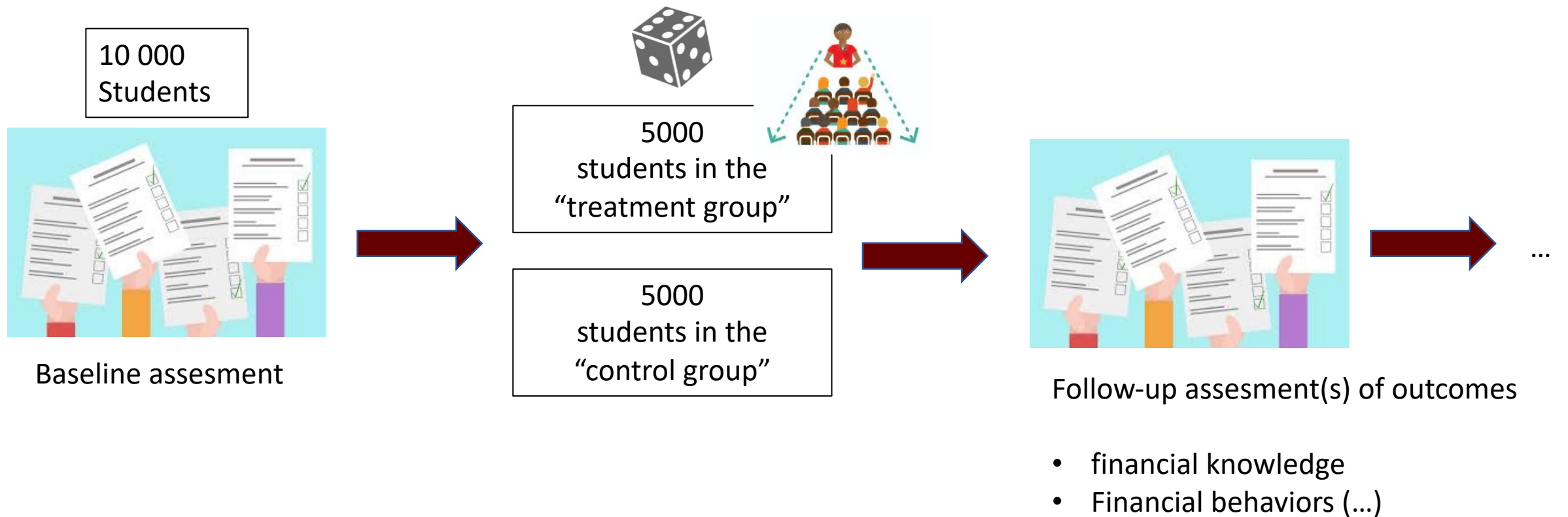
We study the literature on school financial education programs for children and youth via a quantitative meta-analysis of 37 (quasi-) experiments. We find that financial education treatments have, on average, sizeable impacts on financial knowledge (+ 0.33 SD), similar to educational interventions in other domains. Additionally, we document smaller effects on financial behaviors among students (+ 0.07 SD). When restricting the sample to 18 randomized experiments average effect sizes are estimated to be about 0.15 SD units on financial knowledge and 0.07 SD units on financial behaviors. These results are robust irrespective of the meta-analytic method used and when accounting for publication bias. Subgroup analyses show the beneficial effect of more intensive treatments, albeit with decreasing marginal returns.

A rapidly growing field



Notes: Number of journal articles within the social science citation index (Web of Science) including the term “financial literacy” in the title or the abstract. Data extracted from the Web of Science on March 3rd, 2021.

An ideal financial education impact evaluation



Example

The Impact of High School Financial Education: Evidence from a Large-Scale Evaluation in Brazil

By MIRIAM BRUHN, LUCIANA DE SOUZA LEÃO, ARIANNA LEGOVINI,
ROGELIO MARCHETTI AND BILAL ZIA*

We study the impact of a comprehensive high school financial education program spanning 6 states, 892 schools, and approximately 25,000 students in Brazil through a randomized control trial. The program increased student financial proficiency by a quarter of a standard deviation and raised grade-level passing rates. Short-term financial behaviors, however, show mixed results with significant improvements in students' savings and budgeting as well as positive spillovers to parents, but also an increase in students' use of expensive credit to make consumer purchases. (JEL D14, I21, O12, O16)

Panel B. Follow-up 2

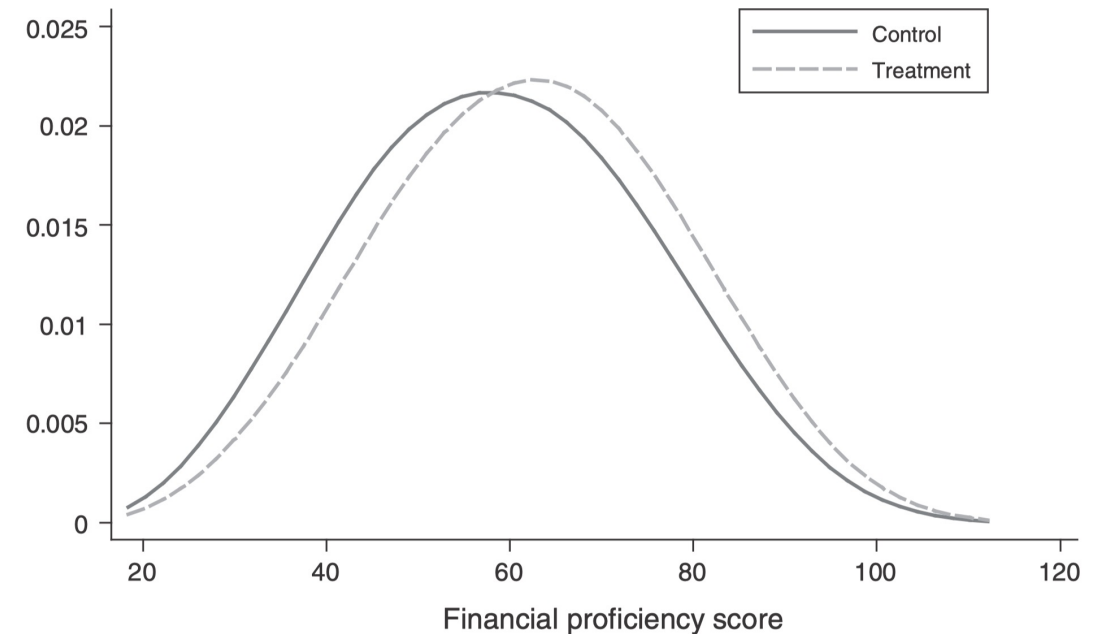


FIGURE 2. DISTRIBUTION SHIFT IN FINANCIAL PROFICIENCY SCORES

How can we summarize the results of all available studies?

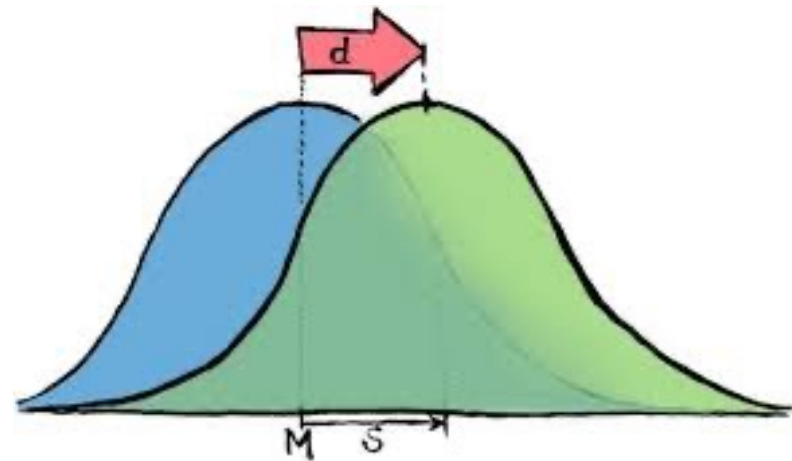
Meta-Analysis: Research questions

- i. What is the direction and size of the (weighted) average effect of financial education interventions?
- ii. Are results consistent across studies or is there a high degree of heterogeneity in reported findings (beyond sampling error)?
- iii. Are there observable study or program characteristics that may explain part of this heterogeneity?

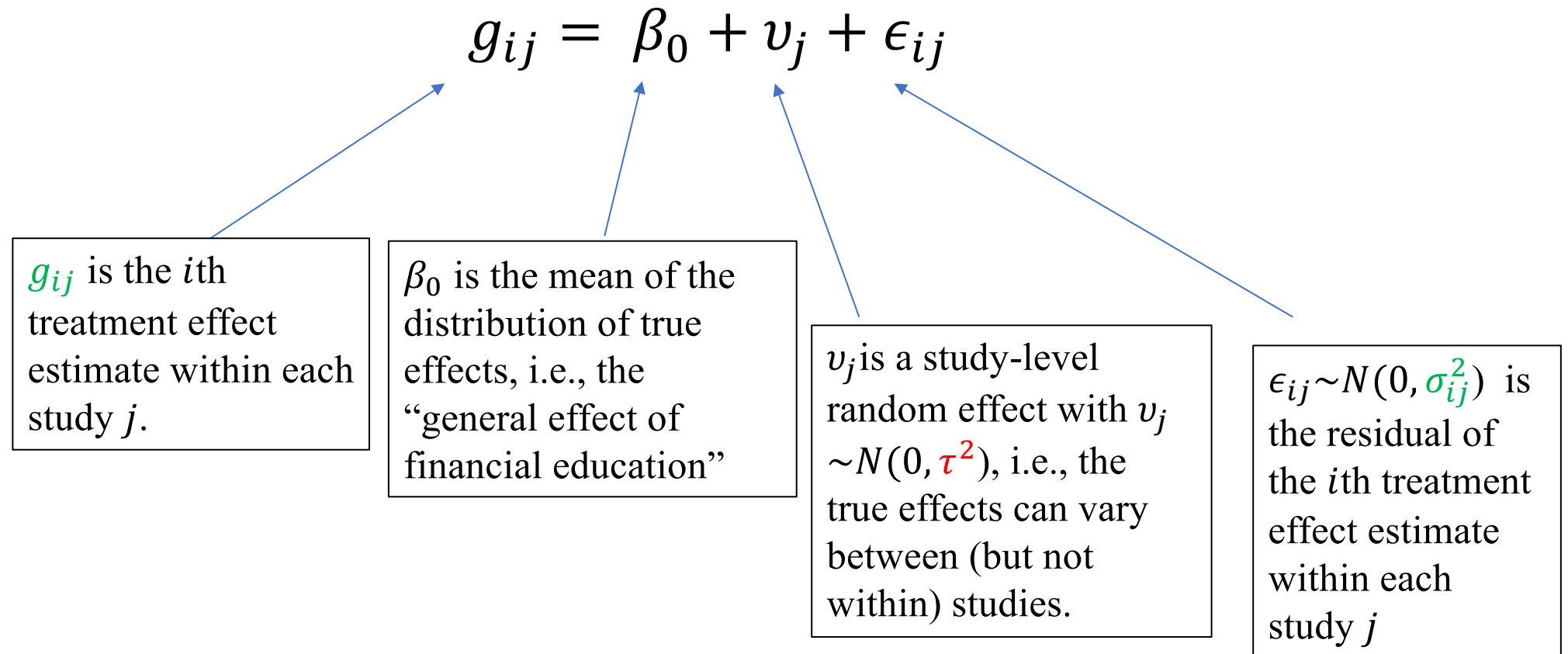
A primer on meta-analysis

- Consider a set of **randomized field experiments**, each of them reporting estimates of causal effects relative to a control group
- Goal of evidence aggregation (meta-analysis) is to arrive at a “general effect” of financial education
- A meta analysis requires to make effects comparable across studies: in our case we use standardized mean differences.

$$g = \frac{M_T - M_C}{SD_p}$$



Formal model



- We observe both g_{ij} and σ_{ij}^2 from the data
- τ^2 needs to be estimated

A scheme for interpreting effect sizes (Kraft 2020)

		Cost-Effectiveness Ratio (ES/Cost)		
		Cost Per Pupil		
		Low ($< \$500$)	Moderate (\$500 to $< \$4,000$)	High (\$4,000 or $>$)
Effect Size	Small ($< .05$)	Small ES / Low Cost	Small ES / Moderate Cost	Small ES / High Cost
	Medium ($.05$ to $< .20$)	Medium ES / Low Cost	Medium ES / Moderate Cost	Medium ES / High Cost
	Large ($.20$ or $>$)	Large ES / Low Cost	Large ES / Moderate Cost	Large ES / High Cost

Notes: ES = Effect Size

(Kraft 2020, p. 250)

Results meta-study on schools
(Kaiser and Menkhoff 2020)

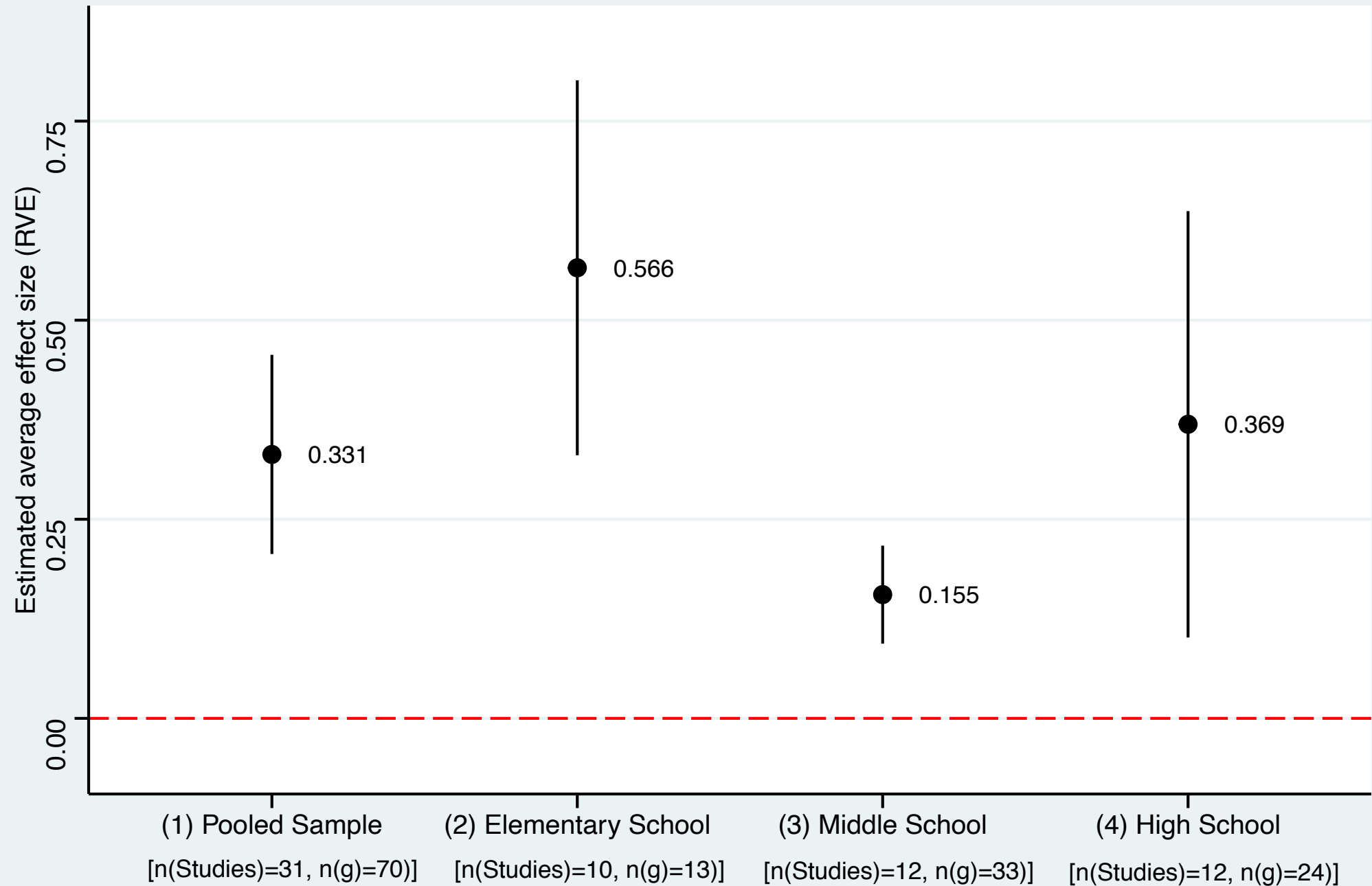
Overview of included experiments.

	Study	Country	RCT	Included in KM (2017)	Students (mean) age	Sample size	Outcomes coded
1	Alan and Ertac (2018)	Turkey	Yes	No	3rd and 4th grade (elementary school)	1970	D
2	Angel (2018)	Austria	Yes	No	18	296	A, D
3	Batty et al. (2015) [independent sample 1]	USA	Yes	Yes	Elementary school (4th and 5th graders)	703	A, C, D
4	Batty et al. (2015) [independent sample 2]	USA	Yes	Yes	Elementary school (4th and 5th graders)	277	A, C, D
5	Batty et al. (2017)	USA	Yes	No	9	1972	A, C, D
6	Becchetti and Pisani (2012)	Italy	Yes	No	High School	3820	A
7	Becchetti et al. (2013)	Italy	Yes	Yes	High School	1063	A, D
8	Berry et al. (2018)	Ghana	Yes	Yes (2015 WP)	11	5400	A, B, D
9	Bover et al. (2018)	Spain	Yes	No	15	3070	A, D
10	Bruhn et al. (2016)	Brazil	Yes	Yes	16	25,000	A, B, C, D
11	Carlin and Robinson (2012)	USA	No	Yes	16	1672	B, C, D, E
12	Chen and Heath (2012) [independent sample 1]	USA	No	Yes	NA (elementary)	1244	A
13	Chen and Heath (2012) [independent sample 2]	USA	No	Yes	NA (middle)	155	A
14	Frisancho (2018)	Peru	Yes	No	15	25,980	A, C, D
15	Furtado et al. (2017)	Brazil	Yes	No	12	14,655	A, D
16	Gill and Bhattacharya (2015)	USA	No	Yes	High School	159	A
17	Go et al. (2012)	USA	No	Yes	9 (4th and 5th graders)	403	A, C, D
18	Grody et al. (2008)	USA	No	No	Elementary school	31	A
19	Harter and Harter (2009)	USA	No	Yes	NA (Elementary, Middle, and High School)	2438	A
20	Harter and Harter (2010)	USA	No	Yes	17	730	A
21	Hinojosa et al. (2010)	USA	Yes	No	9 / 15	8594	A
22	Hospido et al. (2015)	Spain	No	Yes	15	1223	A
23	Kalmi (2018) [independent sample 1]	Finland	No	No	15	2386	A, D
24	Kalmi (2018) [independent sample 2]	Finland	No	No	15	2085	A, D
25	Kajwij et al. (2017)	Netherlands	Yes	No	10	1816	A, D
26	Lührmann et al. (2015)	Germany	No	Yes	14 (7th and 8th grade)	770	
27	Lührmann et al. (2018)	Germany	Yes	No	14 (7th and 8th grade)	914	A, D
28	Langrehr (1979)	USA	No	No	High School	110	A
29	Migheli and Moscarola (2017)	Italy	Yes	No	8 to 9 (Elementary School)	213	D
30	Mandell (2009a)	USA	No	Yes	High School	1279	D
31	Mandell (2009b)	USA	No	Yes	High School	1030	A
32	Mandell and Schmid-Klein (2009)	USA	No	Yes	High School	79	A
33	Schug and Hagedorn (2004)	USA	No	Yes	Middle School	109	A
34	Shephard et al. (2017)	Rwanda	Yes	No	15	1750	A, C, D
35	Sherraden et al. (2011)	USA	No	Yes	Elementary School	93	A
36	Supanataroek et al. (2016)	Uganda	Yes	Yes	13	1746	C, D
37	Walstad et al. (2010)	USA	No	Yes	High School	800	A

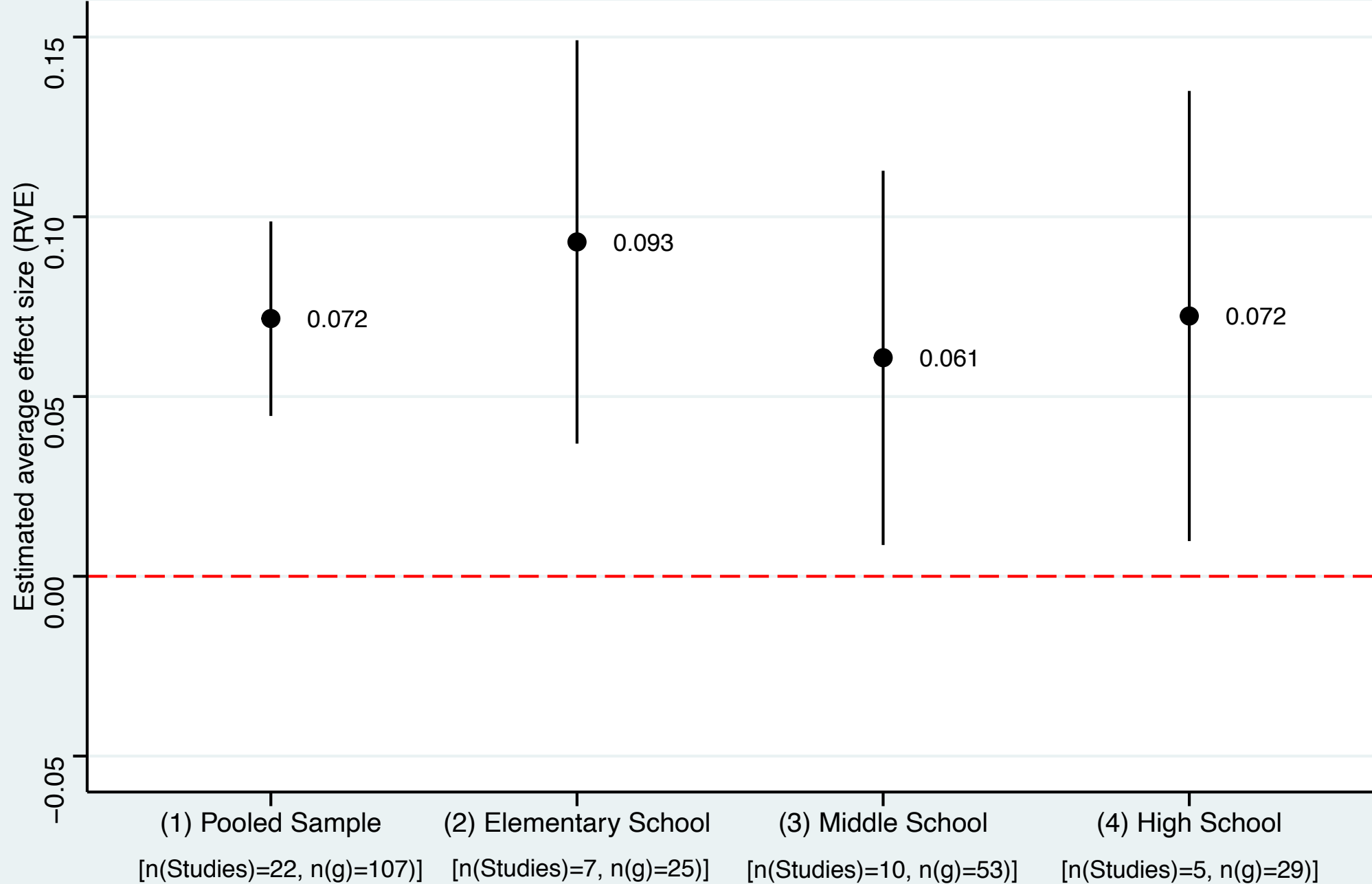
Outcome definitions.

Outcome category		Definition
<i>A</i>	<i>Financial knowledge (+)</i>	Raw score on financial knowledge test Indicator of scoring above a defined threshold Indicator of solving a test item correctly
<i>B</i>	<i>Credit behavior</i>	
	1) Reduction of delinquencies within certain time frame (+)	Binary indicator
	2) Lower cost of credit / interest rate (+)	Sum of real interest amount or interest rate and (if applicable) cost of fees
	3) Any debt (–) / (+) (depending on intervention goal)	Binary indicator
	4) Borrowing index (+)	Study-specific index of survey items to measure borrowing amount, frequency, and repayment
<i>C</i>	<i>Budgeting behavior</i>	
	1) Having a written budget (+)	Binary indicator
	2) Having a financial plan or long-term aspirations (+)	Binary indicator
	3) Seeking information before making financial decisions (+)	Binary indicator
	4) Self-rating of adherence to budget (+)	Study-specific scale
<i>D</i>	<i>Saving & retirement saving behavior</i>	
	1) Amount of savings (+)	Continuous measure (or log) of savings amount (in currency or number of valuable assets) or categorical variable indicating amount within range Savings relative to income
	2) Savings rate or savings within timeframe (+)	Amount over defined time-frame
	3) Savings index (+)	Study-specific index of survey items designed to measure savings amount and frequency
	4) Any savings (+)	Binary indicator
	5) Has formal bank (savings) account (+)	Binary indicator
	6) Amount saved in allocation task (+)	Continuous measure of amount saved in allocation task
	7) Amount allocated to delayed payment date in experimental elicitation task (+)	Continuous measure of amount delayed to be paid out at a later date within an experimental elicitation task
<i>E</i>	<i>Insurance behavior</i>	
	1) Any formal insurance (hypothetical task) (+)	Binary indicator

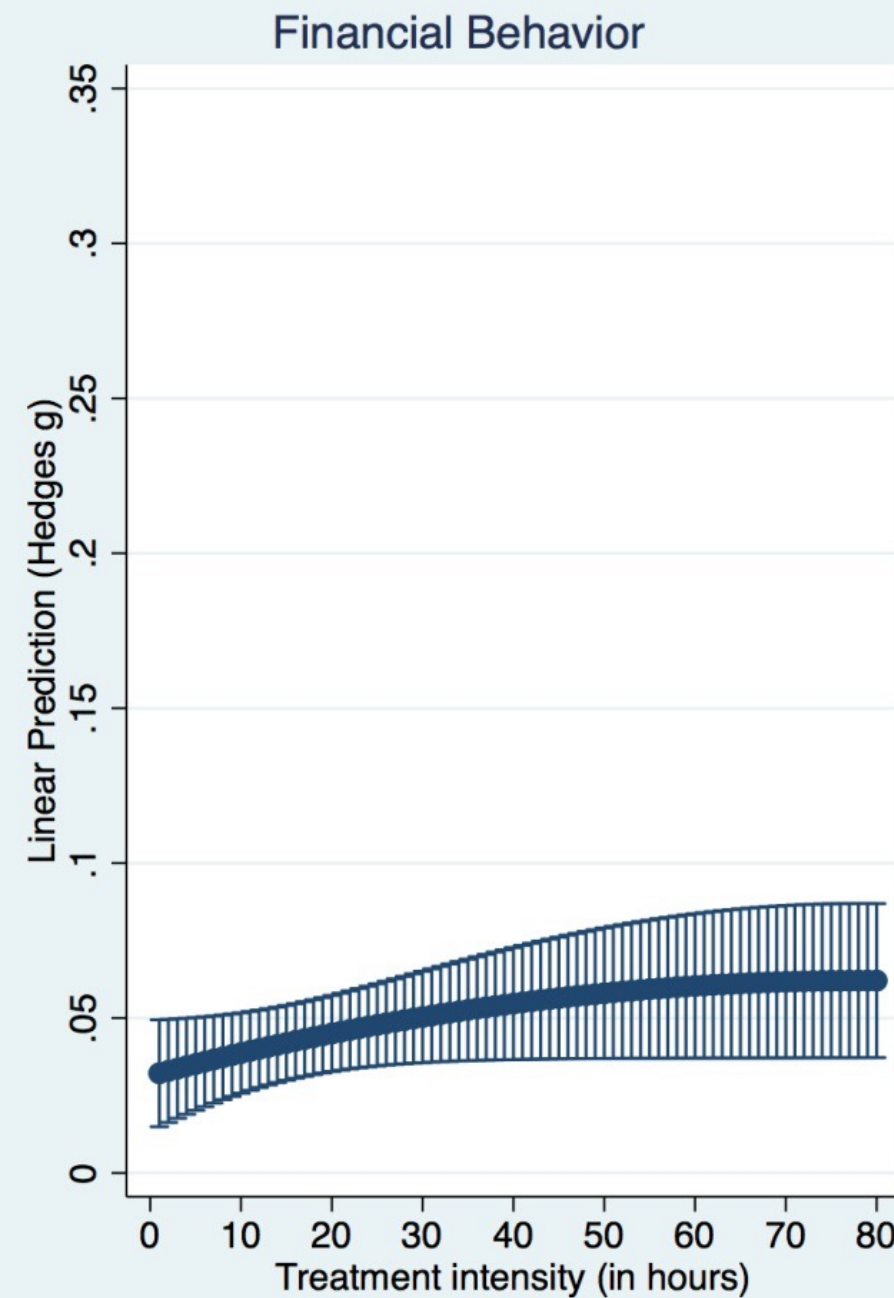
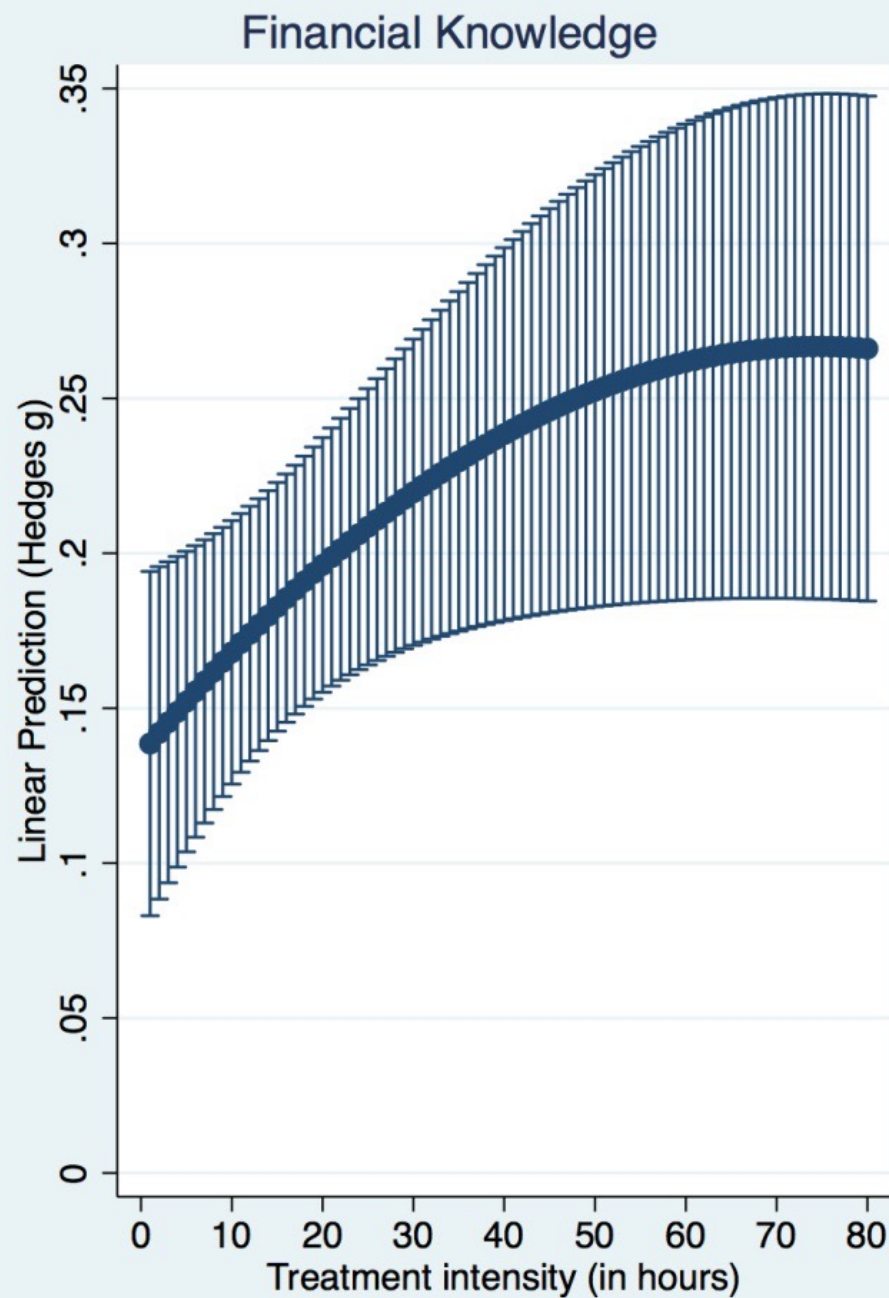
Treatment effects on financial knowledge



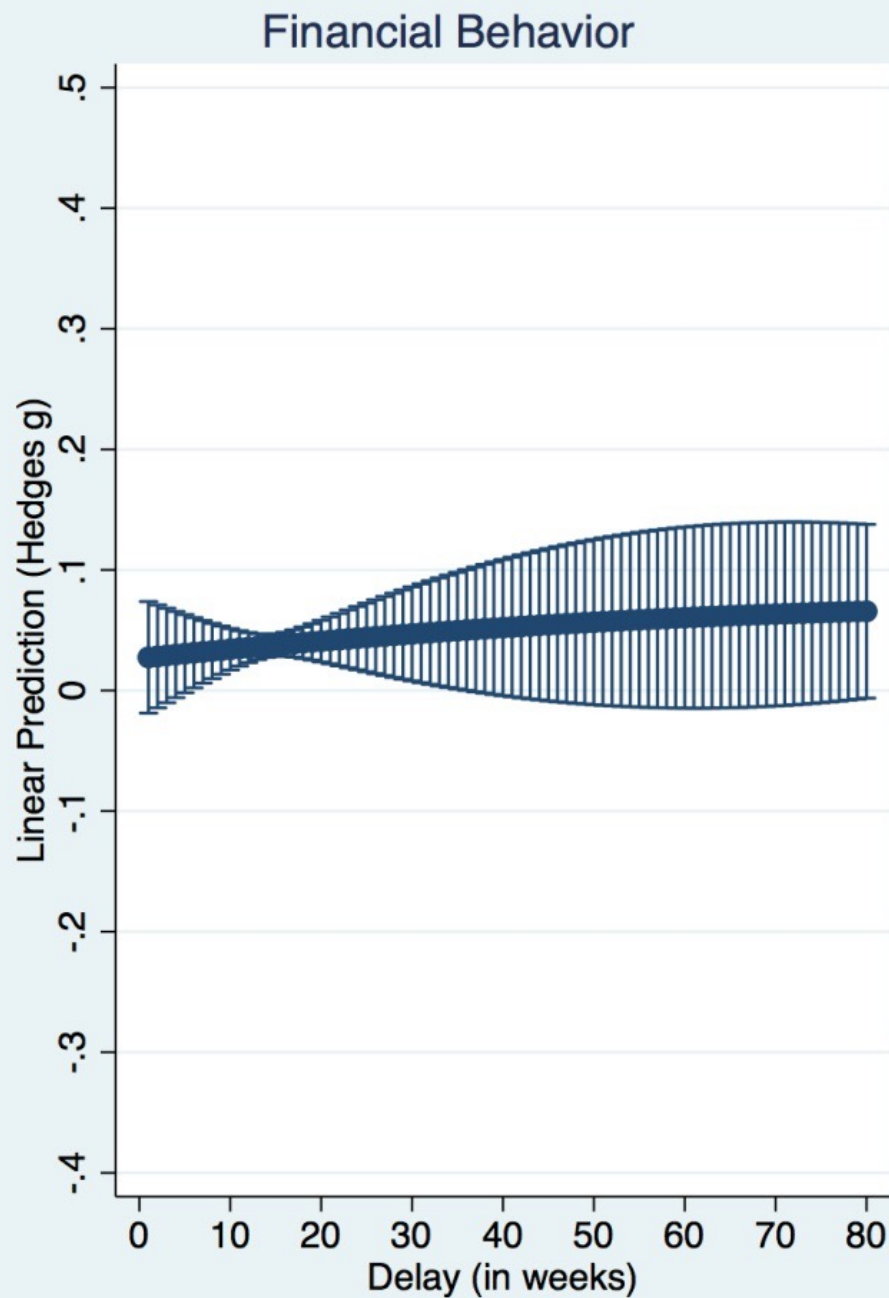
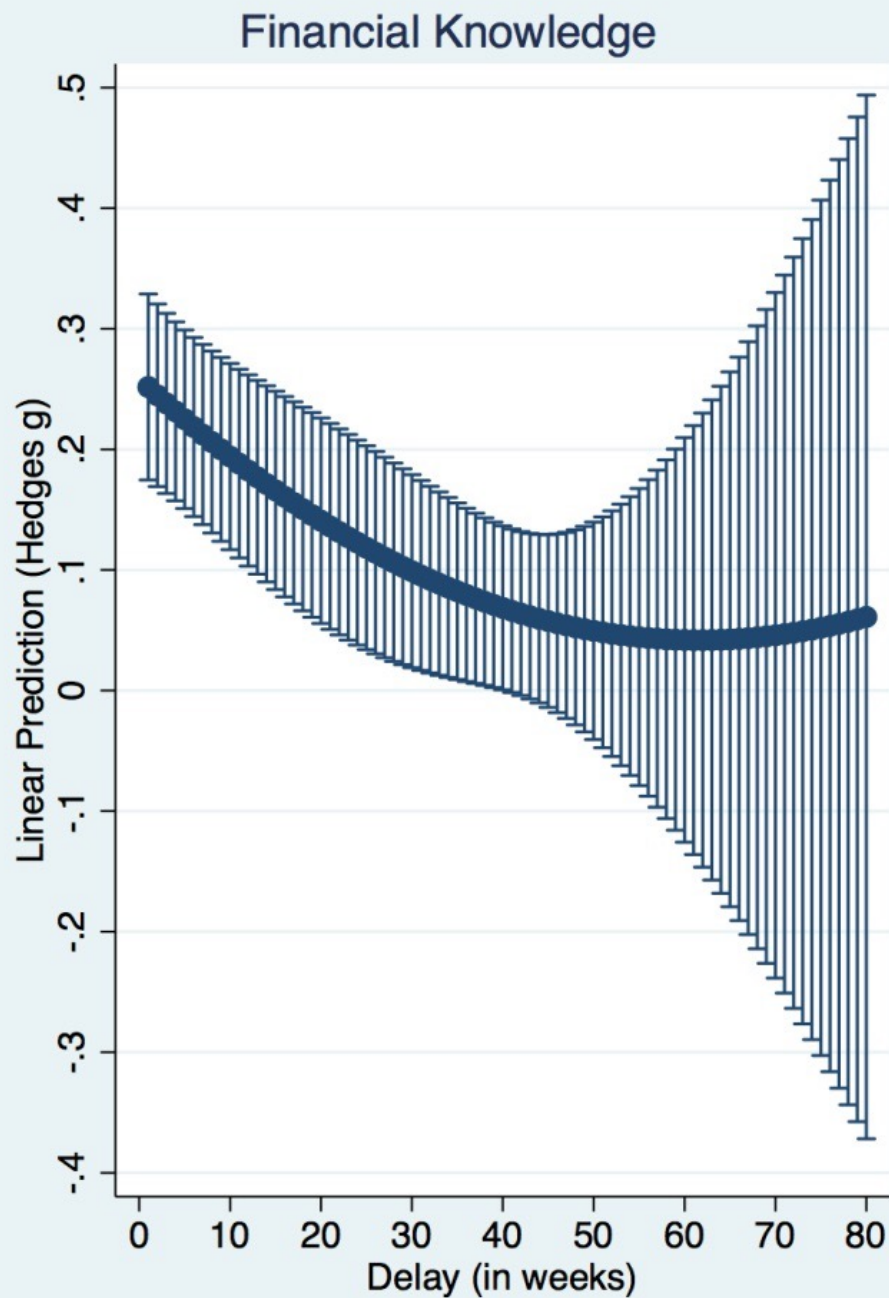
Treatment effects on financial behaviors



Intensity

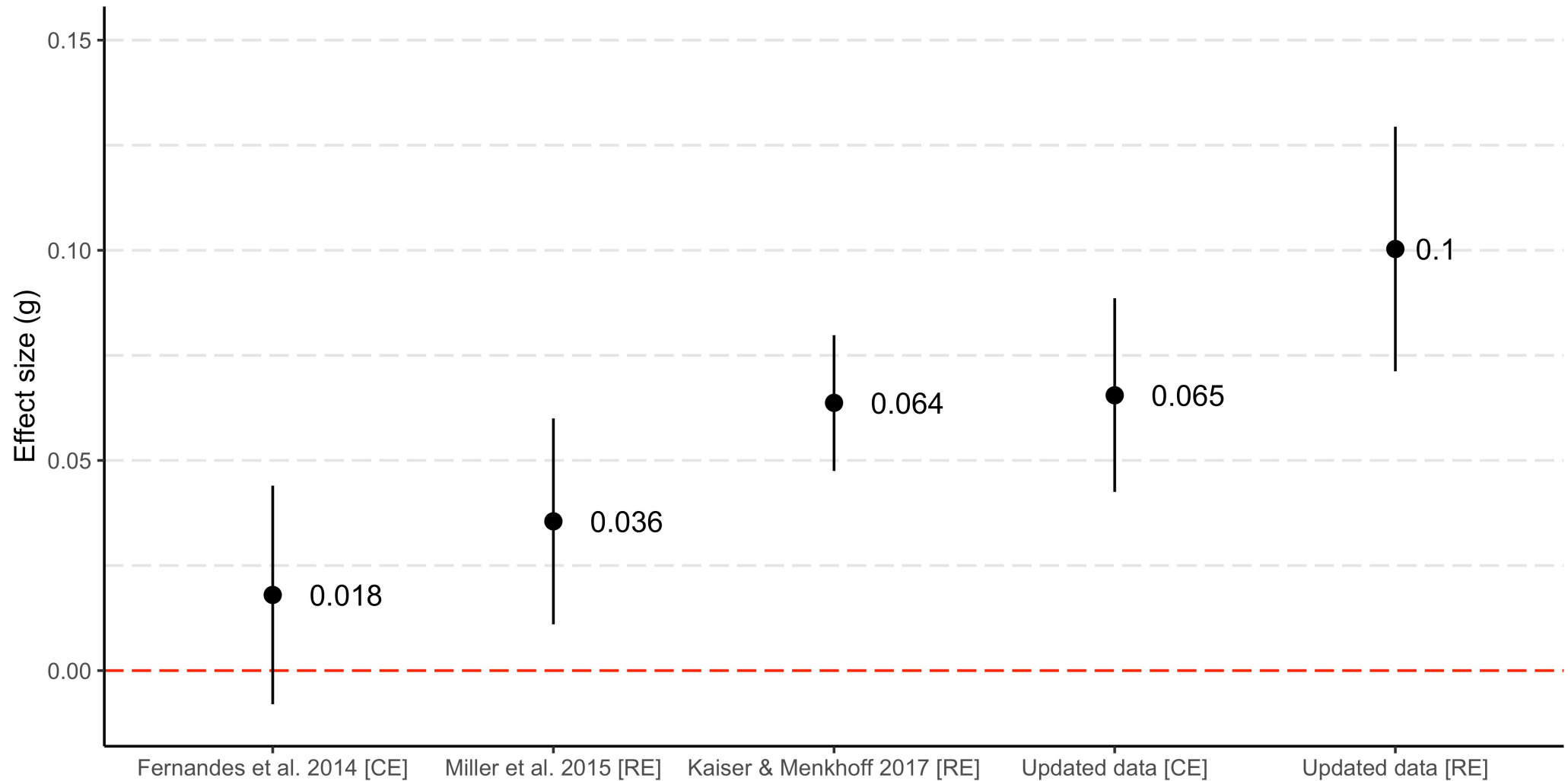


Decay

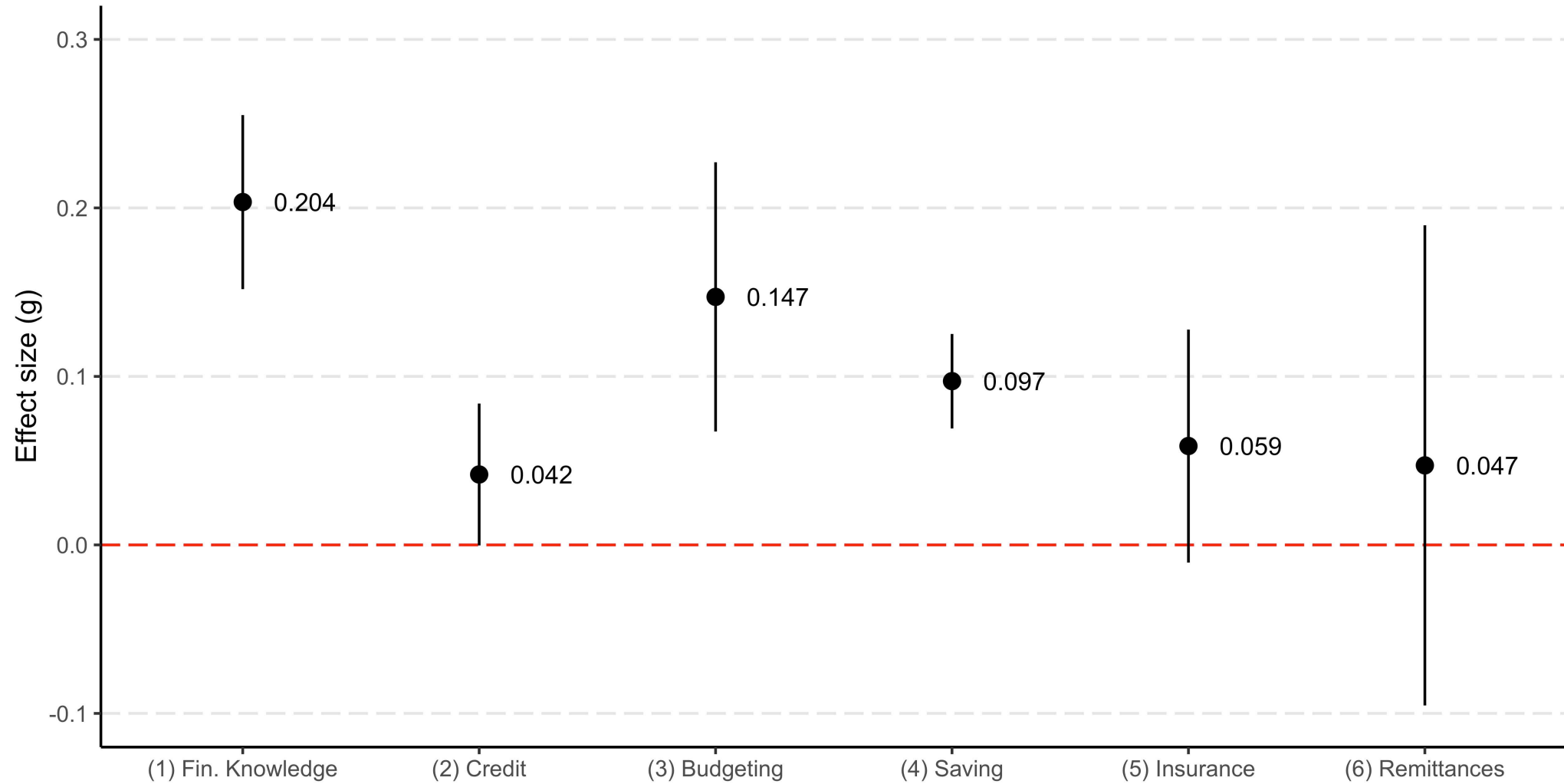


Results on entire population
(Kaiser, Lusardi, Menkhoff and Urban 2021)

Comparison of recent evidence to earlier meta-analyses (effects on fin. behaviors)



Effects by outcome domain (76 RCTs)



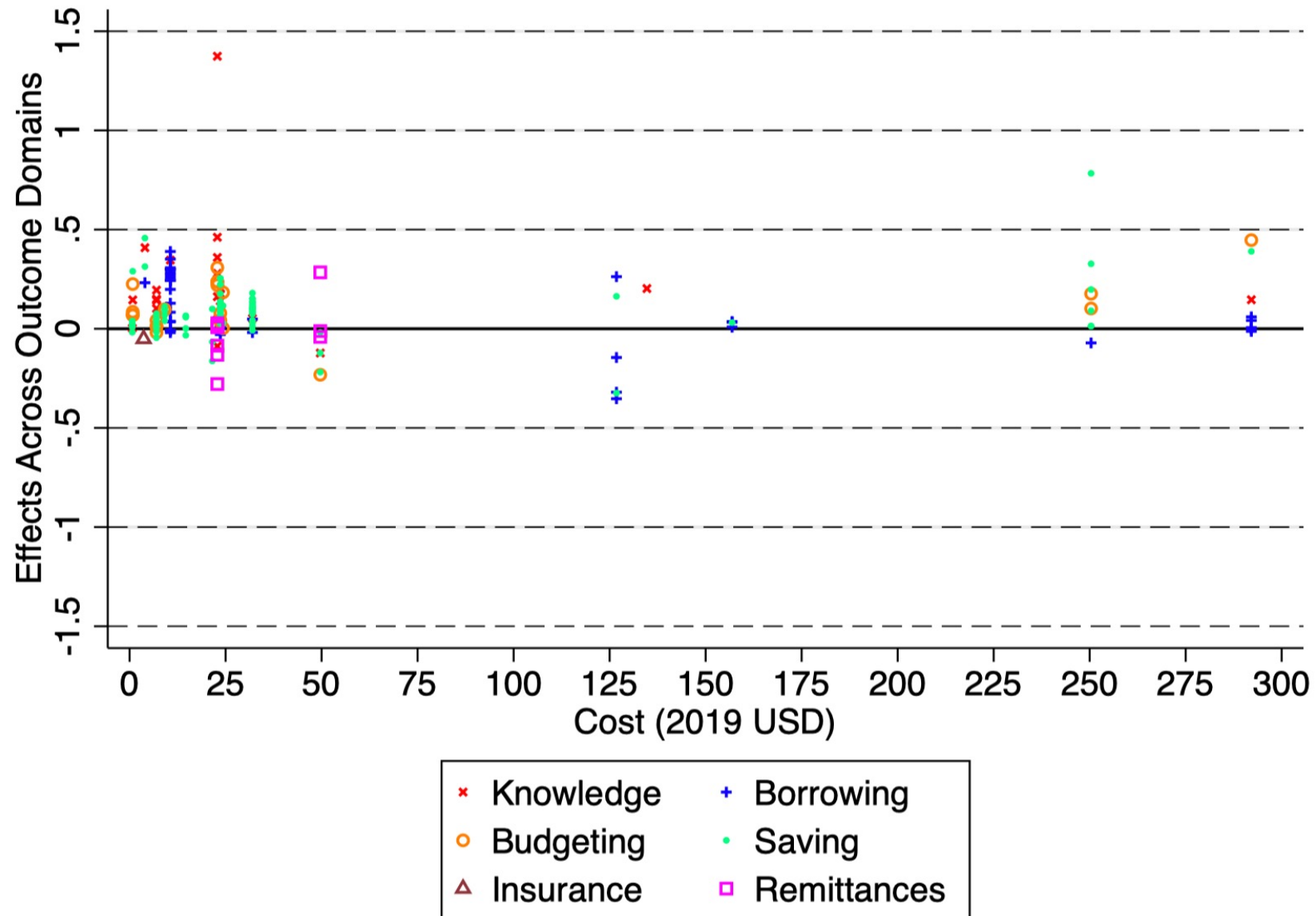
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Notes: ES = Effect Size

(Kraft 2018, p. 20)

Costs (per student) and effect sizes



Are interventions cost-effective?

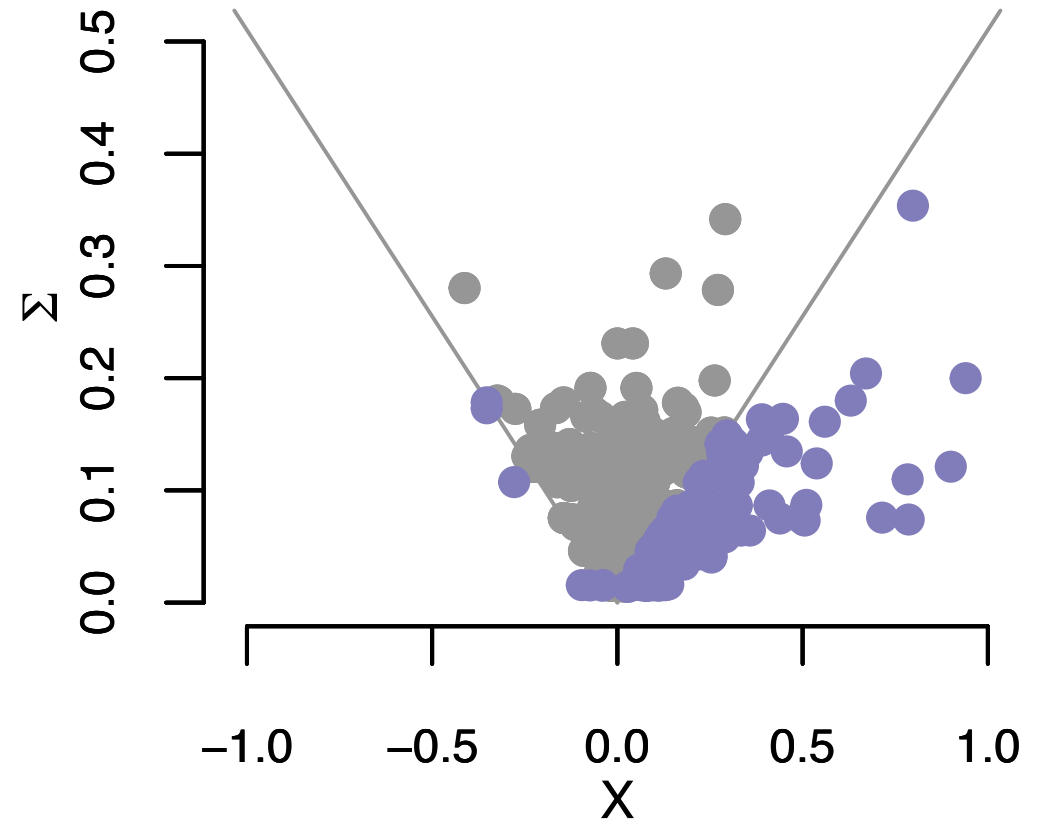
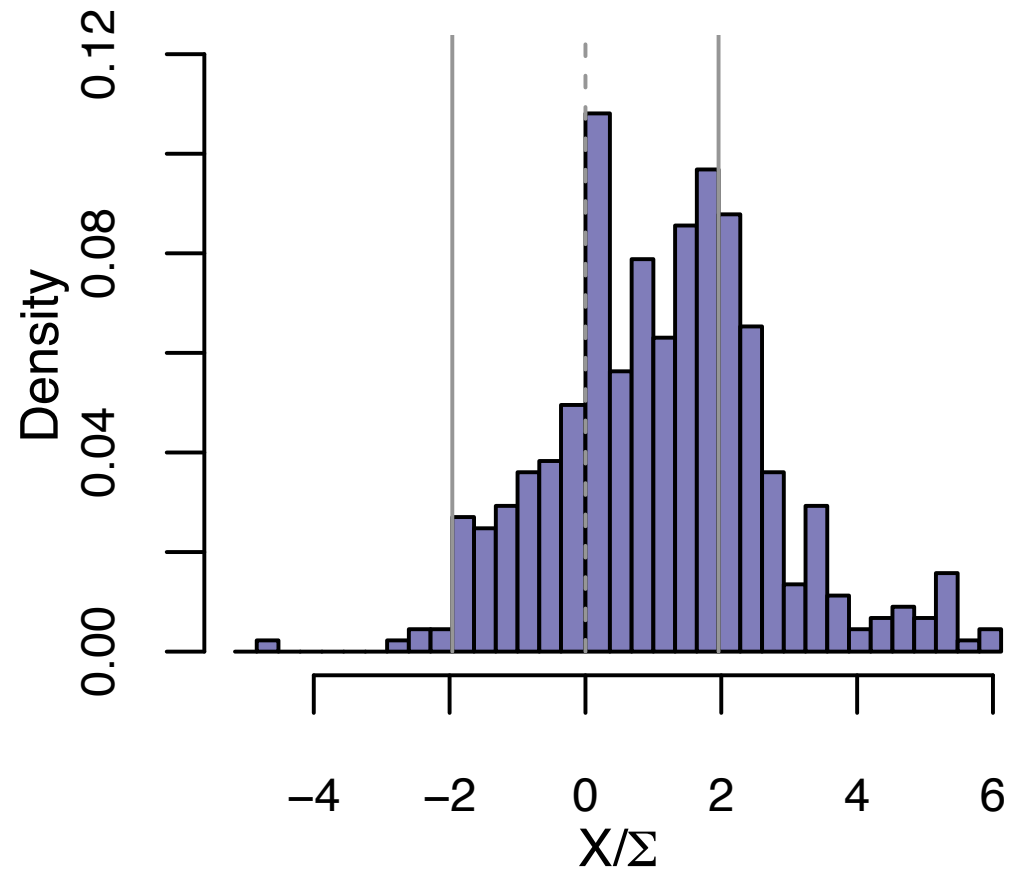
- Using Kraft's (2019) scale of educational interventions, effects are "medium/large."
- Average intervention has low cost per participant (mean costs are \$60.40 and median costs are \$22.90)
- With the data we have, for "medium effect sizes," Kraft's educational intervention scale would say average cost per participant of \$60 implies "low cost."

Subsample analysis

Table 3: Financial education treatment effects by subgroups of studies and populations

Subgroup	Effect size (g)	SE	95% CI Lower bound	95% CI Upper bound	n(Studies)	n(effects)
Panel A: Treatment effects on <i>financial behaviors</i>						
<i>(a) By country income</i>						
High income economies	0.1127	0.0316	0.0478	0.1777	32	129
Developing economies	0.0928	0.0130	0.0660	0.1195	32	329
<i>(b) By respondent income</i>						
Low income individuals	0.0993	0.0194	0.0600	0.1387	43	367
General population	0.1035	0.0219	0.0571	0.1500	21	91
<i>(c) By age of participants</i>						
Children (< age 14)	0.0640	0.0186	0.0188	0.1091	9	36
Youth (age 14 to 25)	0.1203	0.0415	0.0250	0.2155	11	92
Adults (> age 25)	0.1068	0.0205	0.0653	0.1483	44	330
<i>(d) By intensity of treatment</i>						
< 5 hours	0.0817	0.0194	0.0407	0.1227	22	124
≥ 5 and < 20 hours	0.0992	0.0223	0.0533	0.1450	29	251
≥ 20 hours	0.1344	0.0387	0.0500	0.2189	15	83
<i>(e) By delay between treatment and measurement of outcomes</i>						
< 6 months	0.0991	0.0169	0.0645	0.1337	34	180
≥ 6 and < 18 months	0.0901	0.0181	0.0520	0.1283	23	211
≥ 18 months	0.0653	0.0192	0.0209	0.1098	10	49
<i>(f) By type of intervention</i>						
Classroom	0.1064	0.0181	0.0699	0.1428	50	331
Online	0.0796	0.0336	-0.0194	0.1786	5	55
Counseling	0.1595	0.0274	-0.1887	0.5077	2	48
Educative Nudge	0.0597	0.0206	0.0055	0.1138	8	24

What about publication bias?



Identification of and correction for publication bias (Andrews and Kasy 2019)

Table 2: Identification of and correction for publication bias in the financial education literature

(a) Treatment effects on <i>financial behaviors</i>				(b) Treatment effects on <i>financial knowlege</i>			
(1)		(2)		(3)		(4)	
Selection on significance (cutoff of $ Z = 1.96$)		Selection on significance (cutoff of $ Z = 1.65$)		Selection on significance (cutoff of $ Z = 1.96$)		Selection on significance (cutoff of $ Z = 1.65$)	
$\bar{\beta}_0$	λ_p	$\bar{\beta}_0$	λ_p	$\bar{\beta}_0$	λ_p	$\bar{\beta}_0$	λ_p
0.057	0.303	0.050	0.256	0.150	0.150	0.160	0.250
(0.001)	(0.071)	(0.007)	(0.051)	(0.037)	(0.126)	(0.040)	(0.190)

Notes: This table presents results from non-parametric identification of and correction for publication bias based on the method described in Andrews and Kasy (2018) (see Andrews and Kasy 2018, Appendix C). $\bar{\beta}_0$ denotes the estimate of the true treatment effect in latent studies (i.e., the bias corrected treatment effect) and λ_p denotes the estimated conditional publication probability (p) based on the Z-statistic (y_{ij}/σ_{ij}) as specified in the repective column header. Columns (1) and (3) show estimates for the treatment effects on financial behaviors and financial knowledge with $p(y_{ij}/\sigma_{ij}) = \lambda_p$ if $|y_{ij}/\sigma_{ij}| < 1.96$ and $p(y_{ij}/\sigma_{ij}) = 1$ if $|y_{ij}/\sigma_{ij}| \geq 1.96$, i.e., selection on significance at the 5%-level, repectively. Columns (2) and (4) show estimates for for the treatment effects on financial behaviors and financial knowledge with $p(y_{ij}/\sigma_{ij}) = \lambda_p$ if $|y_{ij}/\sigma_{ij}| < 1.65$ and $p(y_{ij}/\sigma_{ij}) = 1$ if $|y_{ij}/\sigma_{ij}| \geq 1.65$, i.e., selection on significance at the 10%-level, repectively. Standard errors (clustered at the study-level) are shown in parentheses.

Summary

- Financial education interventions are, on average, as successful as interventions in other domains (Hill et al. 2008, Fryer 2016, Kraft 2018)
 - Very robust result (also to the consideration of publication bias)
- Treatment effects on *financial knowledge and behaviors* are sizeable and economically relevant
 - Some evidence of decay of effects over time but large uncertainty
 - Interventions effective at any age
 - Positive spillovers to parents and teachers are likely (Bruhn et al. 2016, Frisanco 2020)
- Which interventions show most promising effects?
 - Intensity of classroom instruction matters
 - Tentatively, interventions that are **more personalized and target non-cognitive (affective) channels** have larger effects (Berg and Zia 2017, Carpena et al. 2017)
 - Simply providing information (i.e., an educative nudge) is not effective, on average.

Recent evidence on effective design elements

- Teacher training and implementation quality (Urban et al. 2020, Compen et al. 2021)
- Curricula (rules of thumb) (Drexler et al. 2014, Skimmyhorn et al. 2016)
- Active learning and experiential learning (Amagir et al. 2018, Kaiser and Menkhoff 2018, Batty et al. 2020, Kalmi and Rahko 2020)
- Timing and relevance for students (i.e., “teachable moment”) (Miller et al. 2015, Kaiser and Menkhoff 2017)
- Involving parents, homework and both (Maldonado et al. 2020a,b)
- Ability matching (Iterbeke et al. 2020)
- Computer assisted learning (Attanasio et al. 2020, Iterbeke et al. 2021)
- ...

Thank you!

Additional slides

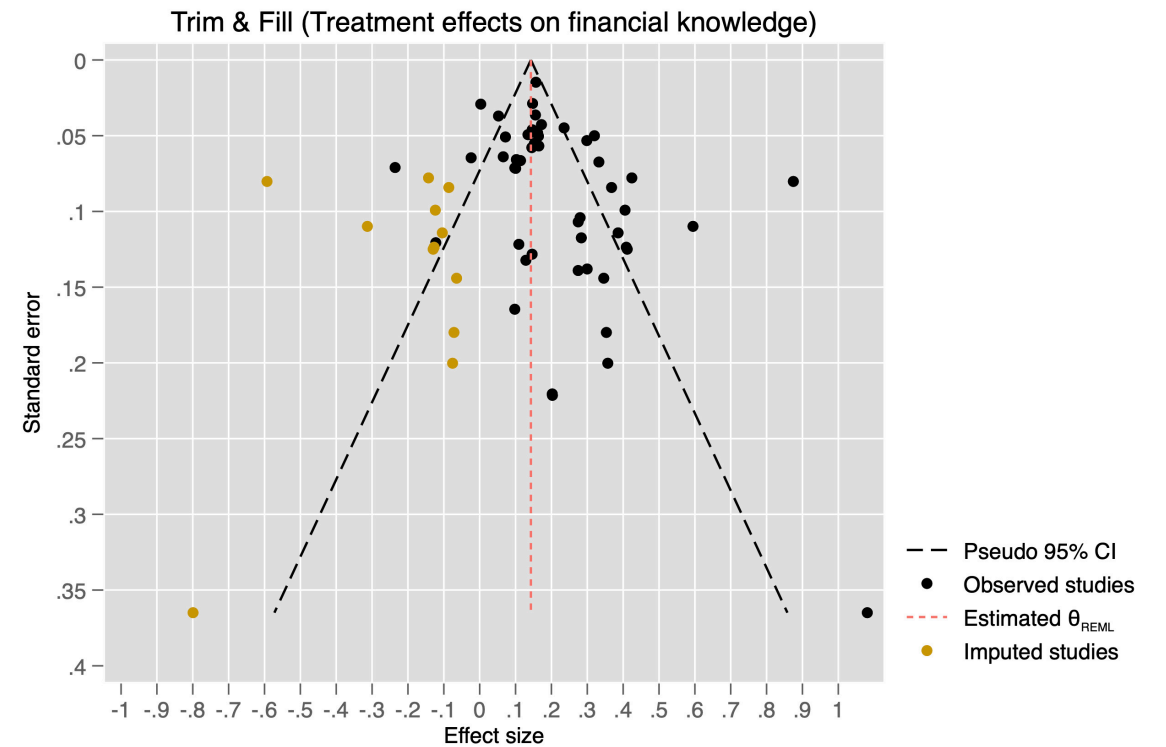
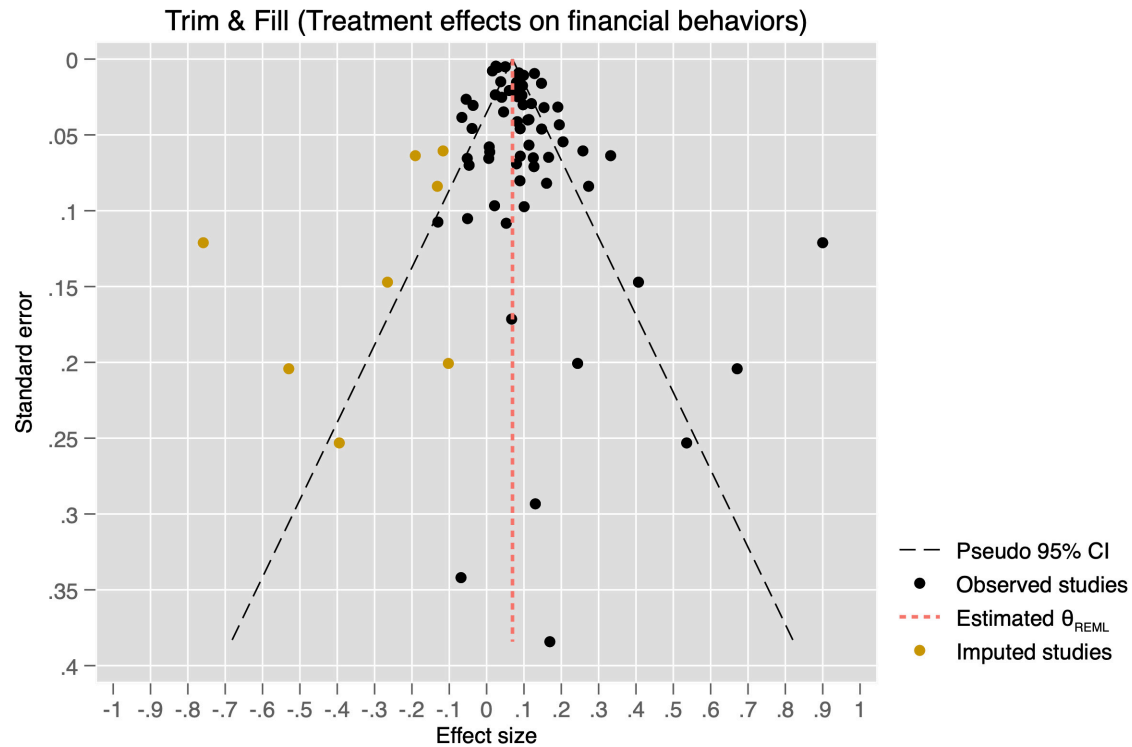
Descriptive statistics (Kaiser et al. 2020)

Table 1: Descriptive statistics

Variable	Obs.	Mean	Median	Std. Dev.	Min.	Max.
Hedges' g	673	0.123	0.098	0.183	-0.413	1.374
SE (g)	673	0.084	0.072	0.049	0.007	0.365
Delay (in weeks)	639	30.238	25.800	31.537	0.000	143.550
Intensity (in hours)	604	11.709	7.000	16.267	0.008	108.000
Mean age (in years)	646	33.549	38.430	12.488	8.500	55.000
Children (< age 14)	673	0.076	-	-	0.000	1.000
Youth (age 14 to 25)	673	0.196	-	-	0.000	1.000
Adults (> age 25)	673	0.728	-	-	0.000	1.000
Low income (yes=1)	673	0.724	-	-	0.000	1.000
Developing economy (yes=1)	673	0.608	-	-	0.000	1.000
Top econ journal (yes=1)	673	0.308	-	-	0.000	1.000
Classroom	673	0.666	-	-	0.000	1.000
Online	673	0.224	-	-	0.000	1.000
Educative Nudge	673	0.037	-	-	0.000	1.000
Counseling	673	0.073	-	-	0.000	1.000

Note: Descriptive statistics at the extracted estimate-level, meaning we consider the total of 673 treatment effects reported in 76 RCTs. [□]

Trim and Fill



Publication type

Table B11: Treatment effects by type of publication

	Effect size (g)	SE	95% CI Lower bound	95% CI Upper bound	n(Studies)	n(effects)
Panel A: Treatment effects on <i>financial behaviors</i>						
<i>(a) By type of publication</i>						
Top econ/finance Journals	0.0833	0.0235	0.0325	0.1342	15	161
Other Journals	0.1222	0.0311	0.0583	0.1861	31	160
<i>(b) Published vs. unpublished</i>						
Published in Journal	0.1062	0.0203	0.0651	0.1473	46	321
Published as Working Paper	0.0902	0.0189	0.0500	0.1305	18	137
Panel A: Treatment effects on <i>financial knowledge</i>						
<i>(a) By type of Journal</i>						
Top econ/finance Journals	0.1572	0.0379	0.0648	0.2497	8	46
Other journals	0.2305	0.0499	0.1267	0.3343	23	112
<i>(b) Published vs. unpublished</i>						
Published in Journal	0.2091	0.0383	0.1305	0.2877	31	158
Published as Working Paper	0.1958	0.0271	0.1383	0.2533	19	57

Notes: Results from (random-effects) RVE.

Bayesian hierarchical analysis

Table B4: Results from Bayesian Hierarchical Models (BHM)

Outcome	Model	Posterior mean [95% uncertainty interval]	Hyper SD [95% uncertainty interval]	I ² [95% uncertainty interval]
Financial behaviors (n= 64 studies)	Partial pooling	0.090 [0.067, 0.117]	0.081 [0.057, 0.111]	36% [22%, 52%]
	Full pooling	0.055 [0.05, 0.059]	-	-
Financial knowledge (n=50 studies)	Partial pooling	0.210 [0.159, 0.264]	0.160 [0.12, 0.21]	67% [54%, 77%]
	Full pooling	0.159 [0.145, 0.174]	-	-

Notes: Results from fitting Bayesian Hierarchical Models in *Stan* using the R package *baggr* by Wiecek and Meager (2020). The “partial pooling” model fits a Rubin model whereas the “full pooling” model assumes no heterogeneity in true effects by definition (see discussion of the common effect assumption in the main text). All estimations rely on synthetic effect sizes (one summary treatment effect estimate per study) and use the default (i.e., very weak) Gaussian priors which assume that treatment effects are small unless the data provides evidence to the contrary.

Extraction and standardization of effect sizes

- Coding of effect sizes (Hedges' g) and corresponding standard errors

- $g = \frac{M_T - M_C}{SD_p}$

- $SE_g = \sqrt{\frac{n_T + n_C}{n_T n_C} + \frac{g^2}{2(n_T + n_C)}}$