Educate or automate?

The role of information and default nudges in sustainable investing

Marcel Seifert, Stefan Palan, Florian Spitzer, Erich Kirchler & Katharina Gangl

Institute for Advanced Studies (IHS)

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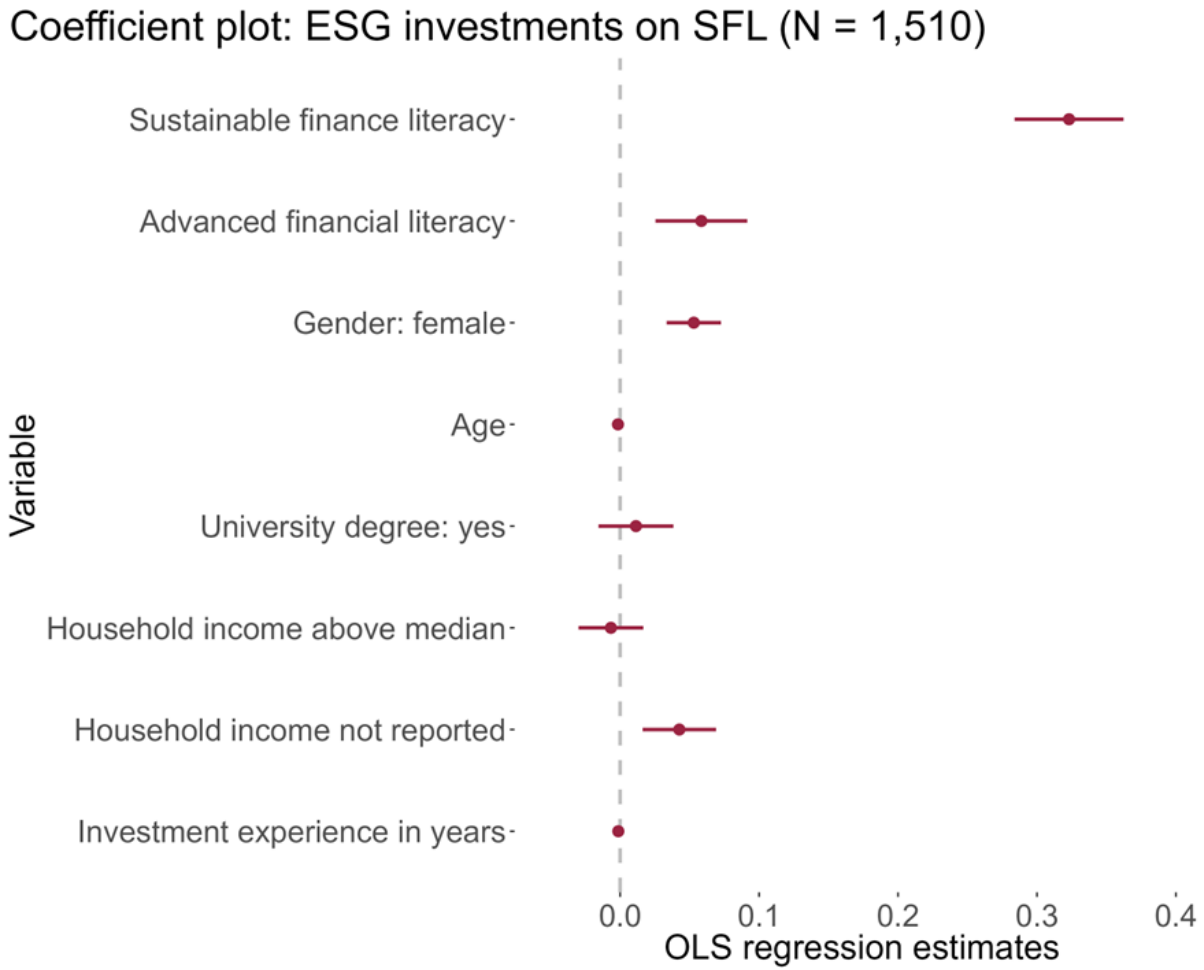
Background

- ESG investing is growing fast (UNDP, 2023; UNFCCC, 2018)
  - Adds complexity to investment decisions (Löfgren & Nordblom, 2024; Pedersen et al., 2021)
- Sustainable investing requires understanding ESG terms, regulation, risks, and impact (Seifert et al., 2024a)
- Traditional financial literacy, however, overlooks sustainability (e.g., Lusardi & Mitchell, 2008, 2014; van Rooij et al. 2011)

Sustainable Finance Literacy (SFL) (Filippini et al., 2024a, Seifert et al., 2024b)

…. *Knowledge about sustainable finance and ESG investments, including its fundamental terms, regulatory frameworks, products, strategies, …*

Prior Findings – Why SFL Matters (Seifert et al., 2024b)



- **High SFL is related to**
  - +31 pp in sustainable investments
  - +29 pp in stock market investments
    - Perceived immorality (Briere et al., 2021)
  - -15 pp in greenwashed investment
  - 4x better identification of a potentially greenwashed fund
- **SFL** explains behavior **beyond** advanced **financial literacy**
  - Among investors and non-investors

Research Gaps – What We Still Don't Know

- **Most financial education is lengthy and has limited behavioral impact**
  - Just-in-time at a teachable moment (Fernandes et al., 2014; Kaiser & Menkhoff, 2017)
- **Short SFL trainings are promising – but little causal evidence** (Auzepy et al., 2024; Filippini et al., 2024b)
- **Effectiveness across training formats (brochure, video, quiz) unknown** (Ambuehl et al., 2022; Heinberg et al., 2014; Isler et al., 2022; Lusardi et al, 2017)
- **Default nudges work – but do they lead to better or more sustainable decisions?** (Isler et al., 2021; Gajewski et al., 2022)
- **Existing studies rarely link SFL to broader financial behaviors** such as
  - Greenwashed investments (Gatti et al., 2021; Kleffel & Muck, 2023)
  - Stock market investments
- **It remains unclear which psychological channels translate SFL into behavior**
  - Perceived risk (Wang et al., 2011), Self-efficacy (Lusardi et al., 2017), Perceived immorality (Dobni & Racine, 2015; Briere & Ramelli, 2021)

Research Questions

- ***RQ1:*** *Which mode of SFL training (quiz, video, brochure) most effectively increases literacy?*
- ***RQ2:*** *Does higher SFL lead to more stock market and ESG investments – and fewer greenwashed investments?*
  - ***RQ2.1:*** *Which mode of SFL training affects those behaviors most effectively?*
- ***RQ3:*** *Are SFL training interventions more effective than a default nudge?*
- ***RQ4:*** *Through which psychological channels does SFL affect behavior? (e.g., risk perception, self-efficacy, perceived immorality)*

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Study Design: Experimental Conditions

- **Sample: *N* = 1,790** (Austria; representative with regards to age, gender, education)
- Randomly assigned to one of six conditions

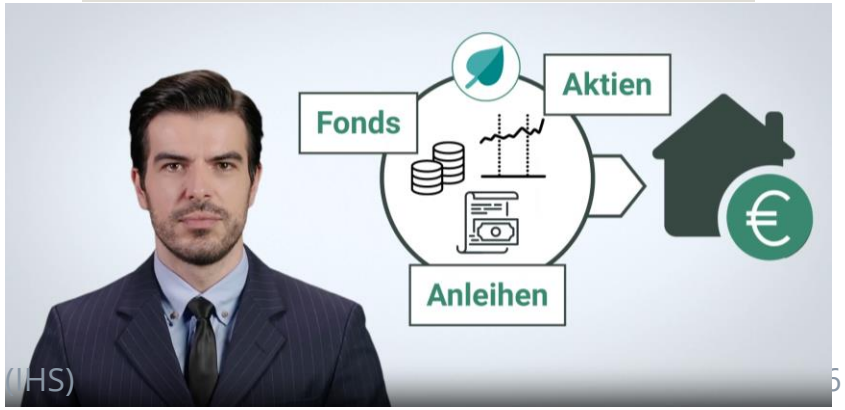
SFL interventions (~ 3 minutes)			Comparison conditions		
Quiz interactive + feedback	**Video** narrated, animated	**Brochure** static text + visuals	**Default** 100% pre-allocated	**Placebo control** Loan brochure	**Neutral control II** No information

Quiz with feedback

Question 7. The abbreviation ESG stands for Environmental, Social and Governance.

Your choice: False
This answer is unfortunately not correct. The correct answer is „True". ESG stands for Environmental, Social, and Governance. […]

Video



Study Design: Incentivized Investment Decision

- Identical to previous incentivized setup (Seifert et al., 2024b)
- Participants allocated 500€ across:
  - 4 equity funds (A, B, C, D)
  - 1 savings account

- **Fund characteristics**
  - **Fund C:** Marketed as sustainable (Article 8) but faced greenwashing allegations
  - **Fund D:** Sustainable fund (Article 9, Austrian Eco-Label)
  - All **other attributes** (fees, risk, performance) held **constant**

Fund	Fund A	Fund B	Fund C	Fund D	Savings account
Short description	This fund invests in equity and equity-related securities of small and mid-cap companies in the energy sector and seeks capital growth.	This fund invests in companies in the oil & gas, service, power, gas, and other sectors of the energy industry.	This fund invests in companies through which investors make targeted investments to achieve climate goals and help counteract climate change through targeted investing.	This fund invests in companies that seek to reduce energy-related greenhouse gases and/or are sustainable according to ESG criteria.	This savings account offers the opportunity to invest money for one year tied at a fixed rate of interest.
Sustainability-related disclosure according to SFDR	Article 6 - Fund without consideration of sustainability criteria	Article 6 - Fund without consideration of sustainability criteria	Article 8 - Fund that considers environmental or social characteristics	Article 9 - Fund that has a sustainable investment objective	-
Sustainability label	none	none	none	Austrian Eco-Label (UZ49), FNG-Label	-
Cumulative performance over the last 3 years	more than 12%	more than 12%	more than 12%	more than 12%	2% interest per year
Risk and return profile	Medium risk	Medium risk	Medium risk	Medium risk	-
Fund volume (in euros)	> 136 million	> 136 million	> 136 million	> 136 million	-
Fees	ca. 2% per year	ca. 2% per year	ca. 2% per year	ca. 2% per year	none
Geographical orientation	global	global	global	global	not specified
Compliance with EU-taxonomy	0% taxonomy-compliant	0% taxonomy-compliant	0% taxonomy-compliant	31% taxonomy-compliant, 50% taxonomy-able	not specified
Cleanvest ESG-Rating (1 = low, 10 = high)	5,6 out of 10	5,2 out of 10	7,0 out of 10	8,2 out of 10	not specified
Carbon intensity (per million US-Dollars invested)	327.3 tons	199.8 tons	241.1 tons	163.3 tons	not specified
Top 10 holdings (share of fond volume in %)	Galp Energia (6,5%) USD Cash (4,38%) Ovinitiv Inc (3,87%)	Baker Hughes (5,27%) Equinor Asa (4,97%) Totalenergies (4,71%)	Darling Ingredients (3,63%) Republic Services (3,41%) Schneider Electric (2,89%)	ON Semiconductor (5,42%) EUR Cash (4,65%) Wolfspeed (4,22%)	

Study Design: Incentivized Investment Decision

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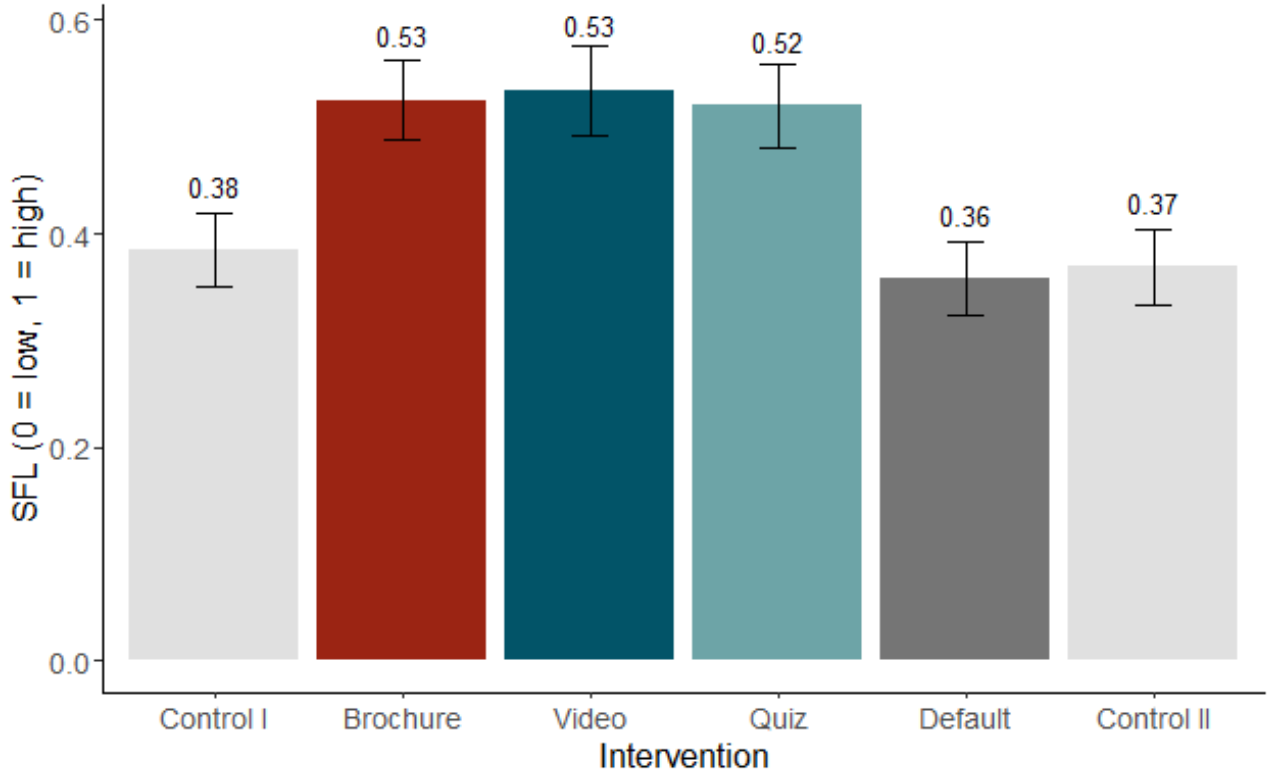
Study Design: Outcomes & Psychological Channels

- **Behavioral outcomes**
  - Stock market investments: % in funds
  - Sustainable investments: % in sustainably marketed funds (C & D)
  - Greenwashed investments (GW): % in potentially greenwashed fund (C)
    - Change in allocation after greenwashing disclosure (revised decision)
- **Literacy**
  - SFL score (3 items; pre/post intervention)
  - Advanced financial literacy (3 items; van Rooij et al., 2011)
- **Mechanisms (pre/post)**
  - Risk perception (Wang et al., 2011)
  - Self-efficacy (Lusardi et al., 2017)
  - Perceived immorality (Dobni & Racine, 2015)
  - ESG return & impact beliefs (Riedl & Smeets, 2017)

Literacy Gains (*H1*)

- All three **SFL formats significantly improved SFL** by ~ 11-15 pp ($p < 0.001$)
- **No difference** between quiz, video, and brochure (Wald test $p > 0.4$)
- Default and control → no effect
- SFL groups showed fewer "I don't know" answers → higher confidence



Sustainable Investments Increase (*H2*, *H3*)

- All **SFL formats significantly increased SI** by ~ 6-13 pp
- **No major difference** between formats (Wald test $p > 0.06$)
- Default also effective, but without improving understanding
- **Post-SFL score** strongly predicts SI

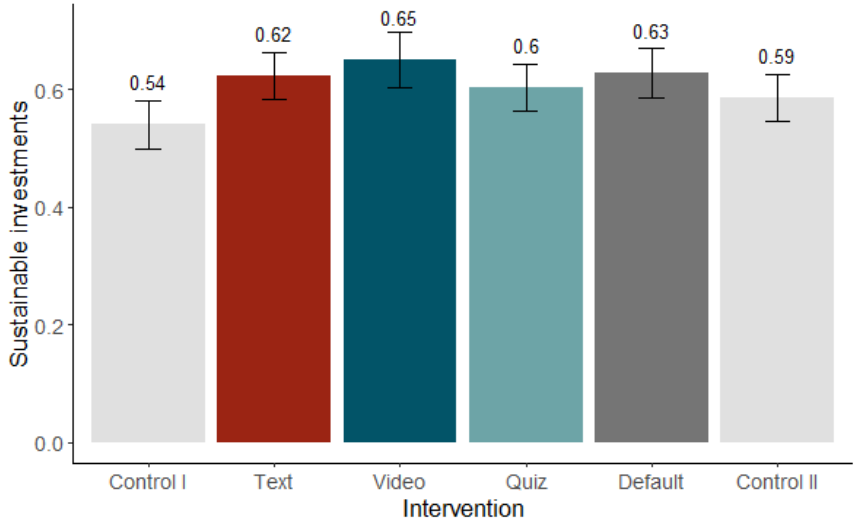


Table. OLS-regressions of sustainable investments on treatments.

	(1)	(2)	(3)	(4)
Brochure	0.084**	0.098***		
	(0.029)	(0.026)		
Video	0.109***	0.131***		
	(0.031)	(0.028)		
Quiz	0.063*	0.077**		
	(0.030)	(0.027)		
Default	0.087**	0.113***		
	(0.029)	(0.026)		
Control II	0.046	0.054*		
	(0.029)	(0.026)		
SFL3 (pre)		0.069*		0.028
		(0.030)		(0.034)
SFL3 (post)			0.197***	0.085**
			(0.026)	(0.031)
AFL (post)		0.076**		0.057*
		(0.027)		(0.028)
Constant	0.539***	0.168+	0.515***	0.233**
	(0.020)	(0.090)	(0.014)	(0.088)
N	1790	1790	1790	1790
R2 Adj.	0.006	0.191	0.031	0.182
Controls	-	X	-	X

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

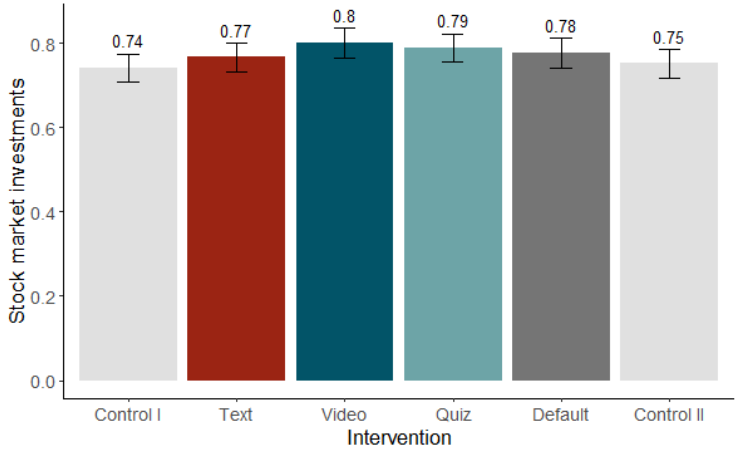
Stock Market Investments (*H2*, *H3*)

Table. OLS-regressions of stock market investment on treatments.

	(1)	(2)	(3)	(4)
Brochure	0.025	0.036+		
	(0.024)	(0.022)		
Video	0.059*	0.063**		
	(0.026)	(0.023)		
Quiz	0.047+	0.061**		
	(0.025)	(0.022)		
Default	0.036	0.062**		
	(0.024)	(0.022)		
Control II	0.010	0.025		
	(0.024)	(0.022)		
SFL3 (pre)		0.086***		0.054+
		(0.024)		(0.028)
SFL3 (post)			0.165***	0.063*
			(0.021)	(0.025)
AFL (post)		0.057*		0.043+
		(0.023)		(0.023)
Constant	0.742***	0.492***	0.697***	0.532***
	(0.017)	(0.067)	(0.012)	(0.066)
N	1790	1790	1790	1790
R2 Adj.	0.001	0.208	0.032	0.207
Controls	X	X	-	X

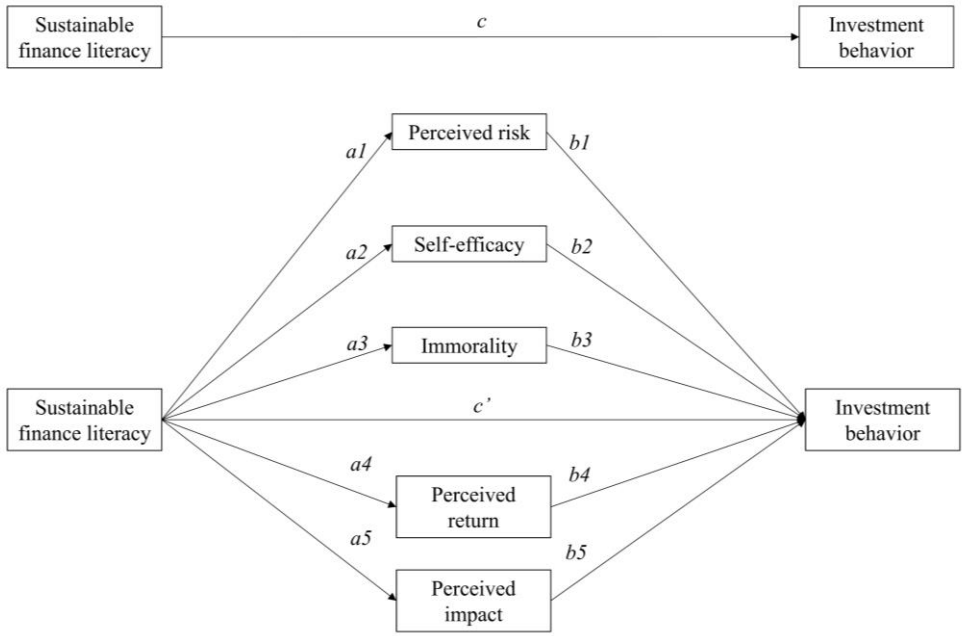
+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

- **Video** ↑ stock market investments by ~ 6 pp
- **Quiz** showed mixed but positive effects
- **Brochure** → no effect
- **Post-intervention SFL** predicts stock investments, even after controls
- **AFL weaker or no predictive value**
- **No major format difference** (Wald test $p > 0.2$)



Mechanisms of Change (*H4*)

Figure. Conceptual framework of the mediation model.



- SFL interventions (esp. video) reduced perceived risk and immorality, and increased self-efficacy
- Default nudge had no positive effect on beliefs — and lowered self-efficacy for some
- Belief change is a key channel linking SFL to investment behavior

Table Mediation analysis: Direct and indirect effect of SFL on investment behavior.

	Stock market investment		Sustainable investment	
	Coefficient	% of total	Coefficient	% of total
Direct effect				
SFL	0.123***	75.54	0.096***	48.73
Indirect effect				
Perceived risk	-0.007	-4.24	0.012**	6.09
Self-efficacy	0.011**	6.67	0.008**	4.06
Immorality	0.006*	3.63	0.034***	17.26
Perceived return	0.001*	0.61	0.001	0.51
Perceived impact	0.031*	18.79	0.045***	22.84
Combined indirect effect	0.042***	25.45	0.101***	51.27
Total (direct + indirect)	0.165		0.197	
N	1,790		1,790	

Greenwashed Investments (*H2*, *H3*)

- **SFL** interventions did not directly reduce greenwashed investments
- **BUT: Higher post-SFL → lower** investment in Fund C (greenwashed)
- Interesting: Opposite effect of quiz
- SFL is a key driver of greenwashed investment and **identification**

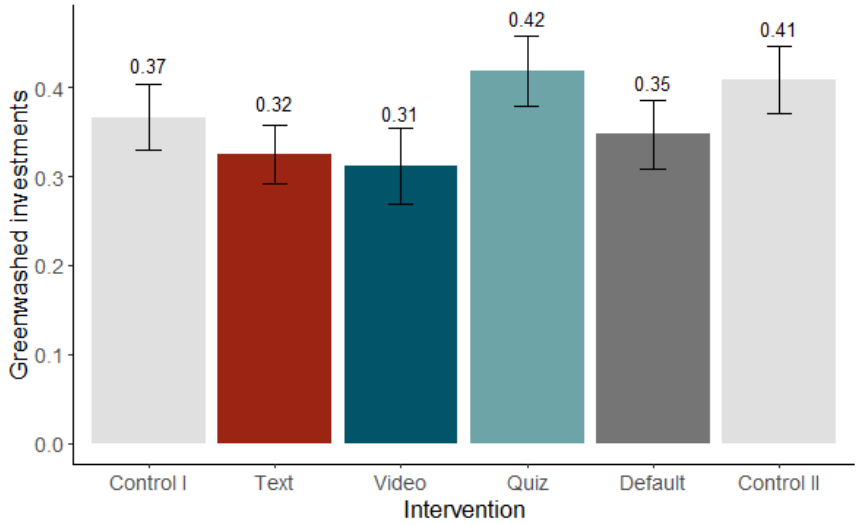


Table. Logistic regressions of identifying potential greenwashing on treatments.

	(1)	(2)	(3)	(4)
Brochure	-0.160	-0.160		
	(0.193)	(0.207)		
Video	-0.046	-0.048		
	(0.204)	(0.219)		
Quiz	-0.139	-0.167		
	(0.194)	(0.208)		
Default	-0.459*	-0.455*		
	(0.200)	(0.214)		
Control II	-0.218	-0.198		
	(0.192)	(0.206)		
SFL3 (pre)		1.176***		0.860***
		(0.228)		(0.258)
SFL3 (post)			1.515***	0.603*
			(0.182)	(0.237)
AFL (post)		0.819***		0.714**
		(0.232)		(0.237)
Constant	-0.693***	-1.811*	-1.612***	-2.239**
	(0.135)	(0.746)	(0.112)	(0.734)
N	1458	1458	1458	1458
R2 Adj.	0.002	0.062	0.040	0.067
Controls	X	X	-	X

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Revised Investment After Learning About Greenwashing

- Even after greenwashing disclosure, most (~63%) did not revise their investments in Fund C (*N* = 1,019)
- **Main reasons**
  - Focus on returns
  - Skepticism or disinterest
  - Effort avoidance
- **Reallocation**
  - Away from Fund C (-81%) …
  - … to genuinely sustainable Fund D (+51%)
  - Slight decline in stock investment (-3.3 pp) and sustainable investment (-12 pp)

Table. Comparison of participants who revised and did not revise their investment.

	Revision (N = 379)	No revision (N = 640)	p-value
Sustainable finance literacy (post)	0.51 (0.31)	0.41 (0.34)	< 0.001
Advanced financial literacy (post)	0.78 (0.26)	0.61 (0.35)	< 0.001
Gender (female)	1.58 (0.49)	1.49 (0.50)	0.004
Age	49.72 (17.33)	45.38 (17.03)	< 0.001
Biospheric Values	5.99 (0.99)	5.51 (1.26)	< 0.001
Risk taking	3.37 (1.31)	3.64 (1.43)	0.002
Patience	5.00 (1.09)	4.70 (1.27)	< 0.001
General trust	3.24 (1.47)	2.99 (1.44)	0.008
Left wing views	4.18 (1.22)	3.87 (1.21)	< 0.001
Perceived risk SI (post)	3.88 (1.03)	4.04 (1.19)	0.022
Self-efficacy SI (post)	4.78 (1.23)	4.56 (1.23)	0.006
Perceived immorality SI (post)	2.64 (1.25)	3.25 (1.31)	< 0.001

Summary and Practical Implications of Findings

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- **Summary**
  - SFL training interventions ↑ literacy and behavior – especially **video**
  - **Default** nudges ↑ ESG investing, but with **no literacy gain**
  - No format outperformed others in improving knowledge
  - **Post-SFL**, not just the treatments, predict more sustainable decisions
  - **Greenwashed investment** persists – knowledge helps but is not enough

- **Practical implications**
  - Embed short SFL education:
    - Financial advice / Robo-advisor platforms
  - Format can be flexible – **just in time** delivery is crucial (Fernandes et al., 2014)
  - Policy tools that inform – not just nudge – may better support sustainable financial decisions

Conclusion

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Short educative nudges build **confidence, literacy, and sustainability**

Defaults shift behavior – but do not inform

Brief education fosters informed, sustainable decisions — an essential foundation for **resilient financial behavior**

SFL matters: for research and practice

INSTITUT FÜR HÖHERE STUDIEN
INSTITUTE FOR ADVANCED STUDIES
Vienna

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Thank you!

Marcel Seifert
seifert@ihs.ac.at
Tel: +43 1 59991 243

Institute for Advanced Studies (IHS)
Josefstädterstraße 39, 1080 Wien
http://www.ihs.ac.at/

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