Multistudy Report

ASSET

A New Measure of Economic and Financial Literacy

Tomas Folke[1,5], Jovana Gjorgjiovska[1,2], Alessandro Paul[1,3], Lea Jakob[1,4], and Kai Ruggeri[1,5]

[1]The Policy Research Group, The Centre for Business Research, University of Cambridge, UK
[2]Department of Psychology, School of Biological Sciences, University of Cambridge, UK
[3]Department of Social and Organisational Psychology, Leiden University, Leiden, The Netherlands
[4]Department of Psychology, Faculty of Social Sciences, Charles University, Prague, Czech Republic
[5]Department of Health Policy and Management, Mailman School of Public Health, Columbia University, New York, NY, USA

Abstract: Young adults increasingly require good financial literacy to make the most of the opportunities provided to them. Unfortunately, existing financial literacy measures that may assist with targeting interventions show low reliability, ceiling effects, and a high level of abstraction. To address this, we designed and assessed the psychometric properties of a new measure specifically targeting young people, the Assessment of Economic and Financial Literacy (ASSET). We find it has better overall validity, reliability, and predictive power than existing measures. Using ASSET, we find that mathematical ability, calculator use (an example of deliberative thinking), gender, and socioeconomic status are key predictors of financial literacy. We recommend this more robust tool for use in financial literacy research to assess implications for guiding major financial decisions among young people.

Keywords: financial literacy, psychometrics, public policy, behavioral economics, young adults

To survive and thrive, individuals must effectively manage their personal finances, which requires at least rudimentary understanding of economic concepts, such as inflation and compound interest. Such knowledge is referred to as *financial literacy*. While multiple definitions exist (Remund, 2010; Wuttke & Aprea, 2018), the Organisation for Economic Co-operation and Development (OECD) defines financial literacy as "a combination of awareness, knowledge, skill, attitude and behavior necessary to make sound financial decisions and ultimately achieve individual financial wellbeing" (OECD INFE, 2011, p. 3).

Multiple studies suggest that a large proportion of people lack knowledge of basic financial concepts (e.g., Chen & Volpe, 1998; Lusardi & Mitchell, 2007, 2011; Lusardi, Mitchell, & Curto, 2010; OECD, 2016a). Low levels of financial literacy have been found in young adults (Chen & Volpe, 1998; Breitbach & Walstad, 2016; OECD, 2016a), elderly (Chen & Volpe, 1998; Lusardi & Mitchell, 2008), women, and low-educated individuals (Lusardi & Mitchell, 2008). Poor financial literacy has been shown across countries, economic systems (De Meza, Irlenbusch, & Reyniers, 2008; Lusardi & Mitchell, 2011; OECD, 2016a), and levels of economic development (Lusardi & Mitchell, 2011; Riitsalu & Põder, 2016).

Low financial literacy among young people is particularly alarming, as the cost of postsecondary education has increased rapidly in recent decades. For example, the UK has seen a rise in tuition fees from £1,000 per year in 1998 to over £9,000 per year (Callender & Mason, 2017). As fees increase, more students need to take out student loans to partake in higher education. In the UK, 90% of domestic students take out student loans (Bolton, 2017). As a result, the mean debt load at graduation has reached £50,800 with students from the poorest 40% of households having a debt load of £57,000, with approximately three quarters of students graduating from higher education expected to never repay their loans in full (Belfield, Britton, Dearden, & van der Erve, 2017). This means young people are faced with a major financial decision early in life with long-term consequences and risk levels they may not fully comprehend.

Compounding this problem, good theoretical knowledge does not always translate to good decisions: Ali, Anderson, McRae, and Ramsay (2014) found that eleventh-grade students (age 16–17 years) in Australia had a good overall financial understanding that diminished when tested in practice. Around three quarters of the students passed a financial choice and comprehension test, yet performance

dropped dramatically when the students were asked to apply their knowledge (e.g., calculating and budgeting). At the same time, they reported much higher confidence in their ability to tackle practical problems. Similar findings have been repeated in other locations, such as South Korea and the United States (Ali et al., 2014; Jang, Hahn, & Park, 2014; Sohn, Joo, Grable, Lee, & Kim, 2012).

There has been a substantial number of diverse assessment methods developed to measure financial literacy in young people (see Atkinson & Messy, 2011 or Remund, 2010 for an overview), which creates heterogeneity that limits comparison of results across studies. While research on 15-year-olds is mostly reported from the PISA survey (OECD, 2016b), some have argued against this instrument pointing to the fact that it does not efficiently cover the topic in its entirety (Schuhen & Schurkmann, 2014).

The aim of this paper is to present a new instrument – Assessment of Economic and Financial Literacy (ASSET) – which is developed specifically for young adults with the aim of producing a more viable psychometric tool. The instrument itself was constructed to cover basic numeracy, knowledge of financial concepts, and use of numeracy skills in financial scenarios. These domains do not capture all aspects of financial literacy listed by the OECD. For example, ASSET involves no items that measure financial attitudes. This narrowing is intentional because attitudes and skills are best measured by different types of items, and as such might best be captured by distinct scales (Kollmuss & Agyeman, 2002). Critically, financial attitudes have well-documented links with financial behaviors (Almenberg, Lusardi, Säve-Söderbergh, & Vestman, 2018; Gamble, Gärling, & Michaelsen, 2019), and could be used to complement ASSET. We seek to determine whether this new measure can reliably discriminate between levels of financial literacy, as well as identify demographic predictors of financial literacy in British and American participants.

Methods

Because the primary aim of this study was to develop a viable measure of financial literacy, this study was conducted in three components: a pilot component where we tested the psychometric properties of the instrument and made adjustments if necessary, a main component where we collected additional data to assess the modified instrument, and a validation component where we tested the convergent and criterion validity of the new instrument.

Survey

Pilot Component

A 35-item survey contained questions regarding participant demographics, financial literacy, financial preferences, university choices, and susceptibility to nudging. The financial literacy items included can be found in Table 1. Electronic Supplementary Material 1 (ESM 1) contains the full questionnaire used in this component.

Financial Literacy

In the pilot component of the study, the Standard & Poor's Ratings Services Global Financial Literacy Survey (S&P; Klapper, Lusardi, & Van Oudheusden, 2015) was used to assess whether participants had a basic understanding of four essential concepts in financial decision-making: risk diversification, inflation, numeracy (simple interest rates), and interest compounding. The survey consists of five multiple-choice items with one correct answer for each.

Four more items measuring financial literacy were used. One item was adapted from the Jump$tart Coalition's Survey (Mandell, 2008) and covered basic numeracy, while the remaining three were unique to this study. Of the items developed by us, two covered basic numeracy and one covered compound interest. Similar to the S&P survey, these four items were also multiple-choice questions, with only one correct answer.

As many of the questions were mathematical in nature, we asked participants whether they used a calculator when responding.

Demographic Characteristics

In order to control for and compare between different groups within the population of young people, questions measuring the following demographic variables were included: participants' gender, age, type of secondary education (public vs. state[1]) and name of secondary school they are enrolled in/ have attended, and most recent level of education they have completed. Additionally, socioeconomic status (SES) was measured through three proxy variables: parent/guardian highest level of education, parental employment status, and participants' annual household income. These characteristics are important to consider as the Student Income and Expenditure study for 2011/2012 (Pollard et al., 2013) finds the highest rates of loan taking in students whose parents have routine and manual background, students who are young, and those who come from rural areas. Participants enrolled in undergraduate studies were also asked to report the university they are currently enrolled in, the subject they study, the amount of student

[1] In the UK, a "public" school is typically the equivalent of a "private" school in the US and elsewhere, whereas a UK "state" school is typically the equivalent of a "public" school in the US and elsewhere. Pupils at British "public" schools typically come from higher SES families with historically greater educational attainment.

Table 1. ASSET Pilot (correct responses in italics)

Item code	Question formulation	Response options
FL1	Suppose you need to borrow £100. Which is the lower amount to pay back: £105 or £100 plus 3%?	a) £105 *b) £100 plus 3%* c) I don't know d) I refuse to answer
FL2	You have just found a new job that pays you £2,000 a month. You must pay £900 for rent, £300 for groceries, £400 on transportation, and £250 on various bills. You save all remaining income. What is the shortest amount of time it would take for you to save for a new £600 laptop?	a) 7 months b) 3 months *c) 4 months* d) 1 month
FL3	After working at the job for two months, your friends have invited you to a spontaneous beach weekend. For you to go with them you will have to use the money you have saved. If you decide to go on the trip, how many months in total, from when you started your job, will it take you to save for a new laptop?	a) 3 months b) 9 months *c) 6 months* d) 5 months
FL4	Suppose you have some money. Is it safer to put your money into one business or investment, or to put your money into multiple businesses or investments?	a) One business or investment *b) Multiple businesses or investments* c) I don't know d) I refuse to answer
FL5	Suppose over the next 10 years the prices of the things you buy double. If your income also doubles, will you be able to buy less than you can buy today, the same as you can buy today, or more than you can buy today?	a) Less *b) The same* c) More d) I don't know e) I refuse to answer
FL6	A Spotify account costs £120 for 12 months if you pay it upfront. However, you have chosen a monthly payment plan (£10 a month), which also adds a 5% annual interest. Considering this, roughly how much is the total cost?	a) £118 b) £123 c) £180 *d) £126*
FL7	Suppose you put money in the bank for two years and the bank agrees to add 15% per year to your account. Will the bank add more money to your account the second year than it did the first year, or will it add the same amount of money both years?	*a) More* b) The same c) I don't know d) I refuse to answer
FL8 a)	Your friend asks you which option is best for their student loan. Currently, he needs £2,500 and he is confident he can pay back the loan in one year. The bank offers only the following two options. Which would you tell your friend to take?	a) £3,000 at 4.6% annual interest b) £4,500 at 3.9% annual interest
FL8 b)	Your friend decided to follow your advice and takes out [selected choice at FL8 a]. Estimate the monthly payment, if you know that your friend will need to pay back the loan in 18 equal monthly instalments, after not paying for 3 years.	*a) £280 (if a above)* b) £325 c) £235 *d) £190 (if b above)*
FL9	Suppose you had £100 in a savings account and the bank adds 10% compound interest per year to the account. How much money would you have in the account after five years if you did not remove any money from the account?	*a) More than £150* b) Exactly £150 c) Less than £150 d) I don't know e) I refuse to answer

debt they currently have, and the main funding source for their current education.

Main Component

An adapted survey used in the pilot component was used with some financial literacy questions modified (see E2 in ESM 1). The reason for this was that ceiling effects were observed for the financial literacy scores (for details, see Psychometric Properties of ASSET section). This finding seemingly conflicts with previous literature which has reported that young people typically show low financial literacy (e.g., Klapper et al., 2015). Potential reasons for this ceiling effect will be explored in the Results section and the Discussion. In order to deal with this ceiling effect, some of the financial literacy items were modified to increase difficulty by making the mathematical aspects of the

question more difficult or increasing the number of response options. Because of these modifications, only one item overlapped between the final ASSET items and the S&P items (measuring understanding of inflation), though all the S&P items were included in the pilot version of the scale.

Additionally, to better distinguish between participants' understanding of simple financial concepts and their ability to use this knowledge, practical examples were introduced to all items that did not already contain them. We also added an additional item to test if participants could apply complex mathematical reasoning to a day-to-day scenario. This served a dual purpose to (a) make the questions more relatable to participants' everyday financial experiences and (b) measure whether basic understanding of financial concepts translates to the ability to apply this knowledge to typical problems. Additionally, the "I refuse to answer" option was removed because of its rare usage. See Table 2 for the main version of the ASSET items.

Validation Component

A third component was conducted to further explore ASSET's psychometric properties: construct and criterion validity in a sample different from the populations sampled previously in age (18–24 years) and residency (UK and US). The survey used in the main component was expanded to include: the original S&P; questions about participant savings, spending, and budgeting behaviors; and their self-perceived financial literacy. All items were posed as multiple-choice questions and are annexed to the E3–6 in ESM 1.

Procedure

Pilot Component

All data for this component were collected using the Qualtrics platform. Participants were asked to sign an electronic consent form prior to providing any responses. Participation in the study was voluntary and anonymous. All questions, apart from the ones measuring demographic characteristics, were mandatory for all participants. Where applicable, the order of the possible answers was randomized, while the "I don't know" option was always kept last. Participants were restricted to viewing one question at a time without the option of returning to previous questions. Completion of the study measurement took on average 19 min (*SD* = 46 min). After completing the survey, participants were given a brief explanation of the purpose of the study and thanked for their participation. In the case of further questions and comments, contact information was provided, as well as a link to the laboratory website of the research group.

Main Component

The procedure followed in the main component of the study mirrored the pilot procedure. The only notable difference is the time needed to complete the study. In this component, the mean duration for the full survey was 24 min, but with a lot of variation between participants (*SD* = 76 min). The slightly slower response times can be explained by the increased difficulty of the financial literacy questions and the addition of three financial preference questions.

Validation Component

The procedure used in this component differed from the previous only in that the participants were not restricted to answering one item at a time, and that the financial literacy items were presented according to a quasi-randomization procedure. Specifically, the S&P's second item about compound interest and was always presented at random among the first 10 items. Then the 11th and 12th items were always the set of questions preceding ASSET's financial literacy (FL) item 8 (items 11, 12, and 13 of ESM 1, respectively); followed by ASSET's FL items 8 and 9 presented in randomized order. This was done because ASSET's FL item 9 is a derivative of the S&P's compound interest question and its answer options are indicative of the correct answer for the derivative question. At the beginning of the survey, participants were informed that participation was completely voluntary and could be terminated at any time, but that only those who completed the survey would be paid the equivalent of £1.80. Half of the participants were asked to rate their proficiency in making financial and economic decisions at the beginning of the survey, the other half at the end. The average completion time for all items was 12 min (*SD* = 6 min). Amounts for residents of the UK and the US were shown in British pounds sterling and US dollars, respectively.

Recruitment

For the first two components of the study, we contacted all secondary education facilities we could find contact information for in the UK and asked them to circulate a link to the survey to their pupils. In order to be eligible for the first two components of this study, participants had to be studying at an educational institution in the UK, be between 16 and 18 years of age at the time the study was conducted, and have a UK nationality or settled status. We contacted one third of the institutions for the pilot component and the remaining two thirds for the main component. Participants for the validation component were recruited via Prolific, a company matching researchers to a large online

Table 2. ASSET Main (correct responses in italics)

Item code	Question formulation	Response options
FL1	Suppose you need to borrow £150. Which is the lower amount to pay back: £165 or £150 + 7 percent interest?	a) £165 *b) £150 + 7%* c) I don't know
FL2	You have just found a new job that pays you £2,000 a month. You must pay £900 for rent, £300 for groceries, £400 on transportation, and £250 on various bills. You save all remaining income. What is the shortest amount of time it would take for you to save for a new £600 laptop?	a) 7 months b) 3 months *c) 4 months* d) 1 month
FL3	After working at the job for 2 months, your friends have invited you to a spontaneous beach weekend. For you to go with them you will have to use the money you have saved. If you decide to go on the trip, how many months in total, from when you started your job, will it take you to save for a new laptop?	a) 3 months b) 9 months *c) 6 months* d) 5 months
FL4*	Suppose you have some money. Which one do you see as the safest investment option?	a) A well-known UK company (e.g., Sainsbury's) b) The shop or garage nearest your house c) A UK branch of a successful chain-store (e.g., Spar) d) A recently founded startup (e.g., Uber) e) A multinational corporation (e.g., Apple) f) A mid-sized business (e.g., Nando's) *g) Ask a financial advisor to invest my money into a portfolio* h) I don't know
FL5	Suppose over the next 10 years the prices of the things you buy double. If your income also doubles, will you be able to buy less than you can buy today, the same as you can buy today, or more than you can buy today?	a) Less *b) The same* c) More d) I don't know
FL6	A Spotify account costs £120 for 12 months if you pay it upfront. However, you have chosen a monthly payment plan (£10 a month), which also adds a 5% annual interest. Considering this, roughly how much is the total cost?	a) £118 b) £123 c) £180 *d) £126*
FL7	Suppose you put £100 in the bank for 2 years and the bank agrees to add 15% compound interest per year to your account. How much interest did you earn after 2 years?	*a) £32.25* b) £34.70 c) £30.85 d) £35.15 e) I don't know
FL8 a)	Your friend asks you which option is best for their student loan. Currently, he needs £2,500 and he is confident he can pay back the loan in 1 year. The bank offers only the following two options. Which would you tell your friend to take?	a) £3,000 at 4.6% annual interest b) £4,500 at 3.9% annual interest
FL8 b)	Your friend decided to follow your advice and takes out [selected choice at FL8 a]. Estimate the monthly payment, if you know that your friend will need to pay back the loan in 18 equal monthly installments, after not paying for 3 years.	*a) £280 [if a above]* b) £325 c) £235 *d) £190 [if b above]*
FL9	Suppose you had £100 in a savings account and the bank adds 10 percent compound interest per year to the account. Roughly how much money would you have in the account after 5 years if you did not remove any money from the account?	a) £150 b) £158 *c) £162* d) £168 e) I don't know
FL10	Suppose you have £75 in a savings account and the bank adds 1.5% simple interest per month to your account. In 1 year, what is the most expensive item you could afford with the money in your savings account?	a) A pair of high quality headphones – £89 b) An e-book reader - £92 *c) A pair of shoes from your favourite brand - £86* d) A festival ticket - £98 e) I don't know

Note. *The response options differed slightly between the US and UK samples to ensure that respondents were familiar with the brands (E2 in ESM 1).

panel. To be eligible, participants needed to be between 18 and 24 years and reside in either the UK or US. For more in-depth information about the recruitment procedures see E7 in ESM 1.

Participants

The pilot component of the study was answered by 161 participants. Of them, 9 were excluded from analysis because they did not meet the age requirement (being between 16 and 18 years). Therefore, the final pilot sample of the study was 152. In the main component of the study, 363 participants filled the survey. Of them, 6 were younger than 16 years and 11 were older than 18; thus, the sample size was reduced to 346. In both samples, over 80% of the participants were from England and most of the participants were 17 years. The pilot sample was predominantly female, but the main sample was more balanced. For a more detailed demographic breakdown, see Table 3. The "other" category in the gender breakdowns include both people who preferred not to answer and those who did not identify as male or female.

Figures 1A and 1B contain a detailed overview of the reported household income of the pilot and main samples. Parental income in this sample is typically higher than the general income distribution for the UK (Office for National Statistics [ONS], 2017). Slightly less than a third of the pilot sample (26%, n = 39) and the main sample (29%, n = 101) did not know the income of their parents. These respondents were asked about the employment situation of their parents. For both samples, the majority reported that at least one of their parents had full-time employment (Figures 1C and 1D). Parental education was also high, with 45% of the pilot sample and 60% of the main sample holding a university degree (see Figures 1E and 1F).

For the validation component 253 responses were collected, of which 36 (14.2%) were excluded, resulting in a total sample size of 217. Participants were excluded for any of the following reasons: showing inconsistent time-preferences; entering irrational input (e.g., saving more than 100% of one's monthly net income); or taking longer than two standard deviations from the mean to complete the survey (a criterion a priori specified). The majority of participants resided in the UK (58.1%), the rest were from the US, and slightly less than half of the sample was female (48.4%). Most participants were either enrolled in undergraduate or graduate studies (61.8%), with about an additional quarter not being currently enrolled in any educational program (27.2%). The median annual household income for the US sample was between $21,000 and $30,000 ($n$ = 82), whereas it was between £31,000 and £40,000 (n = 105) for the UK sample. The median age was 22 years (M = 21.45; SD = 1.95).

Table 3. Participant demographic data

	Pilot (N = 152) n (%)	Main (N = 346) n (%)	Validation (N = 217) n (%)
Gender			
Female	102 (67)	178 (51.4)	105 (48.4)
Male	44 (29)	154 (44.5)	109 (50.2)
Other	6 (4)	14 (4.1)	3 (1.4)
Age			
16	42 (28)	73 (21.1)	
17	75 (49)	188 (54.3)	
18	35 (23)	85 (25.6)	18 (8.3)
19			24 (11.1)
20			37 (17.1)
21			26 (12.0)
22			31 (14.3)
23			38 (17.5)
24			43 (19.8)
Place of residence			
England	129 (84.8)	292 (84.4)	
Scotland	2 (1.3)	1 (0.3)	
Northern Ireland	1 (0.7)	1 (0.3)	
Wales	1 (0.7)	7 (2.0)	
UK unspecified	19 (12.5)	45 (13.0)	126 (58.1)
US			91 (41.9)
School type (UK designations)			
State	84 (65)	179 (59)	
Public	47 (35)	122 (41)	

Results

Psychometric Properties of ASSET

Although the ceiling effect in the main component was much smaller than the one found in the pilot component, the responses still exhibited a negative skew (see Figure 2). Accuracy rates for the pilot survey ranged between 93% correct for the easiest item and 60% correct for the most difficult item, with a mean of 81%. For the main component survey, which had been adapted to be more challenging, accuracy rates ranged between 91% and 32%, with a mean of 71%. The mean number of correct responses (further referred to as total financial literacy score [TFL]) for the pilot sample was 7.12 out of 9 (SD = 2.02). The TFL for the main sample was 7.32 out of 10 (SD = 1.63). Table 4 gives an overview of the results for all three samples. Correlations between the ASSET items can be found in ESM 1.

Cronbach's α of ASSET was consistently and reliably higher than for the existing S&P survey (Klapper et al., 2015). To further explore the relationship between the questions we carried out tetrachoric factor analysis, with tetrachoric correlations corrected for continuity. We used

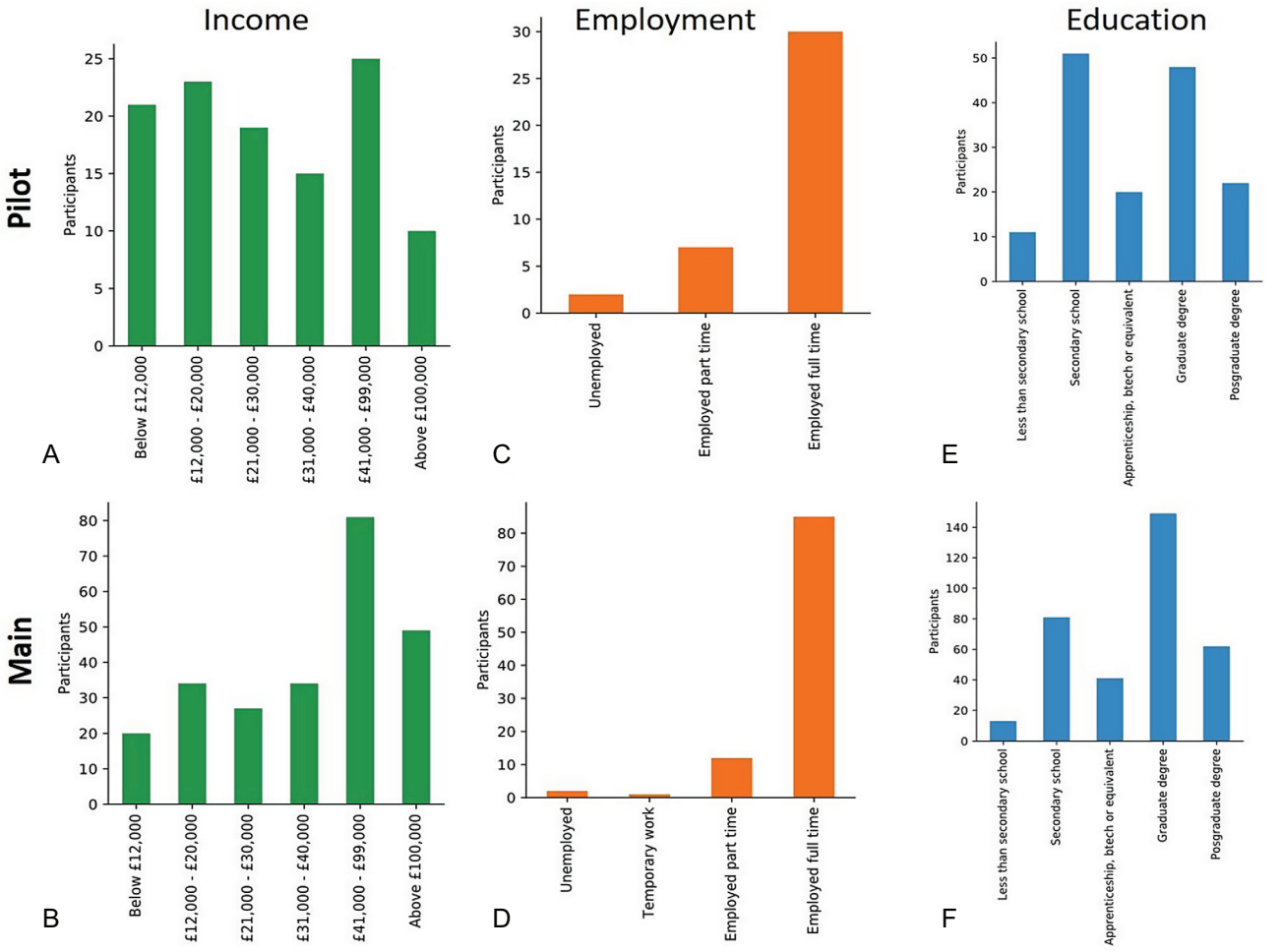

Figure 1. Parental SES from the pilot and main components. (A and B) Parental income for those participants who knew what their parents earned (74% of the pilot sample and 71% of the main sample). The remainder, who did not know parental income, answered a question about parental employment status (C and D); (E and F) parental education. In general, the sample has higher SES than would be expected of a representative English sample, even though the majority of participants are currently residing in England.

the minimum residual factor extraction method. The IRT models were two parameter normal ogive models (i.e., no c parameter was included). The factor analysis was conducted in R using psych package (Revelle, 2017). Factor scores were estimated using the scoreIRT function in the same package. Because of the small number of items only single factor solutions were explored. Factor loadings for the items ranged from .16 to .72 (M = .50) for the pilot data and .25 to .78 for the main data (M = .55). Two items (question two and three) had loadings less than .4 for both datasets. For the pilot dataset, item 8 also had a loading of below .4, whereas item 10 had loadings less than .4 for the main data. Excluding these items led to a new single factor solution with loadings ranging from .50 to .81 (M = .64) for the pilot data and loadings ranging from .47 to .78 (M = .65) for the main data. To get more information about the various single factor solutions, see Table 5. Tetrachoric correlations and thresholds can be found in ESM 1.

Considering that the excluded items were related to interest rates and risk diversification, the reduced item subset was more strictly associated with mathematical ability than the full measure, which may explain the stronger inter-item correlations (see Table 4). Additionally, the subset factor solutions explained more of the shared variance than the full factor solutions (see Table 5). However, despite the exclusion of a few items for the final factor solution and despite the ceiling effects discussed above, the IRT factor scores still correlated strongly with the raw item totals (pilot: r = .91, 95% CI [.89, .94], $p < 10^{-60}$; main: r = .89, 95% CI [.87, .92], $p < 10^{-123}$; see Figure 3).

Financial literacy items two and three were not presented to the validation sample, because of low factor loadings in the previous samples. Item 10 was originally included to see if the original poor factor loadings would improve in a new sample. It again loaded poorly on the single factor and was therefore discarded so that ASSET consisted of

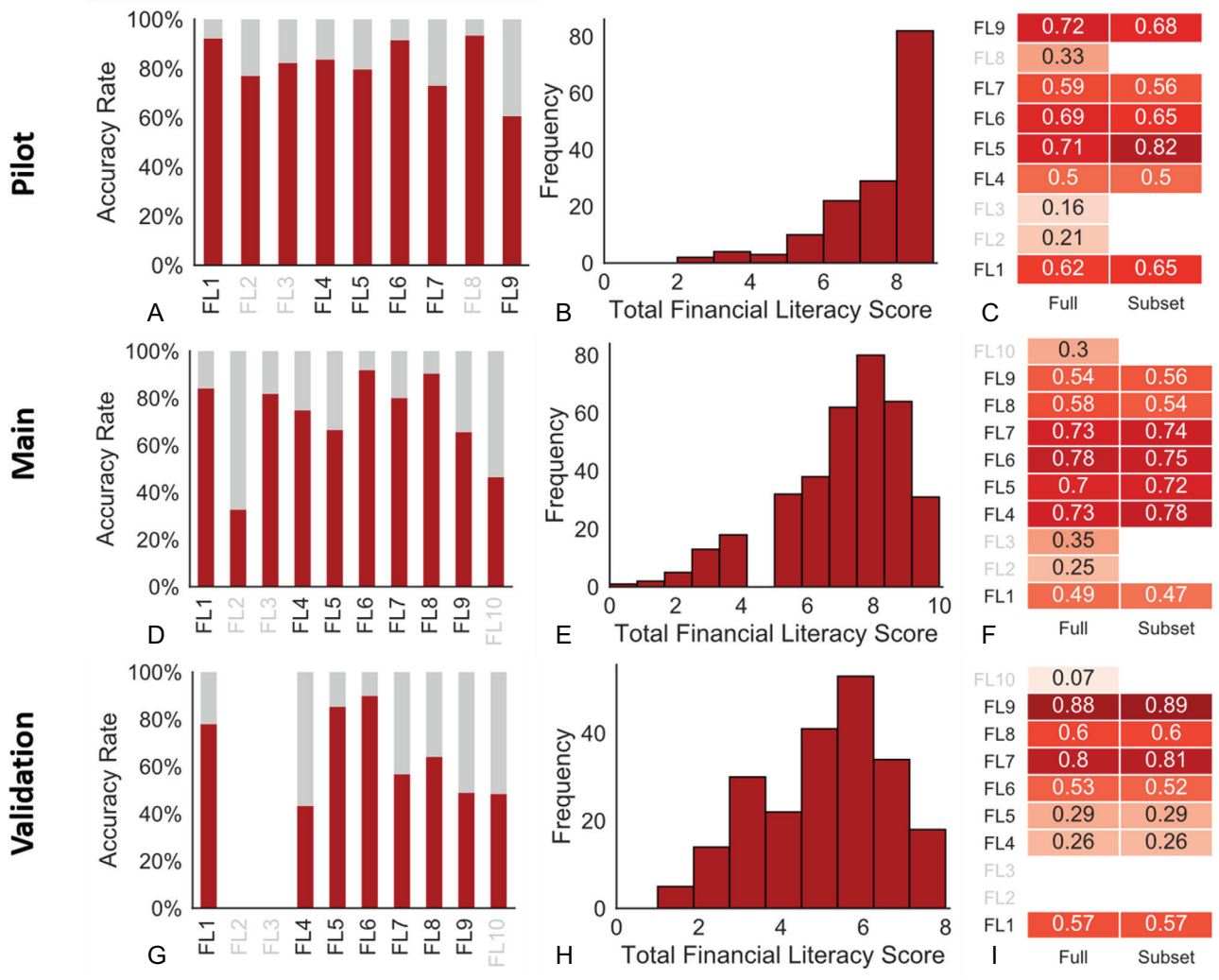

Figure 2. Psychometric properties of ASSET: (A, D, and G) Accuracy rates for the items. The grayed-out items were excluded from the final model. (B, E, and H) Distributions of correct responses for the participants from the pilot sample and the main sample, with all items included. (C, F, and I) Factor loadings for the original factor that included all items, and factors that excluded the items with the lowest loadings.

Table 4. Overview statistics for the TFL in the different samples

	M (Total)	*SD*	Cronbach's α [95% CI]
Full ASSET Pilot	7.33 (9)	1.63	.59 [.49, .68]
Restricted ASSET Pilot	4.80 (6)	1.36	.62 [.53, .71]
Full ASSET Main	7.14 (10)	2.01	.64 [.58, .69]
Restricted ASSET Main	5.53 (7)	1.61	.68 [.62, .73]
Full ASSET Validation	5.14 (8)	1.79	.57 [.48, .65]
Restricted ASSET Validation	4.66 (7)	1.69	.61 [.53, .69]
Pilot S&P (Subset of ASSET Pilot)	4.14 (5)	1.05	.46 [.32, .59]
Validation S&P (Independent of ASSET Validation)	4.06 (5)	1.05	.42 [.30, .54]

the same seven items in both the main component and the validation component (see Figure 2). Again, the factor score of the 7-item factor solution correlated strongly with the raw scores (r = .85, 95% CI [.81, .89], $p < 10^{-62}$). It is worth noting that two additional items (FL 4 and 5) had loadings less than .4; these were nevertheless retained to ensure comparability of results between the main sample and validation sample.

Table 5. IRT parameters

	Pilot sample						Main sample						Validation sample					
	Full (variance explained = .30)			Subset (variance explained = .42)			Full (variance explained = .33)			Subset (variance explained = .44)			Full (variance explained = .33)			Subset (variance explained = .36)		
Item	Difficulty	Discrimination	Loading	Difficulty	Discrimination	Loading	Difficulty	Discrimination	Loading	Difficulty	Discrimination	Loading	Difficulty	Discrimination	Loading	Difficulty	Discrimination	Loading
FL1	−1.80	0.79	0.62	−1.85	0.85	0.65	−1.15	0.57	0.49	−1.13	0.53	0.47	−0.93	0.69	0.57	−0.93	0.69	0.57
FL2	−0.75	0.22	0.21				0.46	0.26	0.25									
FL3	−0.94	0.16	0.16				−0.97	0.37	0.35									
FL4	−1.13	0.58	0.50	−1.13	0.58	0.50	−0.99	1.08	0.73	−1.06	1.23	0.78	0.17	0.27	0.26	0.17	0.27	0.26
FL5	−1.17	1.00	0.71	−1.43	1.42	0.82	−0.59	0.97	0.70	−0.61	1.02	0.72	−1.10	0.31	0.29	−1.09	0.30	0.29
FL6	−1.89	0.96	0.69	−1.80	0.86	0.65	−2.23	1.24	0.78	−2.13	1.15	0.75	−1.50	0.62	0.53	−1.49	0.60	0.52
FL7	−0.76	0.72	0.59	−0.74	0.68	0.56	−1.23	1.05	0.73	−1.26	1.11	0.74	−0.28	1.34	0.80	−0.29	1.38	0.81
FL8	−1.60	0.35	0.33				−1.60	0.71	0.58	−1.55	0.64	0.54	−0.45	0.75	0.60	−0.45	0.74	0.60
FL9	−0.39	1.05	0.72	−0.36	0.92	0.68	−0.48	0.64	0.54	−0.48	0.67	0.56	0.06	1.84	0.88	0.06	1.93	0.89
FL10							0.10	0.32	0.30				0.04	0.07	0.07			

ASSET did not show a ceiling effect in the third sample, but the S&P did: The average TFL was 4.66 out of 7 (SD = 1.69) for scores on ASSET, and 4.06 out of 5 (SD = 1.05) for the S&P questions. Accuracy rates on ASSET ranged from 90% for the easiest item, to 43% for the most difficult item, while they ranged from 88% to 65% for the S&P measures. Cronbach's α was .61 (95% CI [.53, .69]) for ASSET and .42 (95% CI [.30, .54]) for the S&P measure, in line with our previous findings. Factor loadings of ASSET measures ranged from .24 to .81 (M = .56).

Validating ASSET

Convergent Validity

The validation component included both the full S&P and ASSET, so that we could compare the two measures. Total scores on S&P and ASSET correlated strongly with each other, r = .62, 95% CI [.53, .69], $p < 10^{-23}$. However, ASSET and the S&P measure both include the same item testing the understanding of inflation. Excluding this item from ASSET yielded a correlation of r = .56, 95% CI [.46, .64], $p < 10^{-18}$.

Face Validity

The validation study included a measure of self-rated financial literacy ranging from 1 (= *far below average*) to 7 (= *far above average*). Self-rated financial literacy was associated with performed financial literacy as measured by ASSET, r = .42, 95% CI [.30, .52], p < .001. A majority of the participants rated their own financial literacy skills to be above the central response option, meaning that most respondents thought they were more financially literate than the average person (M = 4.29, SD = 1.35). This above-average effect was stronger for participants who were asked to rate their skills before they completed the financial literacy measures (M = 4.57, SD = 1.23), than for those who had already completed them (M = 3.92, SD = 1.42), t(186.79) = 3.59, p < .001, indicating a humbling order-effect for perceived financial literacy. The order effect did not moderate the relation between measured and actual financial literacy, as measured by an insignificant interaction effect between the order of presentation and self-rated financial literacy, on TFL scores (β = .21, p = .14).

Criterion Validity

In the validation component, participants were asked five questions about their budgeting and savings behaviors (see E4 in ESM 1). The scores of these five items showed high internal consistency (Cronbach's α = .81, 95% CI [.77, .85]) and were consequently summed. ASSET results were then used to predict this financial behavior score using linear regression. ASSET scores were positively associated

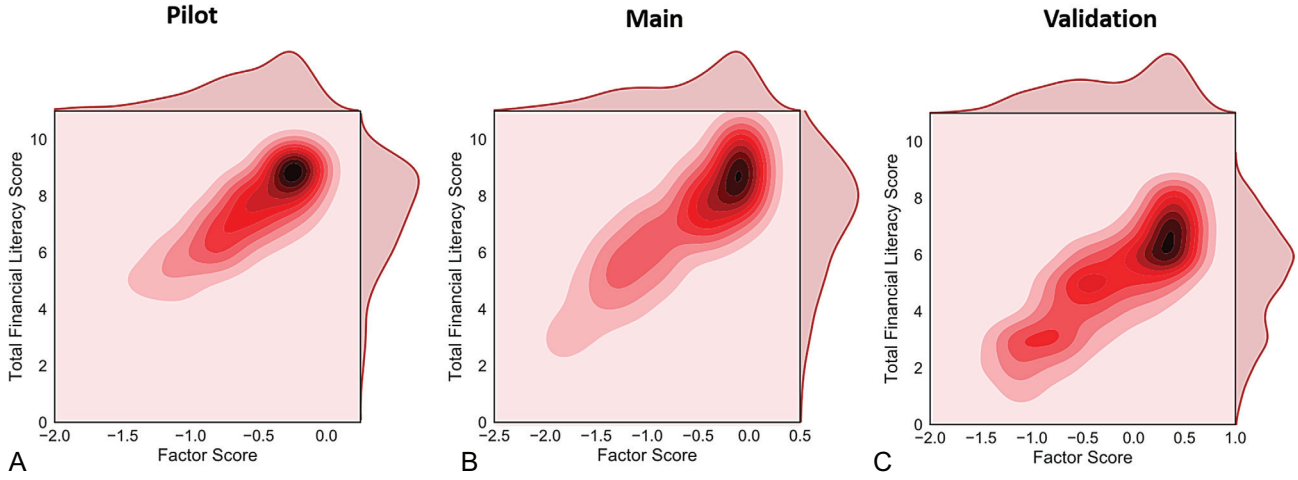

Figure 3. The relationship between the total financial literacy score and the subset factor score: (A–C) bivariate kernel densities illustrating the relationship between the total financial literacy scores of participants and their IRT factor scores for the subset factor solutions. Despite that all variables are negatively skewed, and that this skew is stronger for the factor solutions than the total scores, the two variables are obviously positively correlated. Factor scores were determined by weighting the data matrix by regression-based weights (see Revelle, 2017).

with participant likelihood to engage in savings and budgeting behaviors, $\beta = 0.36$, $SE = 0.17$, $t(215) = 2.13$, $p = .03$. In the validation study, we also asked participants how often they paid for speedy shipping when ordering items online and whether they made in-app purchases in freemium games, ranging from 1 (= *never*) to 5 (= *always*). Seventy-five percent of participants responded that they *never* or *rarely* order goods online and 75% of respondents said that they *never* made in-app purchases. Because of the ordinal nature of the outcomes, we predicted shipping payments and in-app purchases from ASSET scores using a Poisson regression. ASSET scores were not associated with ordering behavior, $\beta = -0.03$, $SE = 0.03$, $z = -1.106$, $p = .27$, nor with in-app purchases, $\beta = 0.01$, $SE = 0.03$, $z = 0.17$, $p = .87$.

Divergent Validity

In the main component of the study, we asked five questions relating to how susceptible participants were to change their mind in relation to outside influences (peers and parents, see ESM 1). We added these five nudging questions together and correlated them with the final 7-item ASSET score to test the divergent validity of the instrument, as we had no a priori reason to believe that financial literacy should be associated with susceptibility to outside influences. However, we found a negative association between ASSET scores and susceptibility to changing one's mind ($r = -.19$, 95% CI [−.29, −.09], $p = .0003$). In retrospect, the reason for this correlation might be that all of the nudging questions related to financial decisions, and respondents who are more financially literate might be less inclined to be swayed by outside advice.

Demographic Predictors of ASSET

In order to explore which demographic factors relate to ASSET scores among young people, we used the factor scores as our outcome measure to maximize our statistical power. Both the pilot and the main component surveys included five demographic questions: age of participants, gender of participants, whether the participant attended a state or public school, parental income, and parental education. For gender, we only included participants replying "Male" or "Female" to ensure we had enough data for reliable coefficients estimates. Parental income was dichotomized for the same reason, to £30,000/year or less on the one hand, and more than that on the other. Parental education was combined into three levels "Secondary education or less," "Apprenticeship or equivalent," and "Undergraduate degree or above." We also included participant calculator use as a predictor.

In total, there were six variables of interest, five demographic variables, and a control variable relating to calculator use. However, we included two beta coefficients for parental education to test for the presence of non-linear effects, resulting in seven candidate predictors. In order to find the best combination of these seven, we ran a best subset selection algorithm that selected the best fitting model for each number of predictors, ranging between 0 (the null model) and 7 (including all predictors). We then used 10-fold cross-validation to determine how many predictors minimized the out-of-sample mean residual error for each dataset. For the pilot data, a single variable model exhibited the lowest out-of-sample mean residual error, whereas a three variable model fit the main data best (see Figure 4).

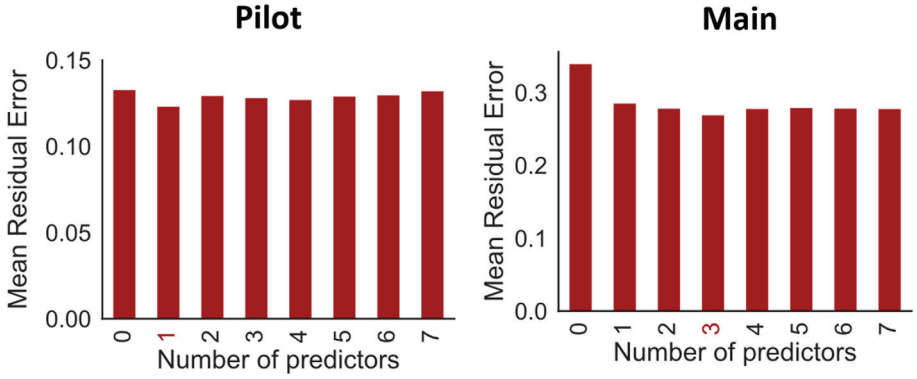

Figure 4. Out of sample mean residual error for the best fitting model for a set number of demographic predictors.

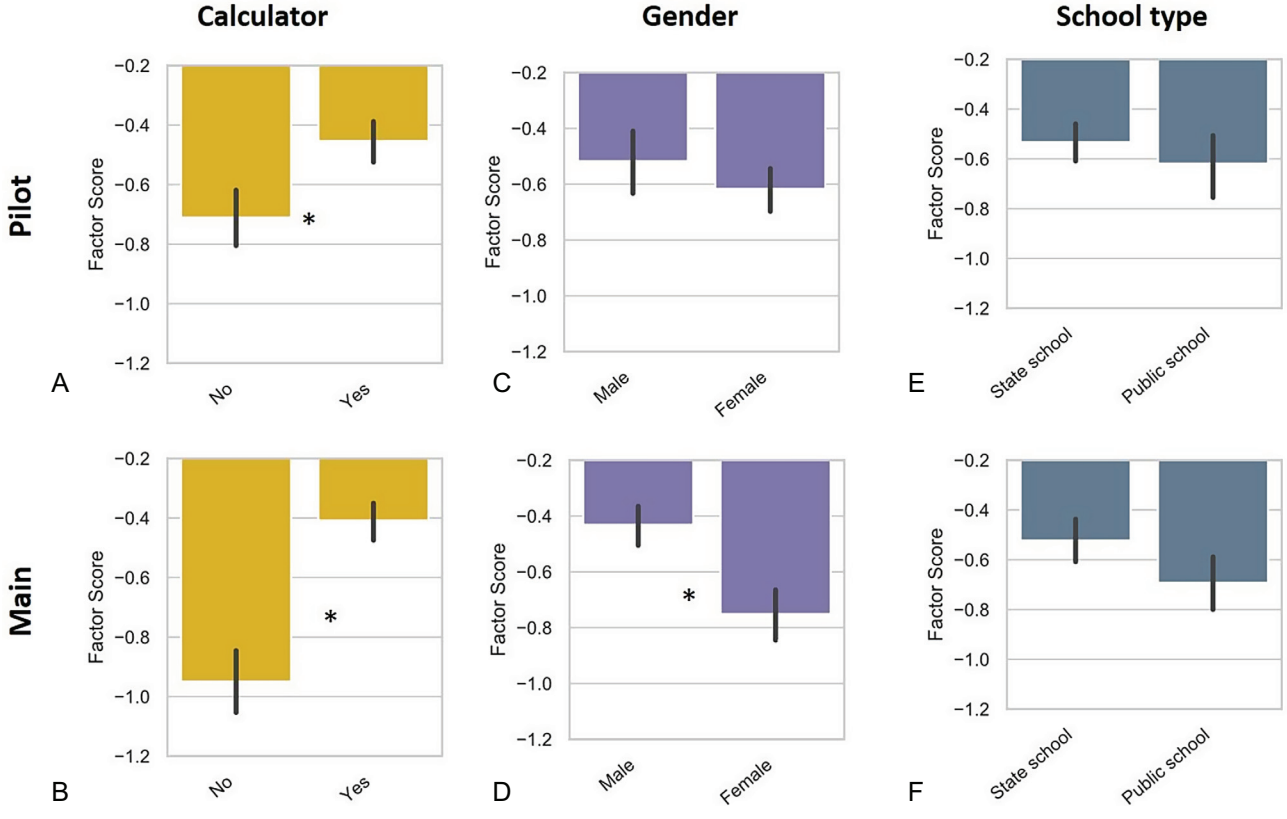

Figure 5. Calculator use and gender predict financial literacy. Error bars indicate bootstrapped 95% confidence intervals. An asterisk signifies that the variable was part of the best fitting model according to the best subset selection cross validation procedure.

In Figure 4, the left-most null model only includes an intercept, and the right-most model includes all five demographic variables and the calculator variable (with two coefficients for the parental education, one linear and one quadratic). A model with one predictor fit the pilot data best, whereas a model with three predictors fit the main data best.

The model that fit the pilot data best included a positive coefficient for calculator use, meaning that participants who used calculators had higher financial literacy scores on average than those who did not ($\beta = 0.21$, $SE = 0.05$, $t(106) = 4.19$, $p > 10^{-4}$; see Figure 5). This model explained 14% of the total variance. It is worth noting that the best model based on TFL was a three-predictor model, which was the runner up for the factor score based model as well. In both cases, this model included parental education (higher parental education was associated with higher financial literacy) and the gender of the student (men tended to score higher than women) as well as whether participants used a calculator or not.

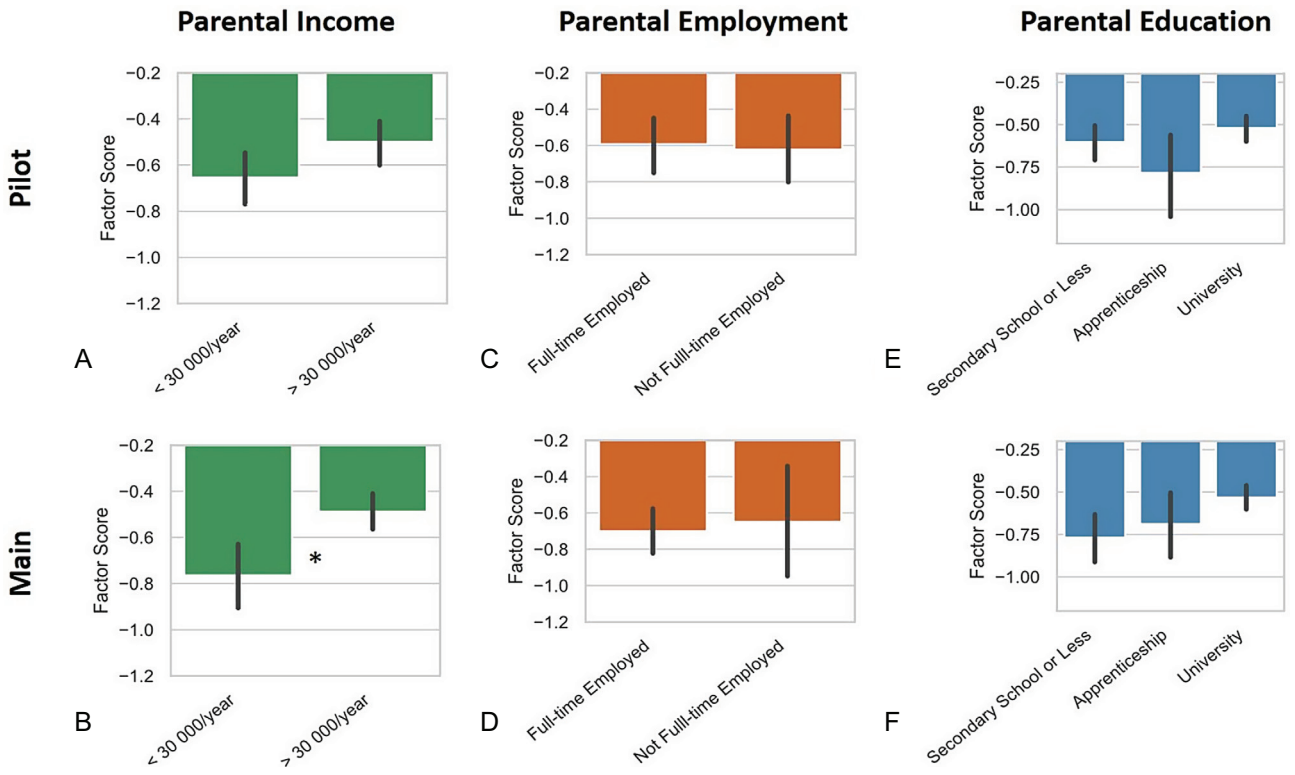

Figure 6. Parental employment status and education do not predict financial literacy. Error bars indicate bootstrapped 95% confidence intervals. An asterisk signifies that the variable was part of the best fitting model according to the best subset selection cross validation procedure.

As reported in Figure 5, calculator use was positively associated with ASSET scores in both components. Males performed better than females in the main component, but not in the pilot component. School type did not reliably predict ASSET scores in either component.

The model that fitted the main data best included positive coefficients for calculator use and parental income and gender. This means that participants who used calculators typically had higher financial literacy scores ($\beta = 0.32$, $SE = 0.05$, $t(232) = 6.66$, $p < 10^{-9}$; see Figure 5), that male participants on average scored higher than female participants ($\beta = 0.19$, $SE = 0.07$, $t(232) = 2.89$, $p = .005$; see Figure 5), and that participants with wealthier parents tended to have higher financial literacy ($\beta = 0.15$, $SE = 0.05$, $t(232) = 2.54$, $p = .01$; see Figure 6). This model explained 22% of the total variance. Finally, we tested whether parental employment status predicted financial literacy scores for those who did not know their household income. Parental employment status did not significantly predict financial literacy scores for either the pilot sample, $t(18.42) = 0.23$, $p = .82$, or the main sample, $t(18.95) = -0.30$, $p = .76$.

Parental income was positively associated with ASSET scores in the main component. No other parental SES variables reliably predicted financial literacy scores. Error bars show bootstrapped 95% CIs. A star signifies that the variable was part of the best fitting model according to the best subset selection cross-validation procedure, or that the main effect was significant for Welch's *t*-test for the parental employment variable.

Discussion

The purpose of this study was to develop a psychometrically robust measure of financial literacy for young adults that covers a diverse set of financial competences and socioeconomic standing. Many studies have undertaken the task of estimating financial literacy and its consequences (e.g., Atkinson & Messy, 2011; Financial Literacy & Education Commission, 2006; Hung, Parker, & Yoong, 2009; OECD, 2016a), but most have focused on adults. Creating a reliable measure that is adapted to financial behaviors of young people enables a more efficient assessment of deficiencies in financial literacy, which in turn enable targeted interventions and more effective evaluation of policies that aim to improve the financial literacy for this demographic group.

Table 6. Comparison between S&P and ASSET

	S&P	ASSET
Number of items	5	7
Cronbach's α	.42–.46	.61–.68
Contains real-world examples relevant to young people	No	Yes
Ceiling effect in Western samples	Yes	No

ASSET, the measure we introduce in this paper, provides a number of incremental benefits relative to existing measures that, together, add up. To illustrate we compare ASSET with the widely used S&P measure (see Table 6).

First, though the internal reliability of ASSET is suboptimal, it is markedly more reliable than the S&P (with an average improvement of 20 percentage points). Additionally, in contrast to the S&P, ASSET items contain real-world examples that are relevant to young people, addressing the gap between theoretical and applied knowledge that has previously been identified (Jang et al., 2014). Finally, because the ASSET items are more difficult, they can capture a wider range of financial ability than the general S&P items and other scales that have focused on diagnosing low-performers (Lusardi & Mitchell, 2011). While all of these differences are incremental rather than radical, we believe that the combined effect of these benefits provides a compelling case for use of ASSET over existing measures.

Expanding on the ceiling effect in our pilot component, that, to the best of our knowledge, we are the first to report: In the initial pilot sample more than half of the participants scored eight or higher on a 9-point scale, while in the main sample, half of the participants scored eight or higher on a 10-point scale, but with a more varied distribution of lower scores. While we attempted to sample these two components from as broad a selection of schools as possible, we cannot ensure sample representativeness of the full population (i.e., schools could choose whether to circulate our surveys and individual students could choose whether to partake).

One way in which the main and pilot samples differed from the English population is that household incomes were higher. SES has been shown to be related to high financial literacy in other research (Rothstein & Rouse, 2011) as well as in our main sample. It is worth noting that the validation component, which differed from the previous components in that participants were recruited online and were offered monetary compensation, did not show this skew in the financial literacy score. This final group also responded to the survey much faster than the pilot and the main experimental groups, suggesting that a combination of self-selection and higher motivation may explain the surprisingly high scores in the first two groups.

We have demonstrated the validity of this new measure by comparing it with an existing measure (S&P), and by successfully predicting self-reported financial management behaviors from ASSET scores. Neither of these measures of validity are perfect; as highlighted above, we consider the S&P to have certain limitations (if it did not, the current work would have been redundant). We are also aware that self-report leads to noisy measurement. However, we believe that both of these measures capture some signal and that they are both correlated with ASSET counts in its favor. Regarding divergent validity, we attempted to show the independence between ASSET scores and susceptibility to parental and peer pressure. Somewhat surprisingly, we found a weak negative correlation between ASSET and this outcome. This might be because the questions relating to susceptibility to outside influences were also related to financial decisions, and because we found that ASSET scores were associated with self-reported financial literacy, that is, participants who felt more financially competent might have been less inclined to change their financial decisions because of external feedback.

The final seven ASSET items were all strongly associated with mathematical ability (as reported in Results section). This, together with how calculator usage strongly predicted performance in both the pilot data and the main data, suggests that financial literacy as measured by ASSET is strongly related to mathematical ability. Lusardi (2012), among others, has highlighted the well-established link between mathematical ability and financial literacy as financial numeracy: the ability to use basic arithmetic skills and calculations when faced with financial decisions and their long-term outcomes. Furthermore, it has been shown that financial literacy scores tend to be related to general intelligence and mathematical ability (Huhmann & McQuitty, 2009; Lusardi, 2012).

While the utilization of calculators may appear trivial as a predictor of performance, there are implications from this finding. By opting to use a calculator, participants have demonstrated a preference for deliberative thinking. With encouraging evidence on encouraging such behaviors, known as boosts (Hertwig & Grüne-Yanoff, 2017), our findings indicate that interventions may benefit substantially by focusing on deliberation as opposed to simply financial concepts.

Consistent with previous literature (e.g., Chen & Volpe, 1998; Lusardi & Mitchell, 2008; Lusardi & Tufano, 2015; Monticone, 2010; Mottola, 2013), the analysis of gender differences has shown that male participants have scored significantly higher than female participants. The current study appears also to confirm the well-documented

relationship between SES and financial literacy (e.g., Coppola, Langley, Sabatini, Wolf, & International Pensions 2017; de Bassa Scheresberg, Lusardi, & Yakoboski, 2014; Lusardi & Mitchell, 2014).

Limitations and Future Research

To complement the current study that tested self-selected samples from schools all over the UK, as well as online-recruited samples from the UK and the US, we suggest applying the same instrument to all students in a single school, or a small set of schools. This would allow for a more careful study of the effect of SES in a context where the school itself was controlled for, and allow for linking ASSET scores to performance on experimental economic games. This would also allow researchers to control for calculator use as part of the experimental design, as we found that the use of calculators (or lack thereof), strongly influences scores and thus harms comparability lest they are controlled for, either statistically or experimentally. Our tentative recommendation is that researchers, when possible, ensure that all students have access to a calculator when taking the test, as that is the more naturalistic choice given the ubiquity of smartphones. If several schools are included in the follow-up study, it would be worthwhile to select schools that vary widely with regards to SES as that would allow to compare the explanatory power of individual SES in relation to the resources of the school with regards to financial literacy.

In this paper, we intended to introduce a short reliable and valid measure of financial literacy, but our results suggest that financial literacy might not be a unitary construct. Given that we found that items related to interest rates and risk diversification loaded poorly on a single factor solution, it would be worthwhile to include multiple, sufficiently challenging items relating to inflation, interest rates and risk diversification, as well as numeracy. This would allow for a more careful exploration of the dimensionality of financial literacy, as well as supporting the principled selection of the subset of items with the highest explanatory power. Furthermore, an increase in the number of response options would decrease the influence of guessing and thus provide greater sensitivity. Once a test with good psychometric properties has been designed and validated, it can be used to cheaply evaluate interventions designed to improve financial literacy.

We also note the potential limitations of running this study entirely online, in that it is a test and could, therefore, have resulted in cheating or getting help with answers. As there is no incentive tied to optimal performance, we do not anticipate this is a likely concern. Additionally, by using Prolific as the chosen platform (in the validation study), the vetting process for participants reduces concerns about naïveté in research sample pools (Chandler, Mueller, & Paolacci, 2014).

Conclusion

We have introduced an improved measure of financial literacy in terms of superior psychometric properties compared to an existing instrument and demonstrated its convergent and criterion validity. Encouragingly, the demographic predictors of financial literacy on this instrument generally match existing research. However, further work on the psychometrics of financial literacy is required to determine the dimensionality of the construct as well as the cause of the ceiling effects we observed.

Ultimately, the best possible version of a financial literacy measure should include all relevant financial topics – interest, investment, inflation, exchange – such that they load on to a scale or scales in a way that is robust and has good statistical fit while remaining valid and reliable. Such a measure would allow for the effective targeting of young people with poor financial literacy or simply assisting with identifying optimal choices on major decisions. Targeting younger populations is worthwhile as major financial decisions occur early in life – and in the case of education funding, covers very large amounts. This puts those with lower financial literacy at risk of making more negative decisions with long-term consequences (Belfield et al., 2017), potentially without their awareness (Clark, 2017). One major example of poor financial decision-making involves student loans, which can actually increase economic inequalities for those attempting to extend their studies, which is the opposite of the intended effect of higher education. Therefore, an effective measure that can capture baseline financial literacy in young people, and evaluate potential interventions that also address temporal factors, is crucial to develop educational and other policy initiatives to safeguard the long-term economic well-being of young people.

Electronic Supplementary Material

The electronic supplementary material is available with the online version of the article at https://doi.org/10.1027/1015-5759/a000575

ESM 1. ASSET pilot and final versions, standard and poor's ratings services Global Financial Literacy Survey, additional items from the validation component (Saving and spending behavior, Paying for shipping, Freemium games, Self-perceived financial literacy), Recruitment procedure, Asset Correlations, ASSET Proportion Correct, and Tetrachoric Correlations and response thresholds.

References

Ali, P., Anderson, M., McRae, C., & Ramsay, I. (2014). The financial literacy of young Australians: An empirical study and implications for consumer protection and ASIC's National Financial Literacy Strategy. *Company and Securities Law Journal, 32*, 334–352.

Almenberg, J., Lusardi, A., Säve-Söderbergh, J., & Vestman, R. (2018). *Attitudes toward debt and debt behavior*. (Working paper no. w24935). Stockholm, Sweden: National Bureau of Economic Research. https://doi.org/10.3386/w24935

Atkinson, A., & Messy, F.-A. (2011). Assessing financial literacy in 12 countries: An OECD/INFE international pilot exercise. *Journal of Pension Economics and Finance, 10*, 657–665. https://doi.org/10.1017/S1474747211000539

Belfield, C., Britton, J., Dearden, L., & van der Erve, L. (2017). *Higher Education funding in England: Past, present and options for the future*. London, UK: Institute for Financial Studies.

Bolton, P. (2017). *Student loan statistics*. London, UK: House of Commons Library.

Breitbach, E., & Walstad, W. B. (2016). Financial literacy and financial behavior among young adults in the United States. In E. Wuttke, J. Seifried, & S. Schumann (Eds.), *Economic competence and financial literacy of young adults – status and challenges* (pp. 81–100). Leverkusen, Germany: Barbara Budrich.

Callender, C., & Mason, G. (2017). Does student loan debt deter higher education participation? New evidence from England. *The ANNALS of the American Academy of Political and Social Science, 671*, 20–48. https://doi.org/10.1177/0002716217696041

Chandler, J., Mueller, P., & Paolacci, G. (2014). Nonnaïveté among Amazon Mechanical Turk workers: Consequences and solutions for behavioral researchers. *Behavior Research Methods, 46*, 112–130. https://doi.org/10.3758/s13428-013-0365-7

Chen, H., & Volpe, R. P. (1998). An analysis of personal financial literacy among college students. *Financial Services Review, 7*, 107–128. https://doi.org/10.1016/S1057-0810(99)80006-7

Clark, E. (2017). *Packhorse Generation: The long debt tail of student loans*. London, UK: Intergenerational Foundation.

Coppola, M., Langley, G., Sabatini, M., & Wolf, R. (2017). When will the penny drop? Money, financial literacy and risk in the digital age. Allianz International Pension Papers, 1. Retrieved from https://gflec.org/wp-content/uploads/2017/01/AGI-IPP_1-17_Financial-Literacy_FINAL.pdf?x28148

de Bassa Scheresberg, C., Lusardi, A., & Yakoboski, P. J. (2014). *College-educated millennials: An overview of their personal finances*. New York, NY: TIAA-CREF Institute and the Global Financial Literacy Excellence Center.

De Meza, D., Irlenbusch, B., & Reyniers, D. (2008). *Financial capability: A behavioural economics perspective*. London, UK: Financial Services Authority.

Financial Literacy & Education Commission. (2006). *Taking Ownership of the Future. The National Strategy for Financial Literacy*. Retrieved from https://www.treasury.gov/about/organizational-structure/offices/Domestic-Finance/Documents/Strategyeng.pdf

Gamble, A., Gärling, T., & Michaelsen, P. (2019). Young adults' attitudes toward borrowing. In J. C. Hauff, T. Gärling, & T. Lindblom (Eds.), *Indebtedness in early adulthood: Causes and remedies* (pp. 65–87). Cham, Switzerland: Palgrave Macmillan.

Hertwig, R., & Grüne-Yanoff, T. (2017). Nudging and boosting: Steering or empowering good decisions. *Perspectives on Psychological Science, 12*, 973–986. https://doi.org/10.1177/1745691617702496

Huhmann, B. A., & McQuitty, S. (2009). A model of consumer financial numeracy. *International Journal of Bank Marketing, 27*, 270–293. https://doi.org/10.1108/02652320910968359

Hung, A. A., Parker, A. M., & Yoong, J. K. (2009). Defining and measuring financial literacy. *RAND labor and population (Vol. 708)* . Retrieved from https://www.rand.org/content/dam/rand/pubs/working_papers/2009/RAND_WR708.pdf

Jang, K., Hahn, J., & Park, H. J. (2014). Comparison of financial literacy between Korean and US high school students. *International Review of Economics Education, 16*, 22–38. https://doi.org/10.1016/j.iree.2014.07.003

Klapper, L., Lusardi, A., & Van Oudheusden, P. (2015). *Financial literacy around the world. Standard & Poor's ratings services global financial literacy survey*. Washington, DC: Standard & Poor's.

Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research, 8*, 239–260. https://doi.org/10.1080/13504620220145401

Lusardi, A. (2012). Numeracy, financial literacy, and financial decision-making. *Numeracy, 5*, 1–14. https://doi.org/10.5038/1936-4660.5.1.2

Lusardi, A., & Mitchell, O. S. (2007). Baby Boomer retirement security: The roles of planning, financial literacy, and housing wealth. *Journal of Monetary Economics, 54*, 205–224. https://doi.org/10.1016/j.jmoneco.2006.12.001

Lusardi, A., & Mitchell, O. S. (2011). Financial literacy around the world: An overview. *Journal of Pension Economics and Finance, 10*, 497–508. https://doi.org/10.1017/S1474747211000448

Lusardi, A., & Mitchell, O. S. (2008). *Planning and financial literacy: How do women fare?* (No. w13750). Stockholm, Sweden: National Bureau of Economic Research. https://doi.org/10.3386/w13750

Lusardi, A., & Mitchell, O. S. (2014). The economic importance of financial literacy: Theory and evidence. *Journal of Economic Literature, 52*, 5–44. https://doi.org/10.2139/ssrn.2243635

Lusardi, A., Mitchell, O. S., & Curto, V. (2010). Financial literacy among the young. *Journal of Consumer Affairs, 44*, 358–380. https://doi.org/10.1111/j.1745-6606.2010.01173.x

Lusardi, A., & Tufano, P. (2015). Debt literacy, financial experiences, and overindebtedness. *Journal of Pension Economics and Finance, 14*, 332–368. https://doi.org/10.1017/S1474747215000232

Mandell, L. (2008). *The financial literacy of young American adults: Results of the 2008 National Jump$tart Coalition survey of high school seniors and college students*. Washington, DC: The Jump $tart Coalition for Personal Financial Literacy.

Monticone, C. (2010). How much does wealth matter in the acquisition of financial literacy? *Journal of Consumer Affairs, 44*, 403–422. https://doi.org/10.1111/j.1745-6606.2010.01175.x

Mottola, G. R. (2013). In our best interest: Women, financial literacy, and credit card behavior. *Numeracy, 6*, 4. https://doi.org/10.5038/1936-4660.6.2.4

OECD. (2016a). *OECD/INFE International Survey of Adult Financial Literacy Competencie"*. OECD: Paris, France. Retrieved from www.oecd.org/finance/OECD-INFE-International-Survey-of-Adult-Financial-Literacy-Competencies.pdf

OECD. (2016b). *PISA 2015 results: Excellence and equity in education* (Vol. I) . Paris, France: Author.

OECD INFE. (2011). Measuring financial literacy: Core questionnaire. *Measuring financial literacy: Questionnaire and guidance notes for conducting an internationally comparable survey of financial literacy*31. Retrieved from https://www.oecd.org/finance/financial-education/49319977.pdf

Office for National Statistics (ONS). (2017). *Gross household income by income decile group, UK, financial year ending 2016*. Retrieved from https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/adhocs/006770grosshouseholdincomebyincomedecilegroupukfinancialyearending2016

Pollard, E., Hunt, W., Hillage, J., Drever, E., Chanfreau, J., Coutinho, S., & Poole, E. (2013). *Student Income and Expenditure Survey 2011/12*. Brighton, UK: Institute for Employment Studies. Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/301467/bis-14-723-student-income-expenditure-survey-2011-12.pdf

Remund, D. L. (2010). Financial literacy explicated: The case for a clearer definition in an increasingly complex economy. *Journal of Consumer Affairs, 44*, 276–295. https://doi.org/10.1111/j.1745-6606.2010.01169.x

Revelle, W. R. (2017). *psych: Procedures for personality and psychological research*. Retrieved from https://cran.r-project.org/web/packages/psych/psych.pdf

Riitsalu, L., & Põder, K. (2016). A glimpse of the complexity of factors that influence financial literacy. *International Journal of Consumer Studies, 40*, 722–731. https://doi.org/10.1111/ijcs.12291

Rothstein, J., & Rouse, C. E. (2011). Constrained after college: Student loans and early-career occupational choices. *Journal of Public Economics, 95*, 149–163. https://doi.org/10.3386/w13117

Schuhen, M., & Schurkmann, S. (2014). Construct validity of financial literacy. *International Review of Economics Education, 16*, 1–11. https://doi.org/10.1016/j.iree.2014.07.004

Sohn, S.-H., Joo, S.-H., Grable, J. E., Lee, S., & Kim, M. (2012). Adolescents' financial literacy: The role of financial socialization agents, financial experiences, and money attitudes in shaping financial literacy among South Korean youth. *Journal of Adolescence, 35*, 969–980. https://doi.org/10.1016/j.adolescence.2012.02.002

Wuttke, E., & Aprea, C. (2018). A situational judgement approach for measuring young adults' financial literacy. *Empirische Pädagogik, 32*, 272–292.

History
Received February 4, 2019
Revision received November 6, 2019
Accepted November 16, 2019
Published online March 13, 2020
EJPA Section / Category Miscellaneous / Other

Authorship
Tomas Folke and Jovana Gjorgjiovska share the first authorship.

Funding
Partial funding for this work was provided by the PEXIM Foundation via Jovana Gjorgjiovska. Partial funding for the publication was provided to Lea Jakob by the Charles University Programme Progress Q15, "Life course, lifestyle and quality of life from the perspective of individual adaptation and the relationship of the actors and institutions." Tomas Folke is funded through the UK Research and Innovation GCRF RESEARCH FOR HEALTH IN CONFLICT (R4HC-MENA); developing capability, partnerships and research in the Middle and Near East (MENA) ES/P010962/1.

ORCID
Tomas Folke
https://orcid.org/0000-0001-6768-8426

Tomas Folke
The Policy Research Group
The Centre for Business Research
University of Cambridge
Trumpington Street
Cambridge, CB2 1AG
United Kingdom
tomas.folke@gmail.com

European Journal of Psychological Assessment

ASSET: A New Measure of Economic and Financial Literacy

Tomas Folke, Jovana Gjorgjiovska, Alessandro Paul, Lea Jakob, and Kai Ruggeri

Online First Publication, March 13, 2020. http://dx.doi.org/10.1027/1015-5759/a000575