

WHY DO CONSUMERS REMAIN FINANCIALLY ILLITERATE? THE EMPIRICAL TEST OF SOME LESS INVESTIGATED REASONS

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ABSTRACT

Although financial literacy becomes increasingly important in more and more financialised world, and despite broad-based financial education interventions, consumers still display large shortcomings in the literacy. In this study, using multivariate linear regression and a nationally representative sample of adult Poles (N=1,067), we test some little-studied potential determinants of financial literacy with the purpose to further explain low financial literacy levels. We found that respondents who are more interested in financial domain, have less difficulty in understanding information supplied by means of numbers, and report more learning from own mistakes are at the same time more financially literate, even after controlling for sociodemographic characteristics. Possible implications regarding the role of these factors for financial education are discussed.

Keywords: Financial literacy, Financial education, Numeracy.

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INTRODUCTION

Financial literacy is deemed an important life competence nowadays. However, worldwide research shows that – on average – consumers are financially illiterate or display low levels of

financial literacy (Klapper, Lusardi, and Van Oudheusden, 2015; OECD/INFE, 2016; Xu and Zia, 2012; Stolper and Walter, 2017). At the same time, the effectiveness of financial education programs is questioned (Fernandes,

Lynch, and Netemeyer, 2014; Hastings, Madrian, and Skimmyhorn, 2013; Willis, 2008). Therefore, it is very likely that the educational interventions do not address some important determinants of financial literacy. It is also possible that, for some reasons, individuals are 'immune' to financial education, decide not to acquire financial literacy, or encounter serious barriers in acquisition of the literacy. To bring additional light on this puzzling issue of widespread and persisting shortcomings in financial literacy, in this article we demonstrate the results of our study in which we examined some cognitive, affective, behavioural and attitudinal determinants of financial literacy which were suggested by previous literature as presumably significant, but hardly investigated empirically so far.

Increasing financialization makes the negative consequences of financial ignorance more and more severe. Financially illiterate individuals are increasingly likely to get excluded from financial markets (Grohmann, Klühs, and Menkhoff, 2018; Atkinson and Messy, 2013; Xu and Zia, 2012), they are also more prone to perform unhealthy financial behaviours (see Stolper and Walter, 2017 for a comprehensive overview). In turn, it is documented that ill financial decisions lead to low levels of long-life well-being indicators, both objectively measured and self-reported, as well as financial and overall ones (Joo and Grable, 2004; Ali, Rahman, and Bakar, 2015; S. Brown and Gray, 2016; Shim et al., 2010, 2009), and to health deterioration (Neill et al., 2005; Lenton and Mosley, 2008). A lot is known about the link between standard sociodemographic characteristics and financial literacy. This allowed identifying those groups of consumers who need financial education the most, and to design appropriate, customised programs supporting financial literacy. It is established, for instance, that financial literacy increases with the educational attainment and income level, and that it is usually higher among men compared to women (see Stolper and Walter, 2017; Lusardi and Mitchell, 2014 for an overview and discussion). The relationship between financial literacy and age is significant, yet more complex (see Cwynar, Cwynar, and Wais, 2018 for a discussion). Some studies evidenced also that financial literacy starts

being acquired as early as in the childhood as a part of financial socialisation process (Shim et al., 2010; Grohmann, Kouwenberg, and Menkhoff, 2015; Sabri et al., 2010).

Nevertheless, prior studies paid more attention to the effect of financial literacy on financial behaviour and less attention to what determines financial literacy. Many potentially significant determinants of financial literacy – other than standard sociodemographic features – have been studied to a very limited extent. They include both cognitive (e.g. numerical abilities), affective (e.g. emotions surrounding financial issues), as well as behavioural (e.g. learning from own mistakes) and attitudinal factors (e.g. an interest in financial matters, perception of financial tasks, attitude towards mathematics and other number-related subjects). The aim of this study is to examine the self-stated levels of these underrated factors against objectively measured financial literacy to learn more about what and how relates to the literacy.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

To date, empirical research indicates that financial literacy is strongly related to overall cognitive abilities (Lusardi, Mitchell, and Curto, 2010; Herd, Holden, and Su, 2012). Among these abilities, a pivotal role is assigned to numerical abilities or, briefly, to numeracy. A significant and positive link between numeracy and financial literacy has been corroborated in previous studies (Grohmann, Kouwenberg, and Menkhoff, 2015; Skagerlund et al., 2018; OECD, 2015). This comes as no surprise given that financial management is, to a large extent, about numbers and requires an ability in working with the numbers. As a result, majority of tests developed to diagnose the level of financial literacy incorporates numbers as an integral part (except for certain purely factual questions). Regrettably, most previous studies focused on the link between numeracy and financial behaviour (e.g., Cole, Sampson, and Zia, 2011), often equating financial literacy with numeracy (e.g., French and McKillop, 2016; Gerardi, Goette, and Meier, 2013; Almenberg and Dreber, 2015; Banks and Oldfield, 2007 even use the term 'financial numeracy').

However, as argued by Hung et al., 2009, numeracy applies not only to financial affairs and hence should be separated from financial literacy. Hastings, Madrian, and Skimmyhorn, 2013 indicate that checking how important numeracy is for determining financial literacy poses one of the key directions for future research. Hence, based on the existing literature, we proposed the following hypothesis:

H1: Respondents who report less difficulty in extracting knowledge from numbers should be more financially literate.

Fünfgeld and Wang, 2009 found that the interest in financial issues (matters) was one of key dimensions discriminating consumers in terms of their self-stated attitudes and behaviours in a comprehensive range of daily financial affairs. If financial behaviour it is strongly linked to financial literacy, as mentioned in the Introduction of this article, then perhaps the interest in financial matters discriminates not only financial behaviour, but also financial literacy. Chen and Volpe, 2002 showed that the importance attached to (or interest in) mathematics and other number-related subjects was different among female and male students and that there was a significant gender gap in financial literacy in favour of men. The attitude to number-related subjects may also explain the difference in the interest in financial affairs found between women and men. For instance, Brown and Graf, 2013 found that women were less interested than men in financial affairs and that, at the same time, women were less financially literate. Herd, Holden, and Su, 2012 found that math-specific skills measured in the early-life might be more important for the late-life financial knowledge than the general reading comprehension. On a more general note, low levels of financial literacy established in numerous studies worldwide may suggest that an average (typical) individual is little interested in financial domain and, therefore, does not have an interest-driven motivation to seek financial knowledge and skills. Ford and Kent, 2009 showed how the lack of interest may limit the awareness regarding financial markets. Allgood and Walstad, 2016 argue that 'financially literate persons may be more

interested in financial planning because they are more aware of what they might lose or gain financially if they do not make a careful decision', suggesting that the causal relationship between interest and literacy may be reversed. Considering all these previous findings, we formulated the following interrelated hypotheses:

H2: Respondents who are more likely to report that they liked mathematics at school should be more financially literate.

H3: Respondents who report more interest in financial matters should be more financially literate.

The effect of affective factors on financial literacy is very little studied. Ford and Kent, 2009 showed that the threat emanating from financial markets and resultant financial anxiety and intimidation deter individuals (particularly women) from the financial domain, leading to low levels of interest in financial issues and financial market awareness. Skagerlund et al., 2018 evidenced that the emotional attitude towards finance (financial anxiety) and, particularly, towards mathematics (math anxiety) predict financial literacy, and that the relationship between anxiety (both financial and math) and financial literacy is negative. Kadoya and Khan, 2016 showed that the literacy may also be predicted by the anxiety about life in old age, with more anxious individuals performing better on financial literacy tests. In our study we measured the affective attitude to financial matters, therefore we based our next hypothesis on the findings of Skagerlund et al., 2018 and we formulated the hypothesis in the following way:

H4: Respondents who report more fear when thinking about financial matters should be less financially literate.

The unidirectional association between educational attainment and financial literacy suggests that overall cognitive abilities, as mentioned earlier in the literature review section of this article, may be essential for acquisition of the literacy. The source of cognition in financial domain may be education, both formal (i.e. school-based) or informal (e.g. parental) – the effect which is well-documented in the existing literature

(Kaiser and Menkhoff, 2017; Shim et al., 2010). The effect of learning from mistakes on financial literacy is, however, considerably less documented. This is a serious deficiency in the literature as own experience equips the individual with a functional, rather than cognitive, knowledge (Sohn et al., 2012). Hastings, Madrian, and Skimmyhorn, 2013 consider the effect of learning by doing on financial literacy as one of the key unaddressed issues in the related literature. Frijns, Gilbert, and Tourani-Rad, 2014 found that there is a positive and causal effect of financial experience on financial literacy. More specifically, some studies showed that those who were receiving an allowance or had a bank account as young persons went on to display higher financial literacy as adults (Sohn et al., 2012; Sabri et al., 2010; Sansone, Rossi, and Fornero, 2018). The positive effect of experiential learning was also confirmed under controlled conditions, i.e. in the classroom (Batty et al., 2016). What is even more important for our study, Chen and Volpe, 2002 showed that learning from own mistakes was the second most often reported source of financial knowledge among surveyed college students (70% female and 63% male participants). Studies such as Duflo and Saez, 2003 or Hong, Kubik, and Stein, 2004 suggest also that consumers acquire knowledge by inferring from the experience of other individuals, such as family members, friends, acquaintances, co-workers, neighbours, etc. (through an observational learning). Based on that, we hypothesised what follows:

H5: Respondents who report more learning from own and others' mistakes should be more financially literate.

Finally, we were interested in how difficult is household financial management in respondents' opinions. Relying on common sense, we hypothesised that:

H6: Respondents who report more difficulty with financial management should be less financially literate.

Although we separated them, these six factors included in our hypotheses seem to be interlinked to a large extent. In some cases the dividing lines among them are blurred. For instance, an individual may perceive financial

management as highly difficult because of the lack of affinity with mathematics, difficulty in dealing with numbers and, thus, she may feel anxious when thinking about financial domain. Similarly, our variable 'The importance attached to mathematics' is at the intersection of attitudes and emotions (at least if one considers liking and disliking as emotions), being a kind of an affective attitude.

METHODOLOGY OF THE RESEARCH

Data

We fielded the questionnaire-based survey during the period of December 10th – 14th, 2018. The data was collected through Computer-Assisted Telephone Interviewing (CATI) from a representative sample of 1,067 adult Poles. We partnered with a professional market and opinion research agency, DRB Research in Poland, to conduct the survey.

Measures and coding

Dependent variable

We used the instrument developed and tested by Allgood and Walstad, 2016 to measure financial literacy (FINLIT). The instrument is a single-choice test consisting of five questions. Two of these questions use numbers in order to test: (a) whether respondents understand the workings of percent, and (b) the relations among inflation, nominal and real interest rate. The remaining questions are more factual and probe whether respondents know some basic principles regarding financial products: (a) the effect of rising interest rates on bond prices, (b) the effect of diversification, and (c) the effect of credit duration on interest payments and total installments. Allgood and Walstad, 2016 indicate that, despite its apparent simplicity, the test has been validated as a reliable instrument measuring financial literacy in several national surveys in the US. In our study, correct answers to test questions were coded as 1 while all remaining options (incorrect answers as well as 'Don't know' responses) were coded as 0. Hence, the financial literacy index ranged between 0 and 5 in value (see the Appendix for details on the applied financial literacy test).

Independent variables

Difficulty in dealing with numbers

To learn the degree to which people understand the information supplied by means of numbers – compared to other forms of information – and, as a result, the difficulty in dealing with numbers, we asked respondents the following question: *‘On a scale of 1 to 5 (where 1 means very easy and 5 means very difficult) indicate the difficulty in understanding various contents that are available in the public space (e.g., advertisements, announcements, instructions, press articles, TV show), if the contents are supplied by means of: (a) charts, diagrams, figures (denoted as CHART in the analyses), (b) text (TEXT), (c) numbers (NUMBERS), (d) audio (AUDIO), (e) video (VIDEO), (f) other (which?) (OTHER)?’*

The importance attached to mathematics

We adopted the approach similar to that previously used by Chen and Volpe, 2002 to check the attractiveness of mathematics for our respondents. They were asked to report, on a scale from 1 (disliked very much) to 5 (liked very much), the degree to which they liked the following subjects when attending the school: (a) foreign languages (LANGUAGE), (b) mathematics (MATHS), (c) science subjects (SCIENCE), (d) humanities (HUMANITIES)’.

Interest in financial affairs

We developed and used the following question to probe respondents’ interest in financial affairs (FINANCE), compared to other topics: *‘On a scale from 1 (never) to 5 (always), indicate which contents attract your attention in various media (e.g., online, TV, radio, press): (a) politics, (b) sport, (c) weather, (d) finance, (e) relationships, (f) entertainment, (g) science, (h) health’*. Only the interest in financial affairs was further included in the regression analysis. The other domains have been used to discuss the sampled respondents’ relative interest in financial affairs.

Emotional states induced by thoughts on finance

A classic set of six basic emotions identified by Ekman, Sorenson, and Friesen, 1969 was used to examine the emotional states induced by thoughts on finance. Surprise was removed

from the set because we concluded that it was inappropriate given the nature of this particular survey item. As a result, the respondents were asked the following question: *‘On a scale from 1 (strongly disagree) to 5 (strongly agree), indicate what you feel when you think about financial matters: (a) happiness (HAPPINESS), (b) sadness (SADNESS), (c) anger (ANGER), (d) fear (FEAR), (e) disgust (DISGUST)’*.

Sources of financial literacy

We followed Chen and Volpe, 2002 in developing the item that allowed us to discover sources of participants’ financial knowledge and skills. To this end, the respondents were asked to report, on a scale from 1 (strongly disagree) to 5 (strongly agree), how they acquired the financial knowledge and skills they possess: (a) from parents (PARENTS), (b) from own mistakes (OWNMISTAK), (c) from school, college, training, seminar etc. (SCHOOL), (d) from others’ mistakes (OTHMISTAK), (e) from work (WORK), (f) other sources (which?) (OTHER)’.

Difficulty in dealing with household financial management

We developed and used the following question to measure respondents’ difficulty in dealing with household financial management (FINMANAGE), compared to other everyday tasks: *‘On a scale from 1 (very easy) to 5 (very difficult), indicate the extent to which the following tasks are difficult for you: (a) raising children, (b) maintaining yourself and your family in a good physical condition and good health, (c) managing household’s finances, (d) performing daily household duties, (e) performing professional duties at work’*. Only the difficulty in dealing with household financial management was further included in the regression analysis. The other tasks have been used to discuss the sampled respondents’ relative difficulty in dealing with household financial management.

Control variables

Finally, we used standard sociodemographic and economic features as control variables in our regressions: sex (GENDER), age (AGE), educational attainment (EDUCATION), and income (INCOME).

Models

We estimated a multiple linear regression model based on the enter method to find factors significantly explaining financial literacy of our survey participants (dependent variable). We used the following potential predictors as the independent (diagnostic) variables in the model: (a) difficulty in dealing with numbers, (b) the importance attached to mathematics, (c) interest in financial affairs, (d) emotional states induced by thoughts on finance, (e) sources of financial literacy, and (f) difficulty in dealing with personal financial management. To control for the effect of sociodemographic variables on financial literacy, we checked how the inclusion of the sociodemographic variables in the model affects the percent of variation that is explained

by this model.

RESULTS

Descriptive statistics

Table 1 reports descriptive statistics for the full sample (the sample composition in terms of sociodemographic characteristics is demonstrated in Table 4 in the Appendix). Although the Kolmogorov-Smirnov test (including Lilliefors significance correction) did not confirm the normal distribution in responses to applied financial literacy test (0.170; $p < 0.001$), the data skewness suggests that the deviation from normality is not considerable.

Table 1. Descriptive statistics

	Mean	Median	SD	Variation	Min	Max	Skewness	Kurtosis
FINLIT	2.42	2	1.15	1.33	0	5	-0.24	-0.58
CHART	2.57	3	1.22	1.49	1	5	0.10	-1.04
TEXT	2.30	2	1.19	1.42	1	5	0.40	-0.93
NUMBER	2.53	3	1.22	1.49	1	5	0.17	-1.01
AUDIO	2.26	2	1.25	1.57	1	5	0.52	-0.91
VIDEO	2.20	2	1.24	1.53	1	5	0.59	-0.81
OTHER	3.00	3	0.22	0.05	1	5	-0.67	79.44
LANGUAGE	3.06	3	1.16	1.34	1	5	0.04	-0.70
MATHS	3.14	3	1.24	1.54	1	5	-0.06	-0.93
SCIENCE	3.32	3	1.13	1.27	1	5	-0.27	-0.53
HUMANITIES	3.45	4	1.20	1.45	1	5	-0.40	-0.67
FINANCE	2.74	3	1.16	1.35	1	5	0.15	-0.75
HAPPINESS	3.15	3	1.09	1.18	1	5	-0.26	-0.46
SADNESS	2.30	2	1.06	1.13	1	5	0.32	-0.75
ANGER	2.37	2	1.13	1.28	1	5	0.30	-0.78
FEAR	2.15	2	1.06	1.13	1	5	0.40	-0.89
DISGUST	1.89	1	1.03	1.06	1	5	0.79	-0.44
PARENTS	3.18	3	1.25	1.57	1	5	-0.17	-0.94
OWNMISTAK	3.94	4	1.08	1.17	1	5	-0.81	-0.10
WORK	2.95	3	1.33	1.78	1	5	-0.07	-1.09
SCHOOL	2.89	3	1.26	1.59	1	5	-0.07	-0.96
OTHMISTAK	2.71	3	1.26	1.58	1	5	0.08	-1.02
OTHER	1.39	1	0.68	0.46	1	5	2.61	9.86
FINMANAGE	3.39	3	1.04	1.08	1	5	-0.18	-0.45

The statistics reveal large shortcomings in financial literacy of our survey participants and, therefore, presumably in entire population of Poles. The average financial literacy of the sampled respondents on a scale

of 0 to 5 equals 2.42 with the median score of 2. A typical evaluation system that is used at universities in Poland assumes that students pass when they achieve at least half of the credits that are available. In light of this simple

rule, the statistical Pole is financially illiterate, at least based on our results.

Numbers and charts turned out to be the only information media for which the respondents were more likely to report a difficulty rather than an ease in understanding the contents transmitted using the indicated forms of information. The average value of the variable NUMBERS on a scale of 1 to 5 equals 2.53. The respondents reported that they had, on average, less difficulties in understanding a textual information and, particularly, audio or video (compared to numbers and charts).

We found that mathematics was liked less than other subjects, except for foreign languages, when the respondents attended school. 31% of the respondents indicated that they did not like mathematics (11.1% strongly disliked this subject), while 38.2% reported the opposite.

On a long list of various themes (from politics, through relationships, to health), finance was reported the second least interesting domain. 17% of the sampled respondents never reach for media contents devoted to financial issues. The average value of the variable FINANCE on a scale of 1 to 5 equals 2.74. For comparison, the mean value equals 3.47 for the entertainment, 3.39 for weather, and 3.11 for politics (see Table 5 in the Appendix for details).

Own mistakes was the source of financial knowledge which was reported the most often by our respondents (68.7% of the survey participants indicated this source). This was followed by parents (42.2%) and work (35.9%). In light of our survey, others' mistakes were the most rare exploited source of financial knowledge and skills (28.1% of the survey participants indicated this source).

Our survey showed that the most common emotion accompanying the thoughts on finance was happiness – the only positive emotion included in our study. The average value of the variable HAPPINESS on a scale of 1 to 5 equals 3.13 (for comparison, the mean equals 2.15 for fear and only 1.89 for disgust).

Among various everyday tasks that have been included in our survey, managing of household finances turned out to be neither

the most difficult, nor the easiest task. Respondents indicated raising children as the most difficult household task. The average value of the hardship index for raising children on a scale of 1 to 5 equals 4.1. For comparison, the average value of this index for household financial management equals 3.39, while performing professional duties at work – 2.92 (see Table 6 in the Appendix for details).

To sum up, the descriptive statistics suggest that average adult Pole does not like mathematics, is very little interested in finance, has significant difficulties in understanding contents provided in terms of numbers, perceives household financial management as a moderately difficult task, however attaches rather positive than negative emotions when thinking about financial issues.

Regression analysis

Table 2 reports the estimation results of multiple linear regression model. The dependent variable used in this specification is the quantitative indicator for financial literacy. The independent variables are those demonstrated in Table 1. The control variables are gender, age, education and income. The model is statistically significant and well-fitted to data ($F(27.1039) = 6.15$; $p < 0.001$). The variation in the dependent variable is explained in 14% by the model (R -squared = 0.138).

We found that the difficulty in understanding media content when the content was provided by means of numbers (variable denoted as NUMBERS in our analyses) was significantly and negatively related to financial literacy. This means that the more difficulty reported by the respondent, the less financial literacy she displays. Thus, H1 is confirmed. It is interesting that our model shows also significant and positive relationship between financial literacy and the difficulty in understanding media content when the content is provided by means of charts, diagrams, figures etc. (variable denoted as CHART in our analyses).

Table 2. Regression results with financial literacy as the dependent variable

Category	Independent variables	Unstandardised coefficients		Standardised coefficients	t	p	CI 95%	
		B	SE	Beta			LL	UL
Emotions	HAPPINESS	-0.04	0.03	-0.04	-1.15	0.252	-0.10	0.03
	SADNESS	0.04	0.05	0.03	0.71	0.480	-0.06	0.13
	ANGER	-0.09	0.05	-0.09	-1.90	0.057	-0.18	<0.01
	FEAR	-0.01	0.06	-0.01	-0.22	0.830	-0.12	0.10
	DISGUST	0.11	0.05	0.10	2.27	0.023*	0.02	0.21
Financial education	PARENTS	-0.04	0.03	-0.04	-1.20	0.230	-0.09	0.02
	OWNMISTAK	0.14	0.03	0.13	4.35	<0.001**	0.08	0.21
	SCHOOL	0.02	0.03	0.02	0.48	0.630	-0.05	0.08
	OTHMISTAK	-0.05	0.03	-0.05	-1.40	0.163	-0.11	0.02
	WORK	-0.01	0.03	-0.01	-0.20	0.843	-0.06	0.05
	OTHER	-0.14	0.05	-0.08	-2.65	0.008**	-0.24	-0.04
Interest	FINANCE	0.15	0.03	0.15	4.60	<0.001**	0.09	0.21
Media content format	CHART	0.13	0.04	0.14	3.16	0.002**	0.05	0.21
	TEXT	0.07	0.05	0.08	1.64	0.101	-0.01	0.16
	NUMBERS	-0.18	0.05	-0.20	-4.03	<0.001**	-0.27	-0.09
	AUDIO	-0.04	0.05	-0.05	-0.80	0.422	-0.14	0.06
	VIDEO	-0.02	0.05	-0.02	-0.28	0.779	-0.12	0.09
	OTHER	0.15	0.16	0.03	0.96	0.338	-0.16	0.45
Liking/disliking school subjects	LANGUAGE	-0.01	0.03	-0.01	-0.17	0.867	-0.07	0.06
	MATHS	0.05	0.03	0.05	1.48	0.138	-0.02	0.12
	SCIENCE	0.01	0.04	0.01	0.16	0.874	-0.06	0.08
	HUMANITIES	0.01	0.03	0.01	0.19	0.849	-0.05	0.07
Hardship	FINMANAGE	-0.06	0.03	-0.06	-1.96	0.050	-0.13	<0.01

B – unstandardised regression coefficient; SE – standard error; Beta – standardised regression coefficient; t – t test; p – significance level; *p < 0.05; ** p < 0.01; ***p < 0.001; LL and UL – lower and upper limit of the confidence interval

The liking / disliking attitude to none of the subjects learnt at school turned out to be significantly related to financial literacy in our model, including mathematics. For this reason H2 must be rejected.

Our model shows that the more interest a respondent has in financial domain, the higher she scores in the financial literacy test applied in this study. Such finding supports H3.

The only emotional factor significantly associated with financial literacy measure is

disgust. The sign of the relationship is positive, meaning that more disgust reported by a respondent in our survey, the higher financial literacy level she reaches. Fear – hypothesised in H4 as negatively related to financial literacy – is insignificant in the model which means that, as a result, H4 must be rejected.

As expected, there is a significant and positive link between learning from own mistakes and financial literacy. However, the link between learning from others' mistakes and financial literacy, turned out to be

insignificant. Therefore, H5 is confirmed only partially.

Although those respondents who report more difficulty with household financial management were found less financially literate in our regression – as we hypothesised in H6 – the relationship is, however, insignificant, leading to rejection of H6.

Additional tests

As mentioned earlier in this article, there may be some interlinkages among the independent variables included in our regression. For instance, in this study we separated emotional states from the interest in financial domain and used them as self-contained variables. However, as suggested by Ford and Kent, 2009, financial anxiety may reduce the interest in finance, while the limited interest may further lead to low financial literacy levels. Therefore, we ran additional test (correlational analysis using Spearman *rho* coefficient) to check whether the emotional states regarding financial affairs relate to the interest in financial domain. Table 3 reports results of this test.

The test showed that all investigated emotions are significantly correlated with the interest, and that in all but one cases – that is, happiness – the sign of the relationship is positive. This means that more sadness, anger, fear and disgust translate into more interest in financial domain. On the other hand, more happiness induced by the thoughts on financial matters is linked to less interest.

Table 3. Correlation between emotional states regarding financial affairs and interest in financial domain

Emotions	Interest in financial domain
Happiness	-0.071*
Sadness	0.173**
Anger	0.151**
Fear	0.251**
Disgust	0.311**

* $p < 0.05$; ** $p < 0.01$

We checked also whether those respondents who report more learning from own mistakes have less difficulty with understanding the information supplied by means of numbers, which seems to be reasonable. Certainly, at least some of those financial situations that have a potential to teach a lesson, expose individuals to number-related tasks. Hence, those who are able to learn the lesson, should be more fluent in dealing with numbers. To check if such rationale is supported by our data, we again carried out correlational analysis using Spearman *rho* coefficient and found that the link between learning from own mistakes and reported difficulty in understanding numbers is significant and positive, as expected, yet weak ($rho = 0.070$; $p = 0.023$).

DISCUSSION, IMPLICATIONS AND LIMITATIONS

Our study was aimed to test several potential determinants of financial literacy that haven't been comprehensively studied so far. To this end, we used both cognitive, affective, behavioural and attitudinal factors as likely predictors of the literacy. Several important conclusions emerge from the empirical analyses we have conducted.

Firstly, we confirmed that financial literacy is significantly and inversely related to the difficulty in dealing with numbers. The effect is known from previous research (Grohmann, Klühs, and Menkhoff, 2018; Skagerlund et al., 2018; OECD, 2015). Such result, combined with broad-based meta-analyses reporting low effectiveness of educational interventions aimed directly at increasing financial literacy (e.g., Fernandes, Lynch, and Netemeyer, 2014), may suggest that the educational efforts could be re-directed – at least partly – to increasing numeracy. The evidence shows that mathematical competences support individuals in becoming financially knowledgeable and skilled consumers. Whether the ability to understand numbers is a sole critical driving force underlying financial literacy or it is just one of many essential factors, remains an issue open to further investigation. For instance, OECD/INFE, 2016 indicates that the differences in scores

achieved in number-related financial test cannot be attributed exclusively to the differences in numeracy. Nevertheless, the policy implication of our findings seems to be straightforward: numeracy needs to be targeted as a priority in the educational system as it contributes significantly to various key life competences, including financial literacy. Perhaps, the low level of the literacy that is observed currently in the Polish population results to a large extent from the voluntary status of mathematics in secondary school final examination held for about 25 years, till 2010.

Secondly, a separate issue is the format of mathematical and financial education supporting the effective acquisition of knowledge and skills. Our finding on the link between a difficulty in understanding charts (figures, diagrams etc.) and financial literacy levels is difficult to interpret and calls for more extensive and more in-depth analyses of various educational formats and their influence on financial literacy scores. Very little is known in this field. The study of Hubbard, Matthews, and Samek, 2016 suggests that the phrase 'chart' may be too aggregate if one attempts to capture the effect of educational format on financial literacy. They showed that the linear chart – as opposed to the volumetric chart – turned out to be the least effective educational form of all formats analysed – even less effective than standard textual information. The significance of charts in our regression confirms that the graphical form used in teaching has some relevance for the effective transfer of knowledge and skills, especially where the number-related contents are involved. However, future research should pay more attention to how the contents delivered by means of charts, figures, diagrams etc. lead to a rise of financial literacy. On a more general level, our findings encourage a discussion on how to teach mathematics and other number-related subjects at school to alter the attitude to these subjects. In a way, our study confirmed the anecdotal evidence that mathematics is disliked, on average. A more favourable attitude to these subjects, driven by more friendly teaching formats, may increase the interest in them and, ultimately have a

positive effect on the learning effectiveness.

Thirdly, if the attitude towards maths and maths-related financial domain needs to be changed, then one must remember that attitudes have strong affective underpinnings. Thus, the shift in attitudes should appeal to the emotions. It is well-recognised that positive mood enables individuals to assimilate information (Ackert, Church, and Deaves, 2003). On the other hand, recent research shows that negative emotions cannot only hinder, but also enhance learning (Rowe and Fitness, 2018). Our study is inconclusive in this respect. The only emotion significantly tied to financial literacy in our research is disgust. Additionally, the relation is positive, while our cross-sectional study does not allow inferring about the causality of this relation. This means, then, that the disgust induced by the thoughts on finance may cause individuals to acquire more knowledge and skills in financial domain, however the reversed direction of the causal link is also possible: i.e., for a reason, more financially literate consumers may be more likely to feel finance-related disgust. At the same time, we established that the level of disgust is positively correlated with the interest in finance. Perhaps, it is true that the phrase 'financial matters' connote the financial scandals that have recently galvanised the public opinion in Poland (e.g., Amber Gold scandal, credit unions scandal, Swiss franc mortgage problem, just to mention a few recent affairs in Poland, insurance policies combined with deposits fraud, Financial Supervision Authority scandal; see, for instance, *The Economist*, 2012; Buckley, 2016; Foy, 2015). Possibly, individuals are attracted to financial contents in media by their sensational context which is intrinsically repellent, but watching how these affairs unfold exposes the individuals to a dose of professional knowledge, making them more financially savvy as a result. Certainly, other explanations are also possible regarding the link between financial literacy and the emotional states around finance, as well as between these states and the interest in financial domain. This plethora of acceptable interpretations indicates huge complexity of finance-related emotions and calls for further,

possibly interdisciplinary research. For instance, it is noteworthy that more interest in financial domain is significantly and positively correlated with more frequent reports of all negative emotions and less frequent reports of the only positive emotion included in our study – i.e., happiness. This suggests that, for a reason, delving into financial domains engenders a storm of negative emotions.

Fourth, our study emphasised the role of financial-related experience in the formation of financial literacy. It is symptomatic that all other tested carriers of financial learning, except for learning from own mistakes, turned out to be insignificant as predictors of financial literacy. This may suggest that, despite huge resources devoted worldwide to promotion of controlled financial education in recent years, all resorts of the education fail: starting with parental teaching, through formal education at school, to workplace considered as a setting potentially enabling development of financial literacy. This picture of financial education interventions is consistent with previous evidence showing that the interventions are largely ineffective (Fernandes, Lynch, and Netemeyer, 2014). Perhaps, such finding should induce to a complete re-thinking of the programs designed to support financial literacy.

As usual, there are some limitations inherent in the present analyses. To a large extent our survey uses respondents' self-reports as measures of some variables (e.g., we infer about the understanding of numbers on the basis of participants' self-assessments). Although self-reports have been proved credible even if respondents are asked to report uncomfortable facts (Ameriks et al., 2007), we cannot rule out the social desirability effect. It is recommended to attest our findings in future research with measures other than self-reports.

Further, our study intentionally applies variables that were designed at a general level. This results from the decision to examine largely diversified factors representing various disciplines. Our study has been designed to preliminary explore these factors as potential significant regressors of financial literacy. Future research should develop our

interdisciplinary propositions into more detailed measures.

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REFERENCES

- Ackert, LF, BK Church, and Richard Deaves, (2003). "Emotion and Financial Markets." *Economic Review-Federal Reserve ...* <https://doi.org/10.1017/CBO9781107415324.004>.
- Ali, Azwadi, Mohd Shaari Abd Rahman, and Alif Bakar, (2015). "Financial Satisfaction and the Influence of Financial Literacy in Malaysia." *Social Indicators Research*. <https://doi.org/10.1007/s11205-014-0583-0>.
- Allgood, Sam, and William B. Walstad, (2016). "The Effects of Perceived and Actual Financial Literacy on Financial Behaviors." *Economic Inquiry*. <https://doi.org/10.1111/ecin.12255>.
- Almenberg, Johan, and Anna Dreber, (2015). "Gender, Stock Market Participation and Financial Literacy." *Economics Letters* 137: 140–42. <https://doi.org/10.1016/j.econlet.2015.10.009>.
- Ameriks, John, Andrew Caplin, John Leahy, and T. O.M. Tyler, (2007). "Measuring Self-Control Problems." *American Economic Review*. <https://doi.org/10.1257/aer.97.3.966>.
- Atkinson, Adele., and Flore-Anne Messy, (2013). "Promoting Financial Inclusion through Financial Education." *OECD Publishing/NFE Evidence, Policies and Practice*. <https://doi.org/10.1787/5k3xz6m88smp-en>.
- Banks, James, and Zoë Oldfield, (2007).

- "Understanding Pensions: Cognitive Function, Numerical Ability and Retirement Saving." *Fiscal Studies*. <https://doi.org/10.1111/j.1475-5890.2007.00052.x>.
- Batty, Mike, J. Michael Collins, Collins O'Rourke, and Elisabeth Odders-White, (2016). "Evaluating Experiential Financial Capability Education: A Field Study of My Classroom Economy." <https://centerforfinancialsecurity.files.wordpress.com/2016/10/mce-report-final.pdf>.
- Brown, Martin, and Roman Graf, (2013). "Financial Literacy, Household Investment and Household Debt: Evidence from Switzerland." 13/1. Working Papers on Finance. St. Gallen.
- Brown, Sarah, and Daniel Gray, (2016). "Household Finances and Well-Being in Australia: An Empirical Analysis of Comparison Effects." *Journal of Economic Psychology*. <https://doi.org/10.1016/j.joep.2015.12.006>.
- Buckley, Neil, (2016). "Polish Banks Spared Forced Conversion of Swiss Franc Mortgages." *Financial Times*, 2016.
- Chen, Haiyang, and Ronald P. Volpe, (2002). "Gender Difference in Personal Financial Literacy Among College Students." *Financial Services Review*. <https://doi.org/10.5897/AJBM10.1267>.
- Cole, Shawn, Thomas Sampson, and Bilal Zia, (2011). "Prices or Knowledge? What Drives Demand for Financial Services in Emerging Markets?" *Journal of Finance*. <https://doi.org/10.1111/j.1540-6261.2011.01696.x>.
- Cwynar, A., W. Cwynar, and K. Wais, (2018). "Debt Literacy and Debt Literacy Self-Assessment: The Case of Poland." *Journal of Consumer Affairs*. <https://doi.org/10.1111/joca.12190>.
- Duflo, Esther, and Emmanuel Saez, (2003). "The Role of Information and Social Interactions in Retirement Plan Decisions: Evidence from a Randomized Experiment." *Quarterly Journal of Economics*. <https://doi.org/10.1162/00335530360698432>.
- Ekman, Paul, E. Richard Sorenson, and Wallace V. Friesen, (1969). "Pan-Cultural Elements in Facial Displays of Emotion." *Science*. <https://doi.org/10.1126/science.164.3875.86>.
- Fernandes, Daniel, John G. Lynch, and Richard G. Netemeyer, (2014). "Financial Literacy, Financial Education, and Downstream Financial Behaviors." *Management Science*. <https://doi.org/10.1287/mnsc.2013.1849>.
- Ford, Matthew W., and Daniel W. Kent, (2009). "Gender Differences in Student Financial Market Attitudes and Awareness: An Exploratory Study." *Journal of Education for Business* 85 (1): 7-12. <https://doi.org/10.1080/08832320903217366>.
- Foy, Henry, (2015). "Bankruptcy Fears for Poland's Credit Unions'." *Financial Times*, 2015.
- French, Declan, and Donal McKillop, (2016). "Financial Literacy and Over-Indebtedness in Low-Income Households." *International Review of Financial Analysis*. <https://doi.org/10.1016/j.irfa.2016.08.004>.
- Frijns, Bart, Aaron Gilbert, and Alireza Tourani-Rad, (2014). "Learning by Doing: The Role of Financial Experience in Financial Literacy." *Journal of Public Policy*. <https://doi.org/10.1017/S0143814X13000275>.
- Fünfgeld, Brigitte, and Mei Wang, (2009). "Attitudes and Behaviour in Everyday Finance: Evidence from Switzerland." *International Journal of Bank Marketing*. <https://doi.org/10.1108/02652320910935607>.
- Gerardi, K., L. Goette, and S. Meier, (2013). "Numerical Ability Predicts Mortgage Default." *Proceedings of the National Academy of Sciences*. <https://doi.org/10.1073/pnas.1220568110>.
- Grohmann, Antonia, Theres Klühs, and Lukas Menkhoff, (2018). "Does Financial Literacy Improve Financial Inclusion? Cross Country Evidence." *World Development*. <https://doi.org/10.1016/j.worlddev.2018.06.020>.
- Grohmann, Antonia, Roy Kouwenberg, and Lukas Menkhoff, (2015). "Childhood Roots

- of Financial Literacy." *Journal of Economic Psychology*.
<https://doi.org/10.1016/j.joep.2015.09.002>.
- Hastings, Justine S., Brigitte C. Madrian, and William L. Skimmyhorn, (2013). "Financial Literacy, Financial Education, and Economic Outcomes." *Annual Review of Economics*.
<https://doi.org/10.1146/annurev-economics-082312-125807>.
- Herd, Pamela, Karen Holden, and Yung Ting Su, (2012). "The Links between Early-Life Cognition and Schooling and Late-Life Financial Knowledge." *Journal of Consumer Affairs*.
<https://doi.org/10.1111/j.1745-6606.2012.01235.x>.
- Hong, Harrison, Jeffrey D. Kubik, and Jeremy C. Stein, (2004). "Social Interaction and Stock-Market Participation." *Journal of Finance*. <https://doi.org/10.1111/j.1540-6261.2004.00629.x>.
- Hubbard, Edward, Percival Matthews, and Anya Samek, (2016). "Using Online Compound Interest Tools to Improve Financial Literacy." *Journal of Economic Education*.
<https://doi.org/10.1080/00220485.2016.1146097>.
- Hung, Angela A, Andrew M Parker, Joanne K Yoong, Andrew M Parker, and Joanne Yoong, (2009). "Defining and Measuring Financial Literacy." WR-708. RAND Working Papers.
- Joo, So Hyun, and John E. Grable, (2004). "An Exploratory Framework of the Determinants of Financial Satisfaction." *Journal of Family and Economic Issues*.
<https://doi.org/10.1023/B:JEEI.0000016722.37994.9f>.
- Kadoya, Yoshihiko, and Mostafa Khan, (2016). "What Determines Financial Literacy in Japan?" *SSRN*.
<https://doi.org/10.2139/ssrn.2858021>.
- Kaiser, Tim, and Lukas Menkhoff, (2017). "Does Financial Education Impact Financial Literacy and Financial Behavior, and If So, When?" *The World Bank Economic Review* 31 (2): 611–30.
<https://doi.org/10.1093/wber/lhx018>.
- Klapper, Leora, Annamaria Lusardi, and Peter Van Oudheusden, (2015). "Financial Literacy Around the World: Insights from the Standard & Poor's Ratings Services Global Financial Literacy Survey." Standard & Poor's Ratings Services Global FinLit Survey, (2015).
<https://doi.org/10.1017/S1474747211000448>.
- Lenton, Pamela, and Paul Mosley, (2008). "Debt and Health." 2008004. Sheffield Economic Research Papers. Sheffield.
- Lusardi, Annamaria, and Olivia S. Mitchell, (2014). "The Economic Importance of Financial Literacy: Theory and Evidence." *Journal of Economic Literature*.
<https://doi.org/10.1257/jel.52.1.5>.
- Lusardi, Annamaria, Olivia S. Mitchell, and Vilsa Curto, (2010). "Financial Literacy among the Young." *Journal of Consumer Affairs* 44 (2): 358–80.
<https://doi.org/10.1111/j.1745-6606.2010.01173.x>.
- Neill, Barbara O, Jing Jian Xiao, Benoit Sorhaindo, and E Thomas Garman, (2005). "Financially Distressed Consumers: Their Financial Practices, Financial Well-Being, and Health." *Financial Counseling and Planning*.
<https://doi.org/10.1016/j.envpol.2011.10.01>.
- OECD/INFE, (2016). "International Survey of Adult Financial Literacy Competencies." Paris.
- OECD, (2015). "PISA 2015 Results STUDENTS' FINANCIAL LITERACY VOLUME IV." Paris.
- Rowe, Anna, and Julie Fitness, (2018). "Understanding the Role of Negative Emotions in Adult Learning and Achievement: A Social Functional Perspective." *Behavioral Sciences*.
<https://doi.org/10.3390/bs8020027>.
- Sabri, Mohamad Fazli, Maurice MacDonald, Tahira K. Hira, and Jariah Masud, (2010). "Childhood Consumer Experience and the Financial Literacy of College Students in Malaysia." *Family and Consumer Sciences Research Journal*.
<https://doi.org/10.1111/j.1552-3934.2010.00038.x>.

- Sansone, Dario, Mariacristina Rossi, and Elsa Fornero, (2018). "Four Bright Coins Shining at Me": Financial Education in Childhood, Financial Confidence in Adulthood." *Journal of Consumer Affairs*.
<https://doi.org/https://doi.org/10.1111/joca.12207>.
- Shim, Soyeon, Bonnie L. Barber, Noel A. Card, Jing Jian Xiao, and Joyce Serido, (2010). "Financial Socialization of First-Year College Students: The Roles of Parents, Work, and Education." *Journal of Youth and Adolescence*.
<https://doi.org/10.1007/s10964-009-9432-x>.
- Shim, Soyeon, Jing J. Xiao, Bonnie L. Barber, and Angela C. Lyons, (2009). "Pathways to Life Success: A Conceptual Model of Financial Well-Being for Young Adults." *Journal of Applied Developmental Psychology*.
<https://doi.org/10.1016/j.appdev.2009.02.003>.
- Skagerlund, Kenny, Thérèse Lind, Camilla Strömbäck, Gustav Tinghög, and Daniel Västfjäll, (2018). "Financial Literacy and the Role of Numeracy—How Individuals' Attitude and Affinity with Numbers Influence Financial Literacy." *Journal of Behavioral and Experimental Economics*.
<https://doi.org/10.1016/j.socec.2018.03.004>.
- Sohn, Sang Hee, So Hyun Joo, John E. Grable, Seonglim Lee, and Minjeung Kim, (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*.
<https://doi.org/10.1016/j.adolescence.2012.02.002>.
- Stolper, Oscar A., and Andreas Walter, (2017). "Financial Literacy, Financial Advice, and Financial Behavior." *Journal of Business Economics*.
<https://doi.org/10.1007/s11573-017-0853-9>.
- The Economist*, (2012). "Poland's Shadow Banking Scandal. After the Gold Rush," 2012.
- Willis, Lauren E, (2008). "Against Financial-Literacy Education." *Iowa Law Review* 94: 197–285.
- Xu, Lisa, and Bilal Zia, (2012). "Financial Literacy around the World - An Overview of the Evidence with Practical Suggestions for the Way Forward." *World Bank Policy Research Working Paper*.
<https://doi.org/10.3102/00346543067001043>.

Appendix

Table 4. Sample composition.

		n	%
GENDER	Female	558	52.3
	Male	509	47.7
EDUCATION	Grammar school (primary / elementary education)	14	1.3
	Junior high school (lower secondary education)	5	0.5
	Junior vocational school (lower vocational education)	170	15.9
	High school (upper secondary education)	141	13.2
	Vocational school (upper vocational education)	287	26.9
	Post high school	102	9.6
	Tertiary (university education)	336	31.5
	PhD	12	1.1
INCOME	Up to PLN 1,499	75	7.0
	PLN 1,500-2,499	276	25.9
	PLN 2,500-3,499	306	28.7
	PLN 3,500-4,499	252	23.6
	PLN 4,500-5,999	121	11.3
	PLN 6,000 and more	37	3.5

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