

# Five steps to planning success: experimental evidence from US households

Aileen Heinberg,\* Angela Hung,\*\* Arie Kapteyn,\*\*\*  
Annamaria Lusardi,\*\*\*\* Anya Savikhin Samek,\*\*\*\*\*  
Joanne Yoong\*\*\*\*\*

**Abstract** While financial knowledge has been linked to improved financial behaviour, there is little consensus on the value of financial education, in part because rigorous evaluation of various programmes has yielded mixed results. However, given the heterogeneity of financial education programmes in the literature, focusing on ‘generic’ financial education can be inappropriate and even misleading. Lusardi (2009) and others argue that pedagogy and delivery matter significantly. In this paper, we design and field a low-cost, easily-replicable financial education programme called ‘Five Steps’, covering five basic financial planning concepts that relate to retirement. We conduct a field experiment to evaluate the overall impact of Five Steps on a probability sample of the American population. In different treatment arms, we quantify the relative impact of delivering the programme through video and narrative formats. Our results show that short videos and narratives (each takes about 3 minutes) have sizeable short-run effects on objective measures of respondent knowledge. Moreover, keeping informational content relatively constant, format has significant effects on other psychological levers of behavioural change: effects on self-efficacy are significantly higher when videos are used, which ultimately influences knowledge acquisition. Follow-up tests of respondents’ knowledge approximately 8 months after the interventions suggest that between one-quarter and one-third of the knowledge gain and about one-fifth of the self-efficacy gain persist. Thus, this simple programme has effects both in the short run and medium run.

**Keywords:** financial literacy, retirement planning, learning via narratives and videos

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\* Independent consultant, e-mail: [aheinberg@gmail.com](mailto:aheinberg@gmail.com)

\*\* RAND Corporation, e-mail: [ahung@rand.org](mailto:ahung@rand.org)

\*\*\* USC Dornsife Center for Economic and Social Research, e-mail: [kapteyn@dornsife.usc.edu](mailto:kapteyn@dornsife.usc.edu)

\*\*\*\* George Washington University School of Business, e-mail: [alusardi@gwu.edu](mailto:alusardi@gwu.edu)

\*\*\*\*\* University of Wisconsin-Madison, e-mail: [anyasamek@gmail.com](mailto:anyasamek@gmail.com)

\*\*\*\*\* National University of Singapore and RAND Corporation, e-mail: [jyoong@rand.org](mailto:jyoong@rand.org)

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## I. Introduction

In the United States, individuals are increasingly being asked to be in charge of their financial security throughout their lifetime and after retirement. Despite this shift to individual responsibility, many workers are not planning for their retirement (Lusardi, 1999; Lusardi and Beeler, 2007; and Lusardi and Mitchell, 2007, 2009, 2011a,b). Multiple streams of research have linked financial knowledge to better retirement planning and successful wealth accumulation (Lusardi and Mitchell, 2007, 2009, 2011a; Hung *et al.*, 2009; Stango and Zinman, 2009), and a growing body of evidence strongly suggests that the causality runs from financial literacy to behaviour rather than the other way around (Lusardi and Mitchell, 2014). While financial literacy has been convincingly linked to improved financial behaviour, basic understanding of economics and finance remains low both among the general population and across age, income, and education levels (Hung *et al.*, 2009; Lusardi *et al.*, 2010; Lusardi and Mitchell, 2014).

There is, however, little consensus on the value of financial education, in part because comparative assessment of the gamut of existing programmes has yielded mixed results. There is considerable variation in methodology and programme types across studies, and, as Lusardi (2008, 2009) and others have argued, pedagogy, intensity, and format may matter significantly in explaining different findings. A key next step is therefore to move beyond a potentially misleading discussion of *whether* ‘generic’ financial education works, towards an understanding of *how* to make financial education work through better design and appropriate delivery methods. Bernheim and Garrett (2003) and Bayer *et al.* (2009) show that programmes that only distribute printed material such as newsletters have little effect on participation in retirement savings plans. Duflo and Saez (2003) find relatively small impact from a one-time retirement benefits fair, while both Clark and D’Ambrosio (2008) and Bernheim and Garrett (2003) find some effects on behaviour when employers offer single or occasional retirement seminars. However, when seminars are frequent, participation in retirement savings plans does significantly increase (Bernheim and Garrett, 2003). Lusardi and Mitchell (2009) and Bernheim *et al.* (2001) find evidence that financial education courses that are a mandated part of formal high school curricula lead to more savings and better retirement planning outcomes in later life. While there is little doubt that financial education done properly can work, the issue of cost-effectiveness remains: with these relatively traditional delivery models, there is a clear trade-off between efficacy and ease of implementation: Intensive interactive programmes are more costly in terms of money and time, may not scale easily, may not be easily accessible by a wider audience, and often by design appeal to only a small target demographic.

In this paper, we design and experimentally evaluate a financial education programme called Five Steps that draws on insights from psychology to more effectively deliver information about five core financial concepts underlying retirement planning. A thriving literature in this field demonstrates the power of behavioural economics to affect households’ financial decisions. Benartzi and Thaler (2004) and Ashraf *et al.* (2010) build on inertia and the desire for precommitment to design more effective savings products, while Bertrand *et al.* (2010) use principles of persuasive advertising to motivate a series of advertising content treatments promoting the take-up of consumer credit. We apply the same approach to financial education: Five Steps was explicitly developed using psychological principles to increase appeal and motivate behavioural

change, while keeping to a format suitable for easy, low-cost replication and mass dissemination.

We use a field experiment to evaluate the overall impact of Five Steps on a probability sample of the American population. In different treatment arms, we quantify the relative impact of delivering the programme through video and narrative formats. The results of the paper demonstrate the effectiveness of using simple precepts from psychology and marketing to enhance financial education and the need to take seriously features of programme design and delivery beyond simply informative factual content.

The rest of the paper proceeds as follows. Section II provides a review of the literature related to our work. Section III describes the economic and psychological theory behind the development of the Five Steps programme and the intervention itself, and a conceptual framework for evaluating the effectiveness of the programme. Section IV details the experimental approach used to evaluate the programme. Section V presents the results of the intervention. Section VI considers how much of the effects remain in a follow-up test some 8 months after the intervention. Section VII discusses implications for future work and concludes.

## II. Review of related literature

A review of the related literature (summarized in [Table 1](#)) highlights the need for more field experiments to learn about the effectiveness of financial education programmes. The main drawback of the existing literature is that a systematic evaluation to assess which type of education is most promising has not been conducted since, for the most part, each paper has evaluated a different programme in a different setting.

The different education programmes that have been evaluated using field experiments have involved financial education classes for adults ([Drexler \*et al.\*, 2010](#); [Song, 2011](#); [Collins, 2013](#); [Barcellos \*et al.\*, 2014](#)), retirement benefit fairs for employees ([Duflo and Saez, 2003](#)), online education ([Gartner and Todd, 2005](#); [Lusardi \*et al.\*, 2014](#); [Moulton \*et al.\*, 2013](#)), and youth financial education ([Bernheim \*et al.\*, 2001](#); [Bechetti \*et al.\*, 2011](#); [Lührmann \*et al.\*, 2012, 2014](#); [Bruhn \*et al.\*, 2013](#)). Some of these papers have involved specialized samples, which are limited in their external validity; for example, in [Collins \(2013\)](#), the population studied was residents in subsidized housing. Moreover, many of the papers conducted evaluations in developing countries, which may not generalize to developed countries (these include [Drexler \*et al.\*, 2010](#); [Song, 2011](#); and [Calderone \*et al.\*, 2013](#)). Finally, despite best attempts, the authors of several papers have stated that small sample sizes and low participation rates make inference of causal effects a challenge (e.g. [Gartner and Todd, 2005](#); [Collins, 2013](#)).

Thus, it is not surprising that the results of the reported studies are mixed. For instance, when it comes to youth education, [Bernheim \*et al.\* \(2001\)](#) and [Bruhn \*et al.\* \(2013\)](#) report positive effects in the US and Brazil, respectively; [Lührmann \*et al.\* \(2014\)](#) find mixed effects, depending on the measure, in Germany; and [Bechetti \*et al.\* \(2011\)](#) find no effect for high school students in Italy. A similar result emerges for adult financial education. [Song \(2011\)](#) finds that financial education increases pension contributions among participants in China; [Barcellos \*et al.\* \(2014\)](#) find that financial education increases financial knowledge among recent immigrants to the US; while [Collins \(2013\)](#)

**Table 1:** List of related papers

<b>Authors</b>	<b>Year</b>	<b>Outlet</b>	<b>Programme description</b>	<b>Outcome measures</b>	<b>Findings</b>
Barcellos, Carvalho, Smith, and Yoong	2014	Working paper	Financial education for recent immigrants to the US, both immigrant-specific and general.	Financial knowledge, including immigrant-specific financial knowledge.	Immediate increases in financial knowledge, fade-out after 6 months.
Lührmann, Serra-Garcia, and Winter	2012, 2014	Working Papers	Youth financial education programme called My Finance Coach, administered in Germany.	Time preferences and self-reported measures such as interest in finance.	Less time inconsistency. Some impact on self-reported measures.
Lusardi, Samek, Kapteyn, Hung, and Heinberg	2014	NBER Working Paper	Interactive and static educational programmes tested on American Life Panel participants.	Understanding of risk diversification and financial confidence/self-efficacy.	Interactive tools work better than standard tools to explain risk diversification.
Moulton, Collins, Loibl, and Samek	2014	Working paper	Online tool MyMoneyPath, together with financial coaching for new homebuyers in Ohio	Administrative data on mortgage delinquency.	Combined programme seems to reduce delinquency, programmes not evaluated separately.
Bruhn, Leao, Legovini, Marchetti, and Zia	2013	Working paper	Financial education programme for youth in Brazil.	Financial knowledge and savings.	Increases financial knowledge and savings, 'trickle up' to parents.
Calderone, Mulaj, Sadhu, and Sarr	2013	Working paper	2-day training course in financial education for bank clients in India.	Savings rate, attitudes towards financial planning and financial literacy.	Effects on savings rates/attitudes, not on financial literacy.
Collins	2013	J. of Econ. Beh. and Org.	Financial education for individuals living in subsidized housing	Self-reported behaviours and savings/credit data.	Effects for self-reported behaviours but not savings/credit.
Bechetti, Caiazza, and Coviello	2011	Applied Fin. Econ.	Finance course for students in final year in high school in Italy.	Financial literacy and virtual demand for cash.	No effect of treatment.
Song	2011	Working paper	Financial education for Chinese citizens emphasizing compound interest.	Pension contributions and financial literacy.	Financial education increased pension contributions and financial literacy in the treated group.

Table 1: Continued

Authors	Year	Outlet	Programme description	Outcome measures	Findings
Drexler, Fischer, and Schoar	2010	AEJ: Applied Economics	A rule-of-thumb programme vs. standard based accounting training run by bank in Dominican Republic for loan clients.	Self-reported business practice and outcomes	Rule-of-thumb programme effective while standard training not effective.
Gartner and Todd	2005	Fed. Bank of Chicago	Credit card companies provided online education to credit card holders.	Credit repayment behaviour.	No change in behaviour, possibly due to low participation rate.
Duflo and Saez	2003	QJE	Employees rewarded for participation in benefits fair.	Enrolment in a Tax Deferred Account (TDA).	Increased enrolment among depts. where more workers were treated.
Bernheim, Garrett, and Maki	2001	JPUBe	Mandates for high school financial education (quasi-experiment)	Self-reported savings rates and exposure to curriculum.	Increased exposure to financial curricula and savings.

and Calderone *et al.* (2013) find positive effects on self-reported, but not other, measures in the US and in India, respectively. As reported in Gartner and Todd (2005), online education provided by credit card companies did not work, but the results were obscured by very low participation rates. The online education evaluated in Moulton *et al.* (2013) was complemented by financial coaching, which means that the authors could not separate the impact of each method.

Very few field experiments have compared different education programmes side by side, as we do in this paper. Most notably, Lusardi *et al.* (2014) explore several different educational approaches to improving financial literacy in the area of risk diversification, including online tools and videos. They report that the greatest promise lies in tools that emphasize some form of interaction or engagement. In addition, Drexler *et al.* (2010) explore the impact of a rule-of-thumb versus a standard financial education programme on self-reported business practices among loan clients in the Dominican Republic, finding evidence in favour of rules-of-thumb. However, it is not clear if the work of Drexler *et al.* (2010), which was conducted on potential entrepreneurs, would generalize to other environments and populations.

Moreover, few field experiments have investigated long-term impacts of financial education. In one of the few papers with long-term results, Barcellos *et al.* (2014) find fade-out of financial literacy 6 months post-treatment. The best paper in this area is Bernheim *et al.* (2001), since it includes the impact of youth education among adults, but this paper uses a quasi-experiment.

In our work, we evaluate the comparative efficacy of different methods of conveying information using a probability sample of the United States population. Moreover, we examine both the short-term and longer-term effects of our programme.

### III. Conceptual framework and programme development

The effectiveness of a financial education programme is normally judged on two levels: whether a programme successfully conveys information to its target audience, and whether it ultimately leads to behavioural change. In this paper, we focus on the former, but we also consider changes in hypothetical behaviour.

Although the financial education literature often recognizes that financial education is a choice made by individuals, the decision processes behind knowledge acquisition are not often studied in great depth. Exposing individuals to a financial education programme is by no means a guarantee of take-up—either in terms of actual programme participation or (in the case of programmes that are mandatory) actual learning conditional on participation. Meier and Sprenger (2013) argue that knowledge is a form of investment, the value of which lies in a positive excess return on that investment, and that consumers make the decision to participate in financial education based on their perception of this return. Similarly, Delavande *et al.* (2008) and Lusardi *et al.* (2013) model the returns on financial knowledge as a higher expected return on financial assets, with the cost of acquiring knowledge being a function of explicit payment and other factors, including inherent cognitive ability and effort.

Consider the following very simple conceptual framework: suppose that an individual has to exert effort  $e$  to gain financial knowledge  $k$ , such that the amount of knowledge gained  $k(e)$  and cost of effort  $c(e)$  are both increasing in  $e$ . The expected return on knowledge is  $E[U(k)]$  where  $U$  is also increasing in  $k$ . The net expected gain from expending effort is thus  $E[U(k(e))] - c(e)$ . Under standard assumptions about  $U$ , an individual will expend effort on financial education until the expected marginal return from the investment in knowledge is equal to the marginal cost of effort of acquiring that knowledge; i.e.  $E[U'(k) k'(e^*)] = c'(e^*)$ .

This simple formulation illustrates three possible ways to make a programme more effective for users, in the sense of ultimately increasing the optimal choice of knowledge  $k(e^*)$ .

- First, a programme should be *informative*. It should provide a high marginal return in terms of knowledge gains to a given amount of effort;  $k'(e)$  should be large.
- Second, a programme should be *accessible*. It should have a low marginal cost to a given amount of effort;  $c'(e)$  should be small. We note that this is not only in terms of explicit payment, but also in terms of disutility—programmes that are more inherently enjoyable may ultimately lead to greater knowledge gain.
- Finally, a programme should be *motivational*. It should increase the returns from acquiring a given amount of knowledge;  $U'(k)$  should be large. Choosing to deliver knowledge that is highly relevant (and hence has the potential to provide high returns) to individuals should itself be implicitly motivating. However, in practice, the degree of *ex ante* awareness among potential participants may not be sufficient. Behavioural economics suggests that motivation can be manipulated in multiple ways. For instance, the programme can incentivize participants by making utility gains more salient or more easily achievable: educating participants about the true benefits of financial knowledge or even providing direct financial incentives.

We have designed specific features of a financial education intervention with these three characteristics (*informative*, *accessible*, and *motivational*) in mind. More details on our programme are reported below.

### (i) Selecting informative content

To ensure that our programme is highly informative and likely to result in large benefits to a broad share of the population, we focused the content on five core concepts that underlie successful retirement planning and that have previously been identified in the literature as important, persistent basic knowledge gaps (Lusardi and Mitchell, 2014). The literature also suggests that behavioural factors contribute to these gaps. Taking behavioural factors into account, our programme aims to improve understanding of the following five core concepts.

#### *Compound interest*

Understanding the difference between simple and compound interest and how quickly interest accumulates can help individuals appreciate both the importance of starting to save early and the dangers of borrowing at very high interest rates. However, people seem to know little about interest compounding (Lusardi and Tufano, 2009a,b; Lusardi, 2012; Lusardi and Mitchell, 2014). Moreover, in what has been termed *future value bias* (Stango and Zinman, 2009), people tend to underestimate how quickly compound interest grows. This is a case of the more general exponential growth bias, in which people underestimate the growth of functions with exponential terms. This bias is strongly correlated with savings and portfolio choice.

#### *Inflation*

Individuals need to understand the potential reduction in purchasing power over time due to inflation in order to assess saving and borrowing decisions in real rather than nominal terms. This is particularly important given the long horizons typical in planning for retirement. Yet, young people seem to have little knowledge of the workings of inflation (Lusardi and Mitchell, 2014). Behavioural research also documents *money illusion*: people tend to think in terms of nominal rather than real monetary values, insufficiently taking into account the impact of inflation (Shafir *et al.*, 1997).

#### *Risk diversification*

Individuals should not put all of their eggs in one basket but should choose well-diversified portfolios and avoid investing in only one asset, particularly if that asset is their employer's company stock. In fact, the large majority of individuals exhibit little knowledge about risk diversification (Lusardi and Mitchell, 2014). Understanding of risk diversification seems also influenced by affect and heuristics. For example, people often rate *company stock*, the stock of their employer, as a safer investment than a diversified fund (Benartzi and Thaler, 2007). Even when spreading assets among several investments, 401(k) investors<sup>1</sup> often choose *naïve diversification*, with equity exposure tracking the relative number of equity funds in the menu of available funds (Benartzi and Thaler, 2001).

<sup>1</sup> In the US, a 401(k) plan is a defined-contribution (DC) pension account defined in subsection 401(k) of the Internal Revenue Code.

### *Tax treatment of retirement savings vehicles*

Retirement assets invested in tax advantaged vehicles such as 401(k)s and Individual Retirement Accounts (IRAs) benefit from tax exemptions on contributions, capital gains, or withdrawals, allowing for more rapid potential growth. Again, many individuals, even those working in financial institutions, display little knowledge of the effects of the tax treatment of retirement saving vehicles (Clark *et al.*, 2014a,b,c). Moreover, people possess *limited attention* and often do not deliberately consider and appropriately weight all features of complex decisions. The impact of taxes on decision-making, therefore, does not depend solely on their economic consequences, but also on the salience of these taxes (Congdon *et al.*, 2009).

### *Employer matches of defined contribution savings plans*

Many employers match (in different proportion, often one-to-one) the contributions employees make to retirement accounts, resulting in a much higher return on retirement savings. Failure to contribute up to the employer's matching threshold is often the equivalent of leaving money on the table. However, a large portion of individuals do not take advantage of their employer's full 401(k) matching contributions; evidence suggests this cannot be fully attributed to rational strategies. Choi *et al.* (2005) investigated a special case in which it was difficult to provide a normative explanation for failure to contribute up to the employer's matching threshold. They examined a group of individuals who could withdraw assets from their 401(k)s at any time without tax penalties and found that, even among this group, half contributed below the match threshold. Notifying employees about the existence of this matching opportunity in the context of three brief written survey questions did not significantly impact the contribution rate.

## **(ii) Lowering behavioural barriers**

To ensure that the programme materials were delivered with low technical and time burden on the user, we designed them to be accessible, engaging, and relatively brief. We also drew on several well-established principles of psychology and marketing.

Guided by Bandura's social cognitive theory (1989), we considered the role of self-efficacy in uptake of our educational programme. Self-efficacy refers to the subjective belief that one (rightly or wrongly) has the ability to complete a particular task in a way that will lead to a successful outcome. 'Learning self-efficacy', one's belief that one has the capacity to successfully learn from an educational programme, increases motivation to use such a programme. Since individuals are often intimidated by financial information, we took care to make our programme accessible in order to increase self-efficacy.

The five financial concepts were embedded in five simple, short stories that describe the concepts verbally and present the benefits of taking action. Each story explains elements of one of the financial principles, consists of dialogue between two people, and is written to convey information in a relatively light-hearted, positive manner. Each story focuses on a few simple take-away points related to the concept, and we minimize the use of complex jargon.

We adopted a narrative strategy in developing the programme material. In commercial advertising, adult education, and public health, narratives are an established means

of creating cognitive involvement and emotional immersion (Bruner, 1987; McDaniel *et al.*, 1996; Green and Brock, 2000; Davidhizar and Lonser, 2003; Norris *et al.*, 2005) and have been shown to outperform argument-based advertisements in improved comprehension for poor readers (Michielutte *et al.*, 1992).

While a main focus of the programme was on improving financial knowledge, we also aimed to provide that knowledge in a way that could have an impact on financial behaviour. According to social cognitive theory, bolstering self-efficacy beliefs fosters behaviour change. One way self-efficacy beliefs can be strengthened is through observing others successfully perform (or ‘model’) desired tasks and achieve desired outcomes (Bandura, 1989). We created narratives in which characters did just that: they accomplished desired tasks and achieved desired goals, even in the face of challenges. We included triumph over obstacles in the narratives because observing this type of persistence fosters a more resilient sense of self-efficacy. Moreover, observers are more strongly influenced by others when the observed and observer are similar. Therefore, our stories incorporate a focus on relatable situations and characters. As the content focus of Five Steps is on basic retirement planning, rather than catch-up strategies appropriate for those nearing retirement, we designed these features to be most relevant to young adults (going out, shopping, newly weds, workplace experiences) and our videos employed actors between the ages of 20 and 40. By having the models appear relaxed and in an everyday setting and explicitly emphasizing lack of stress in taking action in the scripted dialogue, we tried to make the intervention accessible and unthreatening, while at the same time imparting and reinforcing new information. It is worth noting that the use of behavioural modelling itself has been found to decrease anxiety in stressful situations more than purely informational materials alone (Gagliano, 1988).

Our programme design also applied other behavioural insights. The literature on present bias and time inconsistency documents that people often lack the self-control to take actions that will result in future benefits (for review, see Frederick *et al.*, 2002). This can manifest itself as a tendency to procrastinate when it comes to saving for retirement or taking up financial education itself, which has largely long-term benefits (Benartzi and Thaler, 2007; Meier and Sprenger, 2013). To counter this, we designed the intervention to emphasize short-term benefits, whether tangible or not (e.g. increased peace of mind), in order to make near-term benefits more salient.

Finally, wherever possible, as related to the individual stories, we employed insights from various aspects of the existing literature. For instance, because research indicates that people perceive free items as especially attractive (Shampanier *et al.*, 2007), when describing 401(k) contributions, employer matches were deliberately described as ‘free money’.

### (iii) Delivery models: videos versus narratives

As part of this study, we developed and produced our narrative-based materials using two alternative delivery methods: written narratives and videos.

While written materials are usually considered easy to disseminate, the online video increases the potential for efficient and scalable interventions. Online videos are rising in popularity; a report by the Pew Research Center (Purcell, 2010) when we started planning our work (and hence at the time of the survey) found that 69 per cent of

Internet users watched or downloaded videos online. The fixed cost of creating videos may be close to the cost of creating written/printed materials. However, with the rise of free Internet video-hosting services, the marginal cost of dissemination is rapidly becoming negligible. While many interventions currently rely on written pamphlets and materials, studies of health education have found higher user satisfaction with educational videos as compared to written materials (Jeste *et al.*, 2008; Armstrong *et al.*, 2011). Most important, while written narratives provide some degree of behavioural modelling, the direct visual experience provided by videos may have greater potential to provide the type of observational learning experience needed to have an impact on self-efficacy (Gist, 1989). Additionally, education research indicates that videos have the potential to create fertile opportunity for cognitive engagement (Kozma, 1991). As the popularity of online videos is an important potential new development in adult education, we sought to explore the relative impact of providing Five Steps through video versus written formats.

Videos and narratives were carefully matched on both informational content and stories, with the way concepts were explained closely mirrored in the two formats. Each of the five videos was approximately 3 minutes long. The narratives are reproduced in Appendix B, while the video links and titles (made available via YouTube.com, a leading free online video hosting service) are listed in Appendix C.<sup>2</sup>

## IV. Field experiment approach

The primary goal of the study was to develop and evaluate an innovative, engaging, and low-cost financial education programme. Our empirical methodology employs qualitative and quantitative methods to design and test the effectiveness of the financial education programme.

### (i) Qualitative study design

In order to qualitatively test the intervention materials and get feedback, as well as to gain insight on savings attitudes and behaviour, we first conducted two focus groups in Washington, DC, with young workers between the ages of 25 and 40. We were particularly interested in young adults' response to our intervention, as starting to apply knowledge of the financial concepts earlier in life could produce the greatest benefit, even though younger adults might consider retirement saving less relevant. The first focus group consisted of ten 'savers', or people who were already saving for retirement. The second group consisted of eight 'non-savers', or people who were not currently saving for retirement. This stratification allowed participants with similar experiences to feel more comfortable and engage in a useful discussion. Focus group participants were presented with each of the five stories explaining the financial concepts. They were shown two stories in video format only, two stories in written narrative format only, and one story in both video and written narrative formats. After each story, comments and feedback on the interventions were solicited and the groups concluded with a general

<sup>2</sup> The three appendices to this article are available online at <http://oxrep.oxfordjournals.org/lookup/suppl/doi:10.1093/oxrep/gru036/-/DC1>

discussion of the different presentation formats as well as how the information might motivate any behavioural changes.

While the focus groups provided us with a deeper understanding of the types of responses we may receive from a small group of savers and non-savers, they did not (and were not meant to) give us a great deal of understanding of programme effectiveness. Thus, we turn to the main empirical strategy in our paper: a field experiment in which we rigorously test the causal effects of the programme.

## (ii) Field experiment design

To quantitatively test the Five Steps programme, we designed a field experiment using the RAND American Life Panel (ALP), fielded from May through November 2010. At the time of the intervention, the ALP consisted of a sample of approximately 3,000 households who are regularly interviewed over the Internet. An advantage relative to most other Internet panels is that the ALP is a probability sample of the US population.<sup>3</sup> Data routinely collected via the ALP include a wide array of variables about household and individual demographics. In our sample, about 30 per cent of participants are below the age of 40, 55 per cent are 41–64 years old, and 15 per cent are 65+. The educational attainment is rather high—more than 40 per cent have a college degree—and 59 per cent are female. About 28 per cent have income below \$35,000, 40 per cent have income between \$35,000 and \$75,000, and 32 per cent have income above \$75,000.

In May 2010, all members of the ALP (regardless of age) were administered a baseline survey with a series of questions on topics related to our five concepts: (i) compound interest; (ii) inflation; (iii) risk diversification; (iv) tax treatment of retirement savings vehicles; and (v) employer matches of defined contribution savings plans. The questions are reproduced in [Appendix A](#). While the survey questions are multiple choice, we classify the correct answers as binary variables (correct or incorrect answers).

Respondents were randomly assigned to either the experimental or control groups. Starting in August 2010, all respondents participated in three successive survey waves, spaced 2 weeks apart. In each of the three waves, the experimental group was exposed to two educational interventions or ‘treatments’, with each treatment addressing one of the five concepts above, either in video or narrative form. This allowed all respondents in the experimental group to be exposed to each topic at least once (and to repeat one topic), while maintaining a reasonable length per session.

<sup>3</sup> ALP respondents participating in our experiments were recruited in one of three ways. Most were recruited from among individuals aged 18+ who were respondents to the Monthly Survey (MS) of the University of Michigan’s Survey Research Center (SRC). A subset of respondents (approximately 500) were recruited through a snowball sample; here respondents were given the opportunity to suggest friends or acquaintances who might also want to participate. Respondents without Internet (both in the Michigan sample and the snowball respondents) were provided with so-called WebTVs (<http://www.webtv.com/pc/>), which allow them to access the Internet using their television and a telephone line. The technology allows respondents who did not have previous Internet access to participate in the panel and furthermore use the WebTVs for browsing the Internet or using e-mail. A new group of respondents (approximately 500) were recruited after participating in the National Survey Project, created at Stanford University with SRBI. This sample was recruited in person, and at the end of their 1-year participation, participants were asked whether they were interested in joining the RAND ALP. Most of these respondents were given a laptop and broadband Internet access. For more information about the ALP sample recruiting methodology as well as access to the data collected in the ALP to date, see <http://mmic.rand.org>.

Further randomization of treatment order and format was implemented as follows.

- The order of topics was randomized with equal probability for all respondents.
- In one of the three survey waves (randomly selected with equal probability), the experimental respondent was exposed to both video and written narrative treatments covering the same topic (also in random order).
- For the other four topics, the respondent was randomly allocated to either the video or written narrative format with equal probability.

After each treatment, the respondents in the experimental group were asked the relevant questions from the baseline survey. In each survey wave, control respondents were also asked questions from the baseline survey in random order of topics, albeit with no intervention. In April 2011, the same quiz was administered again to all respondents, both experimental and control groups.

The effective result of this design was that every experimental respondent was exposed to each of the five topics in random order, and, for every topic but one, was exposed to either video (only) or narrative (only) format. For one randomly chosen topic, these respondents saw both the video and the written narrative. Importantly, respondents could not opt in or out of receiving a certain intervention.

The benefits of the randomization design lie in the power of causal inference. When estimating average effects of the programme by topic and format, we are able to pool the data, regardless of wave and treatment sequence. To estimate the programme effect, we can use a simple comparison of means that captures a difference-in-differences (DID) approach, in which changes in correct answers of the respondents exposed to videos or narratives (the treatment group) are compared to changes in answers in the control group.

Below, we discuss the short-run results. In section VI, we discuss the results of the 2011 follow-up test.

## V. Results

### (i) Qualitative focus group responses

Both the savers and non-savers described the programme's level of content difficulty as appropriate for themselves. The non-saver group found more of the information new, while savers found that the intervention reinforced and supplemented knowledge of concepts with which they were already somewhat familiar. Overall, group participants described themselves as not intimidated by the programme and also did not feel as though it talked down to them. The saver and non-saver groups expressed fairly similar thoughts on format differences. Some expressed keener interest in the videos as they did not require the work of reading, while others noted that they preferred having access to both formats. No one argued for written narratives alone.<sup>4</sup> Unprompted, focus group

<sup>4</sup> Some in the saver group suggested that the videos were more motivating and inspired them to take action. In response to the videos, one focus group members said, 'That made me want to run out and invest some money.' Another said that the videos were 'ready for television! Gonna be like, "Man, I need to start investing!"' People will definitely react to that'.

participants also described specific actions they planned to take as a result of viewing the videos, but no such plans were voiced as a result of interacting with the written narratives.<sup>5</sup>

## (ii) Field experiment results

Table 2 shows the percentage of correct answers to each of the questions at baseline (May 2010). Average baseline knowledge of these concepts varied significantly, with correct responses to some of the questions falling below 50 per cent. However, 92 per cent of respondents were able to answer the first question on compound interest correctly.

Table 2 further breaks down responses by gender, education, age, and income. More men answered questions correctly than women on every question at baseline, confirming the results of many other surveys on financial literacy (Lusardi and Mitchell, 2014). Similarly, respondents aged 18–40 performed worse than those aged 41–64 and worse than those aged 65 and older on all but two questions, again consistent with related research on financial literacy (Lusardi *et al.*, 2010; Lusardi and Mitchell, 2014). On every question, those with incomes below \$35,000 performed more poorly than those with incomes between \$35,000 and \$75,000, who in turn performed more poorly than respondents earning \$75,000 and above. The same pattern was found for education; respondents with high school diplomas or less performed more poorly on each question than respondents who attended some college, who in turn performed more poorly than those with college diplomas, as has been found to be the case in other work (Lusardi and Mitchell, 2014).

Table 3 shows the numbers of each treatment that were administered during each wave, by topic and medium (narrative or video). Wave 1 went to field in August 2010 and the surveys were closed on 3 November 2010.<sup>6</sup> Each written narrative/video was seen alone by between 1,427 and 1,497 respondents, while each topic was administered in the double format consisting of both the narrative and the video to between 1,017 and 1,082 respondents.

## (iii) Quantitative findings

Tables 4(a), (b), and (c) present a summary of performance in each of the five topic areas for the entire sample of respondents, aggregated across individual survey questions. Table 4(a) shows the results for objective knowledge questions (in terms of average

<sup>5</sup> One described starting a new job several months before and said, ‘I haven’t gotten around to filling out the 401(k) forms . . . I will be filling out those forms tomorrow.’ Another said, ‘Last year I got a new nephew and a godson so I think that I’ll open an account for each of them to begin the compound interest.’

<sup>6</sup> In principle, respondents can answer questions whenever it is convenient for them. Typically most respondents reply within the first 2 weeks of a field period. After 2 weeks a reminder is sent by e-mail to those who have not responded yet. This procedure is repeated 4 weeks after a survey goes to field. Generally, there is no reason to ‘close’ a survey, so that, for instance, even after 6 weeks responses still trickle in. In our experiment, 2 weeks after a respondent has answered the first wave, he or she becomes eligible for the second wave; 2 weeks after answering the second wave, he or she becomes eligible for the third wave. Thus depending on when respondents respond to a wave, they get asked to do a next wave. We kept waves in the field until 3 November 2010.

**Table 2:** Percentage of correct responses to each question at baseline by gender, age, income, and education ( $Y_0$ ).

Question	Gender		Age				Income			Education		
	All respondents	M	F	18–40	41–64	65+	<\$35k	>\$35k <\$75k	>\$75k	High school or less	Some college/ associate degree	College degree
<b>A. Compound interest</b>												
Ci2	91.66	94.80	89.47	87.33	92.76	95.15	85.04	92.87	95.57	83.41	90.63	96.59
Ci3	65.74	74.74	59.60	61.82	66.36	70.15	56.22	64.11	75.65	53.45	61.22	75.93
Ci4	71.10	81.70	63.75	65.53	72.67	75.06	57.41	71.47	81.90	52.27	66.48	84.49
Ci5	79.05	84.29	75.45	71.98	80.98	84.32	66.72	79.04	89.31	65.44	77.18	87.36
<b>B. Inflation</b>												
I2	79.91	81.70	78.64	78.36	80.52	80.46	74.29	79.59	85.01	73.00	78.47	84.59
I3	74.00	77.55	71.56	72.95	75.88	69.41	63.72	72.36	84.62	61.77	71.40	82.32
<b>C. Risk diversification</b>												
Rd2	73.67	80.15	69.13	63.21	77.63	77.69	62.20	75.77	80.57	62.63	71.10	81.39
Rd3	72.71	82.52	65.99	62.69	76.11	77.89	57.26	73.72	84.35	54.43	67.90	86.02
Rd4	78.29	87.01	72.27	65.07	81.82	88.43	64.51	78.42	89.44	62.77	74.89	88.93
<b>D. Tax-favoured assets</b>												
Tf2	59.60	69.93	56.52	47.14	63.46	67.35	43.38	60.90	71.28	49.35	53.55	70.22
Tf3	43.20	46.47	40.98	36.32	45.53	46.79	38.17	44.02	46.54	34.85	42.14	48.19
Tf4	48.74	58.65	41.91	34.37	53.93	55.01	31.39	45.82	67.01	33.41	39.93	64.30
Tf5	65.60	72.53	60.80	50.62	71.41	70.95	48.66	65.45	79.66	50.65	62.34	75.85
<b>E. Employer match</b>												
Em2	46.35	55.98	39.70	40.68	48.13	49.74	32.02	45.28	59.84	33.33	39.93	58.65
Em3	45.86	50.78	42.43	45.05	46.83	43.96	32.65	46.74	55.54	33.33	41.05	56.42
EM4	70.70	77.29	66.06	62.42	74.10	72.94	56.31	71.06	82.11	55.75	67.94	80.43
EM5	81.87	86.49	78.62	70.32	85.93	87.40	68.30	82.48	92.17	71.00	79.56	89.25

percentage correct answers) and Table 4(b) shows the results for the self-efficacy questions (in terms of average self-efficacy score on a scale of 1–5, with 1 being the highest). The table shows a summary of the difference-in-differences treatment effect estimates (comparison of the mean changes in the treatment group and the mean changes in the control).

**Table 3:** Interventions, by medium and topic

Medium	Topic	Number of observations across all waves
Video (only)	Compound interest	1,462
	Inflation	1,444
	Risk diversification	1,474
	Tax-favoured assets	1,447
	Employer match	1,455
Narrative (only)	Compound interest	1,497
	Inflation	1,497
	Risk diversification	1,427
	Tax-favoured assets	1,447
	Employer match	1,470
Video and narrative	Compound interest	1,017
	Inflation	1,035
	Risk diversification	1,075
	Tax-favoured assets	1,082
Control group	Employer match	1,051
		642

Note: Total number of respondents equals 2,920.

**Table 4(a):** Difference-in-differences (DID) estimates of treatment effects on the percentage of knowledge questions correct by topic ( $Y_1 - Y_0$ ).

Question	Any Tx	Video only	Narrative only	Both
A. Compound interest				
Ci2	1.1	-0.19	0.61	0.96
Ci3	17.9**	8.32**	4.12*	6.2*
Ci4	6.54**	6.31**	-2.85	4.4
Ci5	8.05**	4.98**	2.31	-0.31
B. Inflation				
I2	-1.19	5.06**	-6.44**	1.05
I3	3.62	3.46	-0.67	0.85
C. Risk diversification				
Rd2	9.67**	3.16	0.62	7.64**
Rd3	12.4**	6.04**	3.18	2.93
Rd4	7.03**	1.38	4.97**	0.02
D. Tax-favoured assets				
Tf2	14.3**	7.26**	1.57	6.08**
Tf3	14.7**	3.72	5.34*	6.28*
Tf4	17.9**	7.54**	2.78	8.77**
Tf5	10.8**	3.54	4.98**	1.8
E. Employer match				
Em2	14.4**	3.59	3.17	9.86**
Em3	-3.82	-0.81	-1.91	-1.02
Em4	8.77**	3.7*	2.31	2.78
Em5	5.55**	1.43	2.49	1.55

Notes: 'Any Tx' means any treatment. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$  for two-sided T-tests.

**Table 4(b).** Percentage of questions correct on each topic at Baseline and at Wave 1, by intervention condition

Topic	Intervention	Mean (standard error)	
		Baseline	Wave 1
Compound interest	Control (no intervention)	76.28 (2.12)	74.29 (2.26)
	Any treatment	76.55 (1.22)	83.22 (1.16)
	Video (only)	74.16 (2.05)	82.30 (1.89)
	Narrative (only)	78.23 (1.83)	83.76 (1.74)
	Video and narrative	78.02 (2.62)	84.07 (2.78)
Inflation	Control (no intervention)	74.56 (2.53)	73.10 (2.66)
	Any treatment	78.52 (1.43)	77.34 (1.43)
	Video (only)	74.88 (2.37)	77.46 (2.22)
	Narrative (only)	80.30 (2.21)	76.35 (2.24)
	Video and narrative	82.81 (2.95)	79.17 (3.37)
Risk diversification	Control (no intervention)	73.67 (2.68)	75.80 (2.55)
	Any treatment	77.15 (1.42)	84.61 (1.22)
	Video (only)	77.78 (2.18)	86.07 (1.77)
	Narrative (only)	75.93 (2.42)	81.11 (2.28)
	Video and narrative	77.97 (2.97)	87.54 (2.35)
Tax-favoured assets	Control (no intervention)	59.11 (2.28)	41.00 (1.94)
	Any treatment	61.28 (1.32)	55.47 (1.02)
	Video (only)	57.92 (2.07)	56.90 (1.67)
	Narrative (only)	61.92 (2.12)	54.52 (1.60)
	Video and narrative	58.70 (2.90)	54.63 (2.11)
Employer match	Control (no intervention)	42.31 (2.01)	67.46 (2.26)
	Any treatment	41.96 (1.14)	72.86 (1.09)
	Video (only)	43.78 (1.81)	74.75 (1.75)
	Narrative (only)	41.79 (1.86)	71.57 (1.74)
	Video and narrative	39.06 (2.35)	71.88 (2.35)

The column headed ‘Any Tx’ shows means for all respondents presented with an intervention, including those who saw the video, read the narrative, or did both. The column headed ‘Video only’ refers to respondents who saw a video on a particular topic; similarly, the heading ‘Narrative only’ signifies that a respondent read a narrative about the topic. ‘Both’ indicates that a respondent was exposed to both a video and a narrative about the topic. Asterisks beside reported coefficients in all tables of results indicate statistical significance based on the application of two-sided T-tests.

Table 4(a) shows a number of significant positive treatment effects on objective knowledge, across all topics. In general, for topics on which respondents’ baseline knowledge was high (interest compounding/numeracy and both inflation questions), the programme had the least effect, while for topics on which baseline knowledge was modest (for example, the tax treatment of defined contribution (DC) plans) we observe consistently large treatment effects. Insignificant results are found for inflation and one employer match question, but in the first case results are somewhat inconsistent across format types and questions; in the second case, no effects are significant.

Overall, Table 4(a) shows that video-only treatments result in somewhat more positive effects than narrative-only treatments, but interestingly, one does not seem to strictly dominate the other for all questions. Also interestingly, and perhaps contrary to

**Table 4(c):** Difference-in-differences (DID) estimates of treatment effects on self-efficacy by topic ( $Y_1 - Y_0$ )

	Any Tx	Video only	Narrative only	Both
Compound interest	-50.4**	-36**	11.2**	-36.1**
Inflation	-50.1**	-43.8**	5.89	-12.9**
Risk diversification	-53.5**	-24.7**	-5.12	-28.7**
Task-favoured assets	-82.4**	-36.3**	-7.8	-46**
Employer match	-92.7**	-37.7**	-20.1**	-39.4**

Notes: 1= highest, 5 = lowest; entries are effects times 100. \*  $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$  for two-sided T-tests. Summary of DID estimates: point differences between treatment and controls

the focus group input, being exposed to both treatments does not seem to strictly dominate exposure only to videos or only to written narratives. Table 4(b) shows that these patterns hold when examining differences in mean knowledge scores, pooling across questions. Finally, in Table 4(c), we show that (again pooling questions together) the overall effects on self-efficacy appear to be positive and significant across all topics, with the largest gains related to tax treatment of DC plans and employer matches. However, format effects in this case are particularly interesting. In the area of self-efficacy, we clearly see that video appears to be more effective and consistently positive. For the written narratives, the effects are weaker. Being exposed to both videos and narratives has a stronger effect on self-efficacy than exposure to only the narrative. The comparison between video only or both video and narrative does not exhibit a clear pattern.

In general, the findings of our analysis indicate that Five Steps can effectively deliver knowledge and increase self-efficacy. The general results also support the hypothesis that video format can have greater effects on self-efficacy.

To save space we concentrate from now on the proportion of correct answers by domain (compound interest, inflation, etc.). Furthermore, since in the next section we present results for the second test, in April 2011, it is convenient to indicate outcome variables as follows:  $Y_0$  if outcomes refer to baseline measures;  $Y_1$  for outcomes obtained immediately after the intervention;  $Y_2$  for outcomes obtained in the April 2012 follow-up.

Table 5 presents treatment effects after controlling for background characteristics. Not surprisingly, a respondent's score on the quiz after the intervention is strongly related to his or her baseline knowledge. Nevertheless, this table confirms the findings shown in Table 4(a). With the possible exception of inflation, the interventions yielded a significant improvement in the knowledge of basic financial concepts.

Table 6 reports the findings of regressing the change in the percentage of correct answers on the various treatments and background characteristics. Apart from again showing highly significant effects of the interventions (with the exception of inflation), it also allows us to examine the hypothesis that behavioural modelling works best when subjects are similar to the models presented. It should be recalled that the content and modelling were targeted specifically at the 18–40 age group, a fact that would be made more salient in the videos where only actors in this age group were shown. There is, indeed, some weak evidence consistent with this hypothesis. Compared to the 18–40 group, the 65+ group shows a negative coefficient for four out of five domains, with one of these strongly significant (employer match). The remaining characteristics do not

**Table 5:** Treatment regressions explaining proportion of correct answers by domain ( $Y_1$ )

	(1)	(2)	(3)	(4)	(5)
	Compound interest	Inflation	Risk diversification	Tax-favoured assets	Employer match
Video	0.089 (0.012)**	0.036 (0.016)*	0.100 (0.013)**	0.144 (0.014)**	0.063 (0.012)**
Narrative	0.076 (0.012)**	-0.004 (0.016)	0.094 (0.013)**	0.128 (0.014)**	0.061 (0.012)**
Both	0.095 (0.015)**	0.031 (0.020)	0.105 (0.015)**	0.144 (0.016)**	0.080 (0.015)**
Has credit card debt	0.009 (0.009)	0.013 (0.012)	-0.003 (0.010)	-0.003 (0.010)	-0.007 (0.009)
41–64	0.059 (0.011)**	0.003 (0.014)	0.040 (0.011)**	0.086 (0.012)**	0.020 (0.011)
65+	0.064 (0.014)**	-0.022 (0.019)	0.071 (0.015)**	0.072 (0.016)**	-0.003 (0.014)
Some college/ associate degree	0.060 (0.013)**	0.058 (0.017)**	0.082 (0.013)**	0.052 (0.014)**	0.060 (0.013)**
College degree	0.102 (0.013)**	0.103 (0.018)**	0.091 (0.014)**	0.083 (0.015)**	0.096 (0.013)**
Female	-0.013 (0.009)	-0.031 (0.012)*	-0.013 (0.010)	-0.020 (0.011)	-0.002 (0.009)
\$35K–\$75K	0.030 (0.012)*	0.041 (0.015)**	0.067 (0.012)**	0.068 (0.013)**	0.052 (0.012)**
>\$75K	0.053 (0.013)**	0.067 (0.017)**	0.079 (0.013)**	0.062 (0.015)**	0.078 (0.013)**
Baseline	0.493 (0.018)**				
Baseline		0.380 (0.019)**			
Baseline			0.445 (0.016)**		
Baseline					0.407 (0.016)**
Constant	0.231 (0.021)**	0.372 (0.027)**	0.266 (0.020)**	0.157 (0.020)**	0.287 (0.019)**
Tax-favoured assets, baseline				0.441 (0.018)**	
Observations	2,275	2,298	2,285	2,279	2,302
R-squared	0.38	0.21	0.40	0.37	0.35

Notes: Standard errors in parentheses. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$  for two-sided T-tests.

**Table 6:** Treatment effects on changes in knowledge ( $Y_1 - Y_0$ )

	(1)	(2)	(3)	(4)	(5)
	Compound interest	Inflation	Risk diversification	Tax-favoured assets	Employer match
Video	0.098 (0.014)**	0.044 (0.020)*	0.101 (0.016)**	0.150 (0.017)**	0.063 (0.016)**
Narrative	0.075 (0.014)**	-0.011 (0.020)	0.102 (0.016)**	0.139 (0.017)**	0.066 (0.015)**
Both	0.094 (0.018)**	0.017 (0.024)	0.106 (0.019)**	0.158 (0.019)**	0.078 (0.019)**
Has credit card debt	0.016 (0.011)	0.015 (0.015)	-0.008 (0.012)	0.001 (0.012)	-0.016 (0.012)
41–64	0.037 (0.012)**	-0.001 (0.017)	-0.032 (0.014)*	0.016 (0.015)	-0.014 (0.013)
65+	0.018 (0.016)	-0.013 (0.023)	-0.030 (0.018)	-0.025 (0.019)	-0.050 (0.018)**
Some college/ associate degree	0.014 (0.015)	0.020 (0.020)	0.036 (0.016)*	0.017 (0.017)	0.020 (0.016)
College degree	0.015 (0.015)	0.030 (0.021)	-0.012 (0.017)	-0.008 (0.018)	0.003 (0.016)
Female	0.032 (0.011)**	-0.012 (0.015)	0.039 (0.012)**	0.019 (0.013)	0.041 (0.012)**
\$35K–\$75K	-0.010 (0.013)	0.006 (0.019)	0.007 (0.015)	0.011 (0.016)	-0.016 (0.014)
>\$75K	-0.006 (0.015)	-0.000 (0.021)	0.006 (0.016)	-0.034 (0.017)*	-0.029 (0.016)
Constant	-0.083 (0.020)**	-0.033 (0.028)	-0.018 (0.022)	-0.019 (0.024)	0.040 (0.022)
Observations	2275	2298	2285	2279	2302
R-squared	0.03	0.01	0.04	0.05	0.02

Notes: Standard errors in parentheses. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$  for two-sided T-tests.

appear to have had much of an impact on the effectiveness of the intervention, with the exception of gender. Women show significantly more improvement in knowledge than men for all domains, except inflation. We have also tested for interactions between age and the different treatments. Findings are not reported here owing to space constraints but can be summarized as follows. Significant interactions are only found for the risk diversification domain, where generally the effects are stronger for younger respondents and weaker for the 65+ category.

Tables 7 and 8 repeat the analysis of Tables 5 and 6 for self-efficacy. Self-efficacy improves in all domains and for all treatments, although the videos appear to be most effective, as observed before. At the bottom of Tables 7 and 8, we report p-values from formally testing for differences across treatment types, using two-tailed T-tests. These results reinforce the earlier findings about differences in treatments as reported in Tables 4(a)–(c).

The oldest group shows the smallest gain in self-efficacy, while females appear to gain more than men, and higher income respondents more than those with lower incomes. As with the knowledge question, we have also tested for interactions between age and the different treatments. The results (not reported) show no significant interactions.

## VI. Following up 8 months later

As of 8 April 2011, the participants in the experiment (both in the treatment and the control groups) were asked to take the same quiz again. This allowed us to investigate to what extent the positive effects found right after the intervention remain after some passage of time. Tables 9 and 10 are similar to Tables 6 and 8. Now, however, the dependent variable in each regression is the difference in percentage correct between baseline and April 2011 ( $Y_2 - Y_0$ ). It is immediately clear that far fewer treatment effects are significantly different from zero than when measured right after the intervention. In Tables 9 and 10 we also report the results of formal tests of the difference between treatment types; we again find fewer significant differences overall. Table 9 shows that for the video treatment, four out of five domains show significant effects, while for the narrative treatment only two out of five domains are statistically significant. Interestingly the video with narrative treatment is never significant. The various background characteristics are generally insignificant. Table 10 exhibits a pattern that is qualitatively similar to Table 9. The video treatment is more often significant (three out of five) than the narrative treatment (two out of five). Age interactions are all insignificant (not reported).

Table 11 provides a direct comparison between the short-run effects ( $Y_1 - Y_0$ ) and the longer-run effects ( $Y_2 - Y_0$ ). As a simple way to gauge how much of the initial effect remain, we also present  $(Y_2 - Y_0) / (Y_1 - Y_0)$ . For knowledge questions, the percentage of the initial effect that remains after about 8 months is in the order of one-third to one-quarter. For inflation, the percentages are larger, but in view of the fact that the initial effect was small for this dimension, we should probably discount this. For the self-efficacy question, only about 10–20 per cent remains.

These finding suggests the need for regular updating of subjects' knowledge with new material, to avoid quick depreciation of newly gained knowledge.

Table 7: Treatment regressions on self-efficacy ( $Y_1$ )

	(1)	(2)	(3)	(4)	(5)
	Compound interest	Inflation	Risk diversification	Tax-favoured assets	Employer match
Video	-0.662 (0.049)**	-0.598 (0.046)**	-0.603 (0.046)**	-0.869 (0.052)**	-0.943 (0.053)**
Narrative	-0.344 (0.048)**	-0.310 (0.045)**	-0.488 (0.046)**	-0.642 (0.052)**	-0.817 (0.053)**
Both	-0.659 (0.061)**	-0.464 (0.056)**	-0.640 (0.055)**	-0.937 (0.061)**	-1.093 (0.064)**
Has credit card debt	0.135 (0.037)**	0.067 (0.034)*	0.035 (0.035)	0.063 (0.039)	-0.054 (0.040)
41-64	-0.029 (0.043)	-0.040 (0.040)	-0.051 (0.040)	-0.074 (0.046)	-0.077 (0.046)
65+	-0.013 (0.056)	-0.072 (0.053)	-0.059 (0.053)	0.055 (0.060)	0.157 (0.061)*
Some college/ associate degree	-0.144 (0.050)**	-0.001 (0.047)	-0.149 (0.047)**	-0.168 (0.054)**	-0.215 (0.054)**
College degree	-0.314 (0.052)**	-0.037 (0.049)	-0.249 (0.049)**	-0.313 (0.056)**	-0.219 (0.057)**
Female	0.261 (0.037)**	0.014 (0.035)	0.194 (0.036)**	0.122 (0.040)**	0.078 (0.041)
\$35K-\$75K	-0.178 (0.046)**	-0.032 (0.042)	-0.066 (0.043)	-0.259 (0.049)**	-0.225 (0.050)**
>\$75K	-0.311 (0.051)**	-0.102 (0.047)*	-0.148 (0.048)**	-0.387 (0.054)**	-0.350 (0.055)**
Baseline score	0.350 (0.018)**	0.363 (0.018)**	0.354 (0.018)**	0.324 (0.021)**	0.316 (0.019)**
Constant	2.041 (0.085)**	1.780 (0.082)**	2.001 (0.085)**	2.311 (0.100)**	2.273 (0.093)**
Observations	2315	2326	2313	2312	2345
R-squared	0.31	0.22	0.29	0.28	0.29
p (video=narrative)	0.00	0.00	0.01	0.00	0.01
p (both=narrative)	0.00	0.00	0.00	0.00	0.00
p (video=both)	0.97	0.01	0.48	0.25	0.02

Notes: Standard errors in parentheses. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$  for two-sided T-tests.

**Table 8:** Treatment effects on changes in self-efficacy ( $Y_1 - Y_0$ )

	(1)	(2)	(3)	(4)	(5)
	Compound interest	Inflation	Risk diversification	Tax-favoured assets	Employer match
Video	-0.620 (0.062)**	-0.694 (0.057)**	-0.587 (0.057)**	-0.871 (0.063)**	-0.987 (0.066)**
Narrative	-0.296 (0.061)**	-0.336 (0.056)**	-0.455 (0.058)**	-0.688 (0.063)**	-0.869 (0.066)**
Both	-0.675 (0.077)**	-0.502 (0.069)**	-0.650 (0.068)**	-1.009 (0.073)**	-1.058 (0.079)**
Has credit card	-0.000 (0.046)	-0.040 (0.042)	-0.094 (0.043)*	-0.037 (0.047)	-0.158 (0.049)**
debt					
41-64	-0.002 (0.054)	0.072 (0.050)	-0.032 (0.050)	-0.034 (0.055)	-0.017 (0.057)
65+	0.069 (0.071)	0.088 (0.065)	0.063 (0.066)	0.185 (0.073)*	0.277 (0.076)**
Some college/ associate degree	-0.033 (0.063)	0.062 (0.058)	-0.047 (0.059)	-0.097 (0.065)	-0.167 (0.068)*
College degree					
Female	-0.131 (0.066)*	0.110 (0.061)	0.024 (0.061)	-0.089 (0.067)	-0.014 (0.070)
\$35K-\$75K	0.018 (0.047)	-0.220 (0.043)**	-0.083 (0.043)	-0.111 (0.047)*	-0.206 (0.050)**
>\$75K	-0.092 (0.057)	-0.039 (0.053)	-0.014 (0.054)	-0.187 (0.059)**	-0.080 (0.062)
Constant	-0.160 (0.064)*	-0.038 (0.059)	-0.001 (0.060)	-0.196 (0.065)**	-0.064 (0.068)
Observations	0.224 (0.087)*	-0.023 (0.081)	0.034 (0.082)	0.181 (0.090)*	0.270 (0.093)**
R-squared	2,315	2,326	2,313	2,312	2,345
p (video=narrative)	0.06	0.08	0.06	0.12	0.13
p (both=narrative)	0.00	0.00	0.02	0.00	0.06
p (video=both)	0.00	0.01	0.00	0.00	0.01
	0.45	0.00	0.33	0.05	0.36

Notes: Standard errors in parentheses. \* p<0.05, \*\*p<0.01, \*\*\*p<0.001 for two-sided T-tests.

**Table 9:** Treatment effects on changes in knowledge ( $Y_2 - Y_0$ ).

	(1)	(2)	(3)	(4)	(5)
	Compound interest	Inflation	Risk diversification	Tax-favoured assets	Employer match
Video	0.041 (0.014)**	0.042 (0.020)*	0.032 (0.015)*	0.031 (0.015)*	0.008 (0.015)
Narrative	0.008 (0.014)	0.032 (0.020)	0.033 (0.015)*	0.034 (0.015)*	0.020 (0.015)
Both	0.034 (0.017)	0.010 (0.025)	0.034 (0.018)	0.033 (0.018)	0.021 (0.018)
Credit card debt	0.005 (0.011)	0.030 (0.015)*	-0.001 (0.012)	-0.011 (0.011)	-0.023 (0.011)*
41-64	0.006 (0.012)	-0.001 (0.018)	-0.017 (0.014)	0.006 (0.013)	0.013 (0.013)
65+	-0.017 (0.016)	-0.022 (0.023)	-0.023 (0.018)	-0.022 (0.018)	0.019 (0.017)
Some college/ associate degree	0.007 (0.015)	-0.007 (0.021)	-0.000 (0.016)	0.004 (0.016)	0.019 (0.015)
College degree	0.009 (0.015)	-0.001 (0.022)	-0.015 (0.017)	-0.009 (0.016)	0.005 (0.016)
Female	0.000 (0.011)	-0.023 (0.015)	0.013 (0.012)	-0.010 (0.012)	0.024 (0.011)*
\$35K-\$75K	0.006 (0.013)	0.010 (0.019)	-0.017 (0.015)	0.008 (0.014)	0.004 (0.014)
>\$75K	-0.003 (0.015)	-0.007 (0.021)	-0.001 (0.016)	-0.014 (0.016)	-0.012 (0.015)
Constant	-0.031 (0.020)	-0.033 (0.028)	0.029 (0.022)	0.040 (0.021)	-0.001 (0.021)
Observations	2454	2457	2455	2448	2446
R-sq	0.006	0.006	0.005	0.006	0.006
p video=narrative	0.01	0.59	0.94	0.82	0.38
p both=narrative	0.12	0.36	0.93	0.95	0.95
p video=both	0.67	0.18	0.88	0.90	0.44

Notes: Standard errors in parentheses. \* p<0.05 \*\*p<0.01 \*\*\*p<0.001 for two-sided T-tests.

**Table 10:** Treatment regressions on changes in self-efficacy ( $Y_2 - Y_0$ )

	(1)	(2)	(3)	(4)	(5)
	Compound interest	Inflation	Risk diversification	Tax-favoured assets	Employer match
Video	-0.045 (0.057)	-0.187 (0.051)***	-0.084 (0.051)	-0.107 (0.051)*	-0.166 (0.056)**
Narrative	-0.064 (0.056)	-0.123 (0.050)*	-0.015 (0.051)	-0.151 (0.051)**	-0.093 (0.055)
Both	-0.078 (0.071)	-0.174 (0.063)**	-0.102 (0.060)	-0.053 (0.061)	-0.098 (0.067)
Has credit card debt	0.003 (0.043)	0.010 (0.039)	-0.021 (0.039)	0.049 (0.039)	-0.026 (0.042)
41-64	-0.019 (0.050)	0.078 (0.045)	0.033 (0.045)	0.039 (0.045)	-0.057 (0.049)
65+	-0.036 (0.067)	0.115 (0.060)	0.110 (0.059)	0.057 (0.060)	0.009 (0.065)
Some college/associate degree	0.057 (0.060)	0.031 (0.054)	0.018 (0.053)	-0.012 (0.054)	-0.120 (0.058)*
College degree	-0.063 (0.062)	-0.045 (0.055)	0.003 (0.055)	0.062 (0.056)	-0.062 (0.061)
Female	0.015 (0.044)	0.052 (0.039)	0.033 (0.039)	0.051 (0.039)	-0.001 (0.043)
\$35K-\$75K	0.064 (0.054)	0.011 (0.048)	-0.019 (0.048)	0.008 (0.049)	0.006 (0.053)
>\$75K	-0.010 (0.060)	0.007 (0.054)	-0.026 (0.054)	0.013 (0.054)	0.020 (0.059)
Constant	-0.024 (0.081)	-0.062 (0.072)	-0.079 (0.072)	-0.132 (0.072)	0.053 (0.079)
Observations	2478	2458	2454	2452	2449
R-sq	0.005	0.010	0.004	0.007	0.006
p video=narrative	0.73	0.19	0.17	0.39	0.18
p both=narrative	0.84	0.40	0.14	0.10	0.94
p video=both	0.64	0.83	0.75	0.37	0.31

Notes: Standard errors in parentheses. \*  $p < 0.05$  \*\*  $p < 0.01$  \*\*\*  $p < 0.001$  for two-sided T-tests.

**Table 11:** Comparison of short-term and long-term effects

	Compound interest	Inflation	Risk diversification	Tax-favoured assets	Employer match
<b>Knowledge effects</b>					
$Y_1 - Y_0$					
Video	0.098	0.044	0.101	0.15	0.063
Narrative	0.075	-0.011	0.102	0.139	0.066
Both	0.094	0.017	0.106	0.158	0.078
$Y_2 - Y_0$					
Video	0.041	0.042	0.032	0.031	0.008
Narrative	0.008	0.032	0.033	0.034	0.02
Both	0.034	0.01	0.034	0.033	0.021
$(Y_2 - Y_0)/(Y_1 - Y_0)$					
Video	42%	95%	32%	21%	13%
Narrative	11%	-	32%	24%	30%
Both	36%	59%	32%	21%	27%
<b>Effects on self-efficacy</b>					
$Y_1 - Y_0$					
Video	-0.62	-0.694	-0.587	-0.871	-0.987
Narrative	-0.296	-0.336	-0.455	-0.688	-0.869
Both	-0.675	-0.502	-0.65	-1.009	-1.058
$Y_2 - Y_0$					
Video	-0.045	-0.187	-0.084	-0.107	-0.166
Narrative	-0.064	-0.123	-0.015	-0.151	-0.093
Both	-0.078	-0.174	-0.102	-0.053	-0.098
$(Y_2 - Y_0)/(Y_1 - Y_0)$					
Video	7%	27%	14%	12%	17%
Narrative	22%	37%	3%	22%	11%
Both	12%	35%	16%	5%	9%

Note: The differences in effects between  $Y_1 - Y_0$  and  $Y_2 - Y_0$  are statistically significant for all knowledge variables at least at the 5 per cent level, except for inflation (there none of the differences is significant). For self efficacy all differences are statistically significant at least at the 5 per cent level.

## VII. Discussion and future work

In this paper, we designed and evaluated a financial education programme that demonstrably increased participants' objective knowledge and self-efficacy. Importantly, our field experiment approach allowed us to conclude that the improvements we saw in the treatment groups were caused by the Five Steps programme or by the particular format tested. Our results show that despite the very minimal time respondents spent watching the videos or reading the narratives (each of the videos or narratives takes only about 3 minutes), Five Steps has sizeable short-run effects on objective measures of respondent knowledge. Moreover, keeping informative content relatively constant, format has significant effects on other psychological levers of behavioural change: effects on self-efficacy are significantly higher when videos are used, which ultimately influences knowledge acquisition.

It is important to reiterate that the experiment at this stage measures only outcomes related to objective knowledge and self-efficacy. The focus group discussions suggest that in general, the written narratives may promote knowledge retention but videos may more strongly motivate action and behaviour change; this remains a possibility to be

tested in future work. Ultimately, the goal of this study is to examine effects on behaviour, with outcomes to be collected in a follow-up survey. Empirical findings suggest that self-efficacy and behaviour are related, although the causal relationships are not well-established: measures of self-efficacy have been found to be correlated with health behaviour (e.g. [Strecher et al., 1986](#); [Holden, 1991](#); [Gillis, 1993](#); [Kreuter et al., 1999](#)) as well as in other domains ([Stajkovic and Luthans, 1998](#)), including finance ([Gutter et al., 2009](#)). There is some evidence that suggests financial education programmes can increase financial self-efficacy, and ultimately behavioural change (e.g. [Shockey and Seiling, 2004](#); [Sanders et al., 2007](#)).

In general, the programme presented here is an example of how field experiments can contribute to better understanding of the effectiveness of financial literacy interventions. As noted in the introduction, part of the reason for the mixed results in related work is the lack of rigorous evaluation. Field experiments are an ideal policy tool for gaining causal inference in this, as well as in other domains. Future work should focus on using field experiments to investigate which components of educational interventions are most effective.

## References

- Armstrong, A. W., Idriss, N. Z., and Kim, R. H. (2011), 'Effects of Video-based, Online Education on Behavioral and Knowledge Outcomes in Sunscreen Use: A Randomized Controlled Trial', *Patient Education and Counseling*, **83**(2), 273–7, doi: 10.1016/j.pec.2010.04.033
- Ashraf, N., Karlan, D., and Yin, W. (2010), 'Female Empowerment: Impact of a Commitment Savings Product in the Philippines', *World Development*, **38**(3), 333–44, doi: 10.1016/j.worlddev.2009.05.010
- Bandura, A. (1989), 'Human Agency in Social Cognitive Theory', *American Psychologist*, **44**(9), 1175–1184, doi: 10.1037//0003-066X.44.9.1175
- Barcellos, S. H., Smith, J. P., Yoong, J. K., and Carvalho, L. (2014), 'Barriers to Immigrant Use of Financial Services: The Role of Language Skills, US Experience, and Return Migration Expectations', RAND Working Paper, No. WR-923-SSa.
- Bayer, P. J., Bernheim, B. D., and Scholz, J. K. (2009), 'The Effects Of Financial Education In The Workplace: Evidence From A Survey Of Employers', *Economic Inquiry*, **47**(4), 605–24, doi: 10.1111/j.1465-7295.2008.00156.x
- Becchetti, L., Caiazza, S., and Coviello, D. (2011), 'Financial Education and Investment Attitudes in High Schools: Evidence from a Randomized Experiment', *Applied Financial Economics*, **23**(10), 817–36, doi: 10.1080/09603107.2013.767977
- Benartzi, S., and Thaler, R. H. (2001), 'Naive Diversification Strategies in Defined Contribution Saving Plans', *American Economic Review*, **91**(1), 79–98, doi: 10.1257/aer.91.1.79
- (2004), 'Naive Diversification Strategies in Retirement Saving Plans', *American Economic Review*, **91**(1), 79–98.
- (2007), 'Heuristics and Biases in Retirement Savings Behavior', *Journal of Economic Perspectives*, **21**(3), 81–104, doi: 10.1257/jep.21.3.81
- Bernheim, B. D., and Garrett, D. M. (2003), 'The Effects of Financial Education in the Workplace: Evidence from a Survey of Households', *Journal of Public Economics*, **87**(7–8), 1487–519, doi: 10.1016/S0047-2727(01)00184-0
- — Maki, D. M. (2001), 'Education and Saving: The Long-term Effects of High School Financial Curriculum Mandates', *Journal of Public Economics*, **80**(3), 435–65.
- Bertrand, M., Karlan, D., Mullainathan, S., Shafir, E., and Zinman, J. (2010), 'What's Advertising Content Worth? Evidence from a Consumer Credit Marketing Field Experiment', *Quarterly Journal of Economics*, **125**(1), 263–305, doi: 10.1162/qjec.2010.125.1.263

- Bruhn, M., De Souza Leao, L., Legovini, A., Marchetti, R., and Zia, B. (2013), 'The Impact of High School Financial Education: Experimental Evidence from Brazil', World Bank Policy Research Working Paper No. 6723.
- Bruner, J. (1987), 'Life as Narrative', *Social Research*, **54**(1), 11–32.
- Calderone, M., Mulaj, F., Sadhu, S., and Sarr, L. (2013), 'Does Financial Education Affect Savings Behavior? Evidence from a Randomized Experiment among Low Income Clients of Branchless Banking in India', working paper.
- Choi, J. J., Laibson, D., and Madrian, B. C. (2005), '\$100 Bills on the Sidewalk: Suboptimal Saving in 401(k) Savings Plans', NBER Working Paper 11554.
- Clark, R. L., and D'Ambrosio, M. (2008), 'Adjusting Retirement Goals and Savings Behavior: The Role of Financial Education', in A. Lusardi (ed.), *Improving the Effectiveness of Financial Education and Saving Programs*, Chicago, IL, Chicago University Press, 237–56.
- Lusardi, A., and Mitchell, O. (2014a), 'Financial Knowledge and 401(k) Investment Performance', NBER Working Paper 20137, May.
- Clark, R. L., Maki, J. A., and Morrill, M. S. (2014b), 'Can Simple Informational Nudges Increase Employee Participation in a 401(k) Plan?', *Southern Economic Journal*, **80**(3), 677–701, doi: 10.4284/0038-4038-2012.199
- — — (2014c), 'Financial Knowledge and 401(k) Investment Performance', NBER Working Paper 20137.
- Collins, J. M. (2013), 'The Impacts of Mandatory Financial Education: Evidence from a Randomized Field Study', *Journal of Economic Behavior and Organization*, **95**, 146–58, doi: 10.1016/j.jebo.2012.08.011
- Congdon, W., Kling, J. R., and Mullainathan, S. (2009), 'Behavioral Economics and Tax Policy', NBER Working Paper No. 15328.
- Davidhizar, R., and Lonser, G. (2003), 'Storytelling as a Teaching Technique', *Nurse Educator*, **28**(5), 217–21, doi: 10.1097/00006223-200309000-00008
- Delavande, A., Rohwedder, S., and Willis, R. (2008), 'Preparation for Retirement, Financial Knowledge and Cognitive Resources', MRRC Working Paper Series 190.
- Drexler, A., Fischer, G., and Schoar, A. (2010), 'Keeping It Simple: Financial Literacy and Rules of Thumb', *American Economic Journal: Applied Economics*, **6**(2), 1–31, doi: 10.1257/app.6.2.1
- Duflo, E., and Saez, E. (2003), 'The Role of Information and Social Interactions in Retirement Plan Decisions: Evidence from a Randomized Experiment', *The Quarterly Journal of Economics*, **118**(3), 815–42, doi: 10.1162/00335530360698432
- Frederick, S., Loewenstein, G., and O'Donoghue, T. (2002), 'Time Discounting and Time Preference: A Critical Review', *Journal of Economic Literature*, **40**(2), 351–401, doi: 10.1257/jel.40.2.351
- Gagliano, M. E. (1988), 'A Literature Review on the Efficacy of Video in Patient Education', *Academic Medicine*, **63**(10), 785–92, doi: 10.1097/00001888-198810000-00006
- Gartner, K., and Todd, R. M. (2005), 'Effectiveness of Online Early Intervention Financial Education Programs for Credit-Card Holders', Federal Reserve Bank of Chicago.
- Gillis, A. J. (1993), 'Determinants of a Health-promoting Lifestyle: An Integrative Review', *Journal of Advanced Nursing*, **18**(3), 345–53, doi: 10.1046/j.1365-2648.1993.18030345.x
- Gist, M. E. (1989), 'The Influence of Training Method on Self-Efficacy and Idea Generation among Managers', *Personnel Psychology*, **42**(4), 787–805, doi: 10.1111/j.1744-6570.1989.tb00675.x
- Green, M. C., and Brock, T. C. (2000), 'The Role of Transportation in the Persuasiveness of Public Narratives', *Journal of Personality and Social Psychology*, **79**(5), 701–21, doi: 10.1037/0022-3514.79.5.701
- Gutter, M., Copur, Z., and Garrison, S. (2009), 'Which Students are More Likely to Experience Financial Socialization Opportunities? Exploring the Relationship Between Financial Behaviors and Financial Well-being of College Students', Networks Financial Institute Working Paper 2009-WP: 07.
- Holden, G. (1991), 'The Relationship of Self-efficacy Appraisals to Subsequent Health Related Outcomes', *Social Work in Health Care*, **16**(1), 53–93, doi: 10.1300/J010v16n01\_05

- Hung, A. A., Parker, A. M., and Yoong, J. K. (2009), 'Defining and Measuring Financial Literacy', RAND Working Paper No. WR-708.
- Jeste, D. V., Dunn, L. B., Folsom, D. P., and Zisook, D. (2008), 'Multimedia Educational Aids for Improving Consumer Knowledge about Illness Management and Treatment Decisions: A Review of Randomized Controlled Trials', *Journal of Psychiatric Research*, **42**(1), 1–21, doi: 10.1016/j.jpsychires.2006.10.004
- Kozma, R. B. (1991), 'Learning with Media', *Review of Educational Research*, **61**(2), 179–211, doi: 10.3102/00346543061002179
- Kreuter, M. W., Strecher, V. J., and Glassman, B. (1999), 'One Size does not Fit All: The Case for Tailoring Print Materials', *Annals of Behavioral Medicine*, **21**(4), 276–83, doi: 10.1007/BF02895958
- Lührmann, M., Serra-Garcia, M., and Winter, J. (2012), 'Teaching Teenagers in Finance: Does it Work?', Discussion Papers in Economics 14101, University of Munich, Department of Economics.
- — — (2014), 'The Impact of Financial Education on Adolescents' Intertemporal Choices', CESifo Working Paper Series 4925, CESifo Group Munich.
- Lusardi, A. (1999), 'Information, Expectations, and Savings for Retirement', in H. J. Aaron (ed.), *Behavioral Dimensions of Retirement Economics*, Washington DC, Brookings Institution Press, 81–115.
- (2008), 'Financial Literacy: An Essential Tool for Informed Consumer Choice?', Working Paper, Joint Center for Housing Studies, Harvard University.
- (2009), 'US Household Savings Behavior: The Role of Financial Literacy, Information and Financial Education Programs', in C. Foote, L. Goette, and S. Meier (eds), *Policymaking Insights from Behavioral Economics*, Federal Reserve Bank of Boston, 109–49.
- (2012), 'Numeracy, Financial Literacy, and Financial Decision-Making', *Numeracy*, **5**(1), doi: 10.5038/1936-4660.5.1.2
- Beeler, J. (2007), 'Saving Between Cohorts: The Role of Planning', in B. C. Madrian, O. S. Mitchell, and B. J. Soldo (eds), *Redefining Retirement: How Will Boomers Fare?*, Oxford, Oxford University Press, 271–95.
- Mitchell, O. S. (2007), 'Baby Boomer Retirement Security: The Role of Planning, Financial Literacy, and Housing Wealth', *Journal of Monetary Economics*, **54**, 205–24.
- — (2009), 'How Ordinary Consumers Make Complex Economic Decisions: Financial Literacy and Retirement Readiness', NBER Working Paper N. 15350.
- — (2011a), 'Financial Literacy and Planning: Implications for Retirement Wellbeing', in A. Lusardi and O. S. Mitchell (eds), *Financial Literacy: Implications for Retirement Security and the Financial Marketplace*, Oxford, Oxford University Press, 17–39.
- — (2011b), 'Financial Literacy and Retirement Planning in the United States', *Journal of Pension Economics and Finance*, **10**(4), 509–25, doi: 10.1017/S147474721100045X
- — (2014), 'The Economic Importance of Financial Literacy: Theory and Evidence', *Journal of Economic Literature*, **52**(1), 5–44.
- Tufano, P. (2009a), 'Debt Literacy, Financial Experiences, and Overindebtedness', NBER Working Paper N. 14808.
- — (2009b), 'Teach Workers about the Peril of Debt', *Harvard Business Review*, November, 22–4.
- Mitchell, O. S., and Curto, V. (2010), 'Financial Literacy among the Young', *Journal of Consumer Affairs*, **44**(2), 358–80, doi: 10.1111/j.1745-6606.2010.01173.x
- Samek, A. S., Kapteyn, A., Glinert, L., Hung, A., and Heinberg, A. (2014), 'Visual Tools and Narratives: New Ways to Improve Financial Literacy', NBER Working Paper No. 20229.
- McDaniel, M. A., Waddill, P. J., and Shakesby, P. S. (1996), 'Study Strategies, Interest, and Learning from Text: The Application of Material Appropriate Processing', in D. J. Herrmann and M. A. McDaniel (eds), *Basic and Applied Memory Research*, Mahwah, NJ, Lawrence Erlbaum Associates.
- Meier, S., and Sprenger, C. D. (2013), 'Discounting Financial Literacy: Time Preferences and Participation in Financial Education Programs', *Journal of Economic Behavior and Organization*, **95**, 159–74, doi: 10.1016/j.jebo.2012.02.024
- Michielutte, R., Bahnson, J., Dignan, M., and Schroeder, E. (1992), 'The Use of Illustrations and Narrative Text Style to Improve Readability of a Health Education Brochure', *Journal of Cancer Education*, **7**(3), 251–60, doi: 10.1080/08858199209528176

- Moulton, S., Loibl, C., Samek, A., and Collins, J. M. (2013), 'Borrowing Capacity and Financial Decisions of Low-to-moderate Income First-time Homebuyers', *Journal of Consumer Affairs*, **47**(3), 375–403, doi: 10.1111/joca.12021
- Norris, S. P., Guilbert, S. M., Smith, M. L., Hakimelahi, S., and Phillips, L. M. (2005), 'A Theoretical Framework for Narrative Explanation in Science', *Science Education*, **89**(4), 535–63, doi: 10.1002/sce.20063
- Purcell, K. (2010), 'The State of Online Video', Pew Internet and American Life Project.
- Sanders, C. K., Weaver, T. L., and Schnabel, M. (2007), 'Economic Education for Battered Women: An Evaluation of Outcomes', *Affilia*, **22**(3), 240–54, doi: 10.1177/0886109907302261
- Shafir, E., Diamond, P., and Tversky, A. (1997), 'Money Illusion', *The Quarterly Journal of Economics*, **112**(2), 341–74, doi: 10.1162/003355397555208
- Shampanier, K., Mazar, N., and Ariely, D. (2007), 'Zero as a Special Price: The True Value of Free Products', *Marketing Science*, **26**(6), 742–57, doi: 10.1287/mksc.1060.0254
- Shockey, S. S., and Seiling, S. B. (2004), 'Moving into Action: Application of the Transtheoretical Model of Behavior Change to Financial Education', *Financial Counseling and Planning*, **15**(1), 41–52.
- Song, C. (2011), 'Financial Illiteracy and Pension Contributions: A Field Experiment on Compound Interest in China', retrieved from [http://works.bepress.com/changcheng\\_song/1](http://works.bepress.com/changcheng_song/1)
- Stajkovic, A. D., and Luthans, F. (1998), 'Self-efficacy and Work-related Performance: A Meta-analysis', *Psychological Bulletin*, **124**(2), 240–61, doi: 10.1037//0033-2909.124.2.240
- Stango, V., and Zinman, J. (2009), 'What Do Consumers Really Pay on Their Checking and Credit Card Accounts? Explicit, Implicit, and Avoidable Costs', *American Economic Review*, **99**(2), 424–9, doi: 10.1257/aer.99.2.424
- Strecher, V. J., Devellis, B. M., Becker, M. H., and Rosenstock, I. M. (1986), 'The Role of Self-efficacy in Achieving Health Behavior Change', *Health Education and Behavior*, **13**(1), 73–92, doi: 10.1177/109019818601300108