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Insights into the State of Financial Literacy in Germany: First Results of a Nationwide Survey

Johannes Treu[1], Valerie Elss[2]

[1] IU International University, Berlin, Germany

[2] FernUniversität Hagen and Fachhochschule des Mittelstands (FHM) - University of Applied Sciences, Germany

Correspondence: Johannes Treu, IU International University, Frankfurter Allee 73a, 10247 Berlin, Germany. E-mail: johannes.treu@iu.org

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Abstract

Financial literacy is playing an increasingly important role in today's complex world. Since the beginning of the new millennium, more countries and international organizations have recognized the importance of measuring and educating people about financial literacy, for example, to guide their market behavior. Using the OECD understanding of financial education and with the help of the OECD toolkit for this, the current state of financial literacy was recorded as part of a Germany-wide representative survey. Methodologically, the aim is to use exploratory data analysis to present an initial analysis and evaluation of the primary data collected. This is also linked to an investigation of what kind of connections exist between the various variables, and which factors can explain financial literacy in Germany. The results show that many respondents consider financial literacy to be rather important to very important and rate their own financial literacy as rather good to very good. However, the measurement of financial literacy shows that out of a total of 20 possible points, only an overall average of 10.7 points is achieved. In addition, differences can be found between the age groups, with the score increasing with age. Multiple linear regressions with all subscores and the final score as the dependent variable, and different independent variables, yield highly significant results and explain a moderate to strong amount of variance.

Keywords: financial literacy, explorative data analysis, nationwide survey

1. Introduction

In today's interconnected world, where labor is divided, the financial system plays a vital role. It allocates capital resources by providing loans and encouraging savings in a manner that maximizes their utility. The system also offers a wide range of financial products and services, which help spread risk. As a result, the financial sector facilitates economic stability and promotes sustainable economic growth (Sujlana & Kiran, 2018).

At the same time, the global financial structure has become increasingly complex, with a wide range of financial products and services. This complexity makes it necessary to have extensive financial knowledge to manage tasks effectively and maximize the benefits of the financial system (Bucher-Koenen & Knebel, 2021; Treu, 2023, 2024). Today, individuals need to be financially literate to make informed decisions and understand the short- and long-term effects of their financial actions (Haupt, 2021). Since the start of the new millennium, there has been a growing focus on improving financial literacy (Bucher-Koenen et al., 2021; Bucher-Koenen & Knebel, 2021; Cude, 2021). This emphasis highlights the need to enhance financial literacy at both individual and societal levels. So, many countries and international organizations have started promoting and measuring financial literacy, considering it a long-term policy priority and a key complement to managing market behavior (OECD, 2013, 2020b).

In Germany, financial literacy has gained increased political attention in 2023. In March, the Federal Ministry of Finance and the Federal Ministry of Education and Research launched the "Financial Education Initiative." This marks the first time that politicians have acknowledged significant gaps in financial literacy within the country, highlighting a clear need for improvement (Federal Ministry of Finance, 2023a, 2023b). The OECD's "International Survey of Adult Financial Literacy" indicates similar trends in adult financial literacy (OECD, 2016). Furthermore, research by Bucher-Koenen and Knebel (2021) evaluating data on the economic situation of private households in Germany shows that financial literacy is not widespread and that there has been little change in financial knowledge over recent years. The Federal Financial Supervisory Authority (2023) also confirms that there is considerable potential for enhancing

financial literacy in Germany.

This paper takes on the challenge of documenting the current state of financial literacy in Germany in 2023 through a representative survey. The aim is to conduct an initial exploratory analysis and present the primary data. At the same time, it aims to explore questions about the variations in financial literacy in Germany, identify the relationships, and understand the factors that impact it.

The paper's structure is as follows: After the introduction, chapter 2 is a literature review. It provides a theoretical basis for the concept of financial literacy. Chapter 3 describes the methodological approach, and the data collected. Chapter 4 presents the results, and Chapter 5 concludes with a discussion of these. Chapter 6 summarizes the key findings.

2. Financial Literacy - Theoretical Background

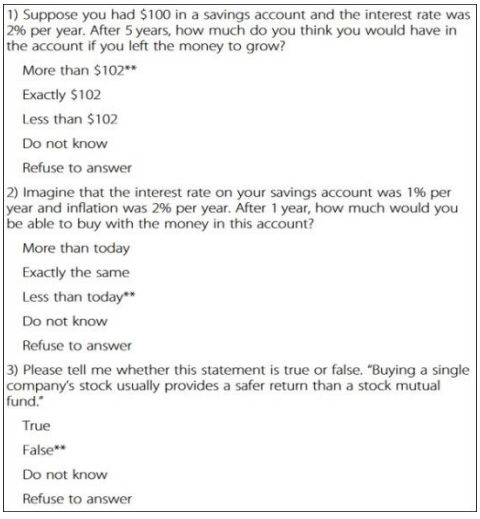
The concept of financial literacy emerged in 1992 when the National Foundation for Educational Research (NFER) partnered with NatWest Bank to provide its first clear definition. This definition emphasizes the ability to make informed and sound decisions regarding financial matters. Five years later, the Jump$tart Coalition for Personal Financial Literacy expanded on this definition in its influential study, the Jump$tart Survey of Financial Literacy Among High School Students. The term was broadened to encompass the practical application of knowledge and skills necessary for effectively managing personal finances, ultimately aiming for lasting financial stability throughout life (Cude, 2021; Świecka et al., 2019).

In academic terms, financial literacy encompasses a broad spectrum of concepts. This spectrum of financial literacy covers a range of abilities, from understanding different financial products to grasping fundamental financial concepts and making informed decisions. It also involves practical skills, including mathematical and numeracy skills, which are necessary for participating in various financial activities (Świecka et al., 2019). One challenge in academic research is that there is no single, universally accepted definition of financial literacy, due in part to the many different ways it can be defined. This confusion is compounded by the overlap between financial literacy and financial knowledge, as well as the emergence of digital financial literacy in the context of increasing digitalization (Cude, 2021; Haupt, 2021; Morgan, 2021).

The concept of financial literacy according to Lusardi and Mitchell (2014) is one of the most widely used approaches. The authors define financial literacy as having the skills needed to understand economic information and make smart, informed decisions based on it. These decisions affect important areas of life, such as planning your finances, building wealth, managing debt wisely, and preparing for pension and retirement. The concept aims to facilitate a deeper understanding of financial processes. In this context, financial literacy is said to be based on three central areas of knowledge that serve as fundamental pillars for financial decisions (Lusardi, 2019; Lusardi & Mitchell, 2014):

(i) Calculation skills concerning understanding and carrying out interest calculations and compound interest
(ii) Knowledge about inflation
(iii) Understanding of risk diversification

This perspective has gained worldwide recognition, and the questions used to measure it have been established as the so-called "Big Three" (see Figure 1). The "Big Five" questions represent an extension according to Hastings et al. (2013) represent an extension. Here, additional questions on the pricing of bonds and mortgages are included (see Figure 2).


1) Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?

More than $102**
Exactly $102
Less than $102
Do not know
Refuse to answer

2) Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?

More than today
Exactly the same
Less than today**
Do not know
Refuse to answer

3) Please tell me whether this statement is true or false. "Buying a single company's stock usually provides a safer return than a stock mutual fund."

True
False**
Do not know
Refuse to answer

Figure 1. The "Big Three" of financial literacy

Source: Lusardi (2019)

Concept	Question	Answer options
Compound Interest	Suppose you have $100 in a savings account and the interest rate is 2 percent per year. After five years, how much do you think you would have in the account if you left the money to grow?	More than $102 Exactly $102 Less than $102 Don't know Refused
Inflation	Imagine that the interest rate on your savings account is 1 percent per year and inflation is 2 percent per year. After one year, would the money in the account be able to buy more than it does today, exactly the same, or less than today?	More The same Less Don't know Refused
Risk Diversification	Do you think that the following statement is true or false: buying a single company stock usually provides a safer return than stock mutual fund?	True False Don't know Refused
Mortgage	A 15-year mortgage typical requires higher monthly payments than 30-year mortgage but the total interest over the life of the loan will be less.	True False Don't know Refused
Bond Pricing	If interest rate rise, what will typically happen to bond prives	They will rise They will fall They will stay the same There is no relationship Don't know Refused

Figure 2. The "Big Five" of financial literacy

Source: Hastings et al. (2013)

In addition to this, financial literacy and its measurement have also been recognized as important by countries and international institutions. It has become a long-term priority in many countries, where it is seen as key to influencing market participants' behavior (OECD, 2013, 2020). The Organization for Economic Co-operation and Development (OECD) took a significant step in 2005 by providing the first official definition of financial literacy, which is defined as (OECD, 2005):

"... the process by which financial consumers/investors improve their understanding of financial products and concepts and, through information, instruction and/or objective advice, develop the skills and confidence to become more aware of financial risks and opportunities, to make informed choices, to know where to go for help, and to take other effective actions to improve their financial well-being."

In 2012, the member states of the G20 agreed on a new definition of the concept of financial literacy. This is based on the research of Atkinson and Messy (2013) who made the findings of the Organization for Economic Cooperation and Development (OECD) and the International Network on Financial Education (INFE) public for the first time. According to Atkinson and Messy (2013) and the OECD (2020a, 2020b) financial literacy is understood to mean the following:

"A combination of financial awareness, knowledge, skills, attitudes and behaviors necessary to make sound financial decisions and ultimately achieve individual financial well-being."

By May 2020, over 70 countries and economies worldwide had developed or were implementing national financial literacy strategies based on this definition (OECD, 2020b). The European Commission, for instance, uses this definition to create a common framework for developing and promoting financial literacy (European Commission, 2021). Similarly, Austria's financial literacy strategy is also built on this definition (OECD, 2021).

A substantial contrast to Lusardi and Mitchell (2014) is the OECD's more comprehensive concept of financial literacy. It goes beyond a purely knowledge-oriented model by including awareness, skills, attitudes, and behavioral patterns. This broader concept identifies three key dimensions that can be used to assess and compare financial literacy across

different nations (Atkinson & Messy, 2013; Haupt, 2021; OECD, 2021, 2022):

1. Knowledge (compound interest, inflation, interest on loans, time value of money, risk vs. return, and risk diversification)
2. Behavior (assessing affordability, paying bills on time, monitoring personal finances, setting and using long-term financial goals)
3. Attitudes (preference between spending and saving, long-term vs. short-term view)

In addition to the "Big Three" and the "Big Five", the "OECD/INFE Toolkit for Measuring Financial Literacy and Financial Inclusion 2022" is available to measure the level of financial literacy (OECD, 2022). This was created in 2010 and found its first practical application during the OECD project to determine financial literacy and inclusion in the same year. The toolkit was updated in 2015, after which it was used by around 40 countries in 2015/16. A revision in 2018 aimed to both refine the content and include subjective financial well-being. The last revision of the questionnaire was carried out in 2022, this time focusing on the assessment of digital financial knowledge (OECD, 2022).

3. Data and Method

The "OECD/INFE Toolkit for Measuring Financial Literacy and Financial Inclusion" from 2022 was used to collect the primary data in the current study (OECD, 2022). This kit contains extensive questions to collect information on financial behavior, attitudes, and knowledge as well as several other questions on financial outcomes. The aim is to measure and assess the level of financial literacy, financial inclusion, financial resilience, and financial well-being. It also includes methodological guidance and instructions on how to create different financial literacy scores. One advantage of the toolkit is that the questions it contains serve to measure and assess financial literacy in an internationally comparable way. Furthermore, the toolkit offers extensive freedom to select individual questions and modules to measure and assess financial literacy, inclusion, resilience, and well-being.

Due to the advantages described above and the high level of application orientation, this study uses the OECD toolkit and the corresponding OECD definition to measure financial literacy in Germany. Consequently, the data collected relates to the three dimensions: (i) financial knowledge, (ii) financial behavior, and (iii) financial attitudes. For the first dimension, a score is calculated based on the number of correct answers to seven questions on financial knowledge. The score for financial behavior is calculated from nine questions and the average answer to two questions is used for the attitude score. The total score for financial literacy is the sum of the three scores: Financial Knowledge (7), Financial Behavior (9), and Financial Attitudes (4) (OECD, 2022).

In addition to the questions on financial literacy, further data was collected on the following points:

(i) Self-assessment of the importance of financial literacy

(ii) Assessment of your own financial literacy

(iii) Self-assessment of being financially educated through school literacy

In addition, socio-demographic characteristics such as gender, age, educational qualifications, net household income, and professional situation were queried.

The data were collected using an anonymous online survey in the period from 28.04.2023 to 03.05.2023. To achieve a representative sample size, a market research panel from the provider "GapFish" was used. This has the largest ISO-certified online access panel in the German-speaking world. The total sample size of the survey is 1,202 people between the ages of 16 and 65, representatively weighted by age and gender.

As the survey involves unique primary data, these are methodically evaluated with the help of an explorative data analysis. This form of analysis serves to uncover previously unknown characteristics, patterns, correlations, and structures in the data (Carranza, 2020; Krämer et al., 2008; Schäfer, 2010). At the same time, this method allows a better understanding of the data set to formulate and test targeted hypotheses in subsequent evaluations (Komorowski et al., 2016). It is also appropriate when the research topic is relatively new and there is no generally applicable theory or analysis on the topic (Keller, 2023). This is the case here. The explorative approach also paves the way for other researchers to investigate the results presented here in new studies.

Exploratory data analysis is seen as a paradigm or strategy for the robust analysis of data and goes back to Tukey (1977). The process ranges from a problem definition to the data, the analysis, and the model through to the conclusion. This is in contrast to the process of data analysis in classical statistics, which ranges from the problem definition via the data and the model to the analysis and conclusion. While analyses in the classical statistical and probabilistic framework require prior assumptions and hypotheses about models and data distribution, this is not the case in exploratory data analysis (Carranza, 2020). In an exploratory analysis, therefore, no hypotheses are defined in advance and no fixed model is set up (Keller, 2023).

Exploratory data analysis uses a variety of methods to enable a comprehensive analysis of the data. These include graphical representations such as histograms, box plots, scatter plots, and Q-Q diagrams. On the other hand, numerical methods provide quantitative key figures that allow the data to be interpreted and analyzed. These include methods for calculating the central tendency (e.g. mean, median), the dispersion (e.g. variance, standard deviation), and the relationship between variables (e.g. correlation, regression) (Carranza, 2020; Keller, 2023; Komorowski et al., 2016; Krämer et al., 2008; Schäfer, 2010; Steland, 2013). Due to the scope of the available data set, there are thus extensive possibilities for using the various analysis methods and the associated evaluations.

4. Results of the Study

4.1 Descriptive Results

For better analysis, the data is divided into four different age groups to highlight possible generational differences. Group 1 comprises the up to 25-year-olds (Generation Z), Group 2 26 to 40-year-olds (Generation Y), 41 to 55-year-olds (Generation X), and 56 to 65-year-olds (Baby Boomer generation). In addition, the data set is analyzed and described across all participants. Furthermore, the descriptive results are weighted so that they reflect the distribution of the age structure in Germany in a representative manner.

The socio-demographic characteristics can therefore be described as follows. A total of 1202 people took part in the survey, whereby the genders (*f=49*.9 % and *m=50*.01 %) were equally distributed. The distribution of the age structure shows that the groups of 46- to 55-year-olds and 56- to 65-year-olds have a higher proportion (21.5% and 23.4% respectively). With a value of 7.3%, the age groups up to 20 years are the least represented. In terms of educational qualifications, the majority of respondents across all generations have a secondary school leaving certificate, followed by a general higher education entrance qualification and a university degree. This result also applies when looking at the generations. The monthly net household income was also surveyed. Here, 19.6% of respondents were in the €3,000 to under €4,000 range. If we look at the different age groups, we see that 18.0% of those aged up to 25 have a net income of less than €1,000 per month. In contrast, the majority of the 56 to 65 age group have a net income of between €3,000 and under €4,000, accounting for 26.0% (see Figure 3-7).

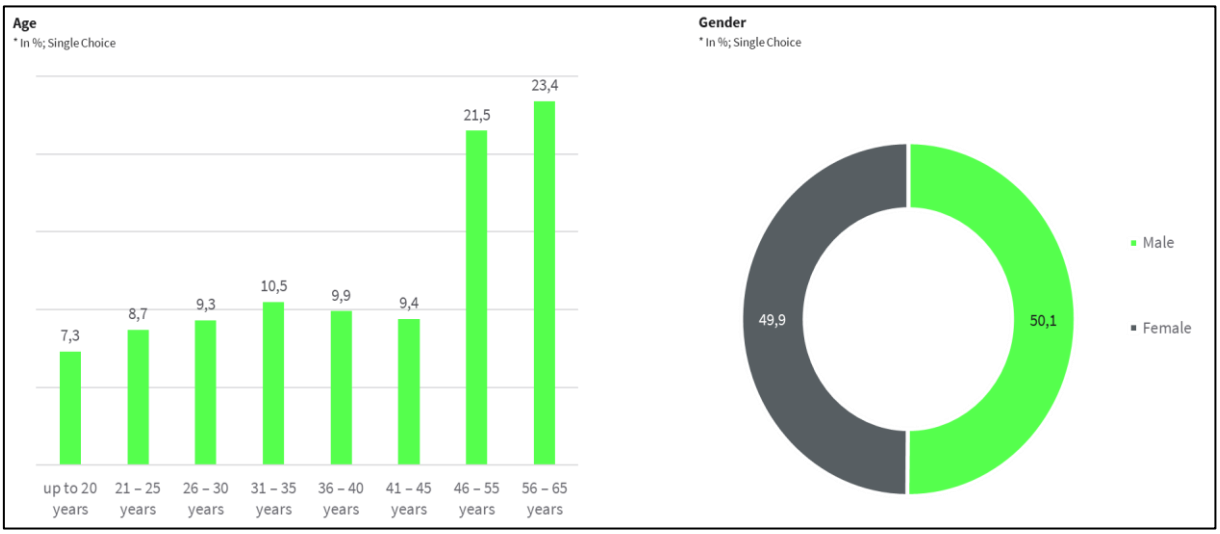


Figure 3. Age and gender distribution in the sample studied

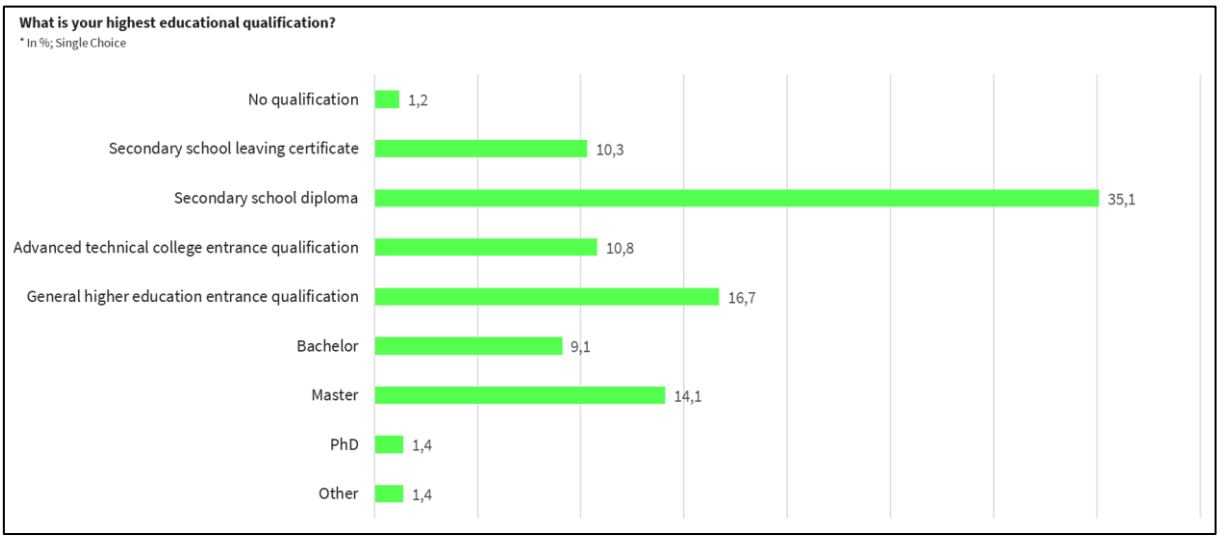


Figure 4. The highest educational qualification in the sample studied

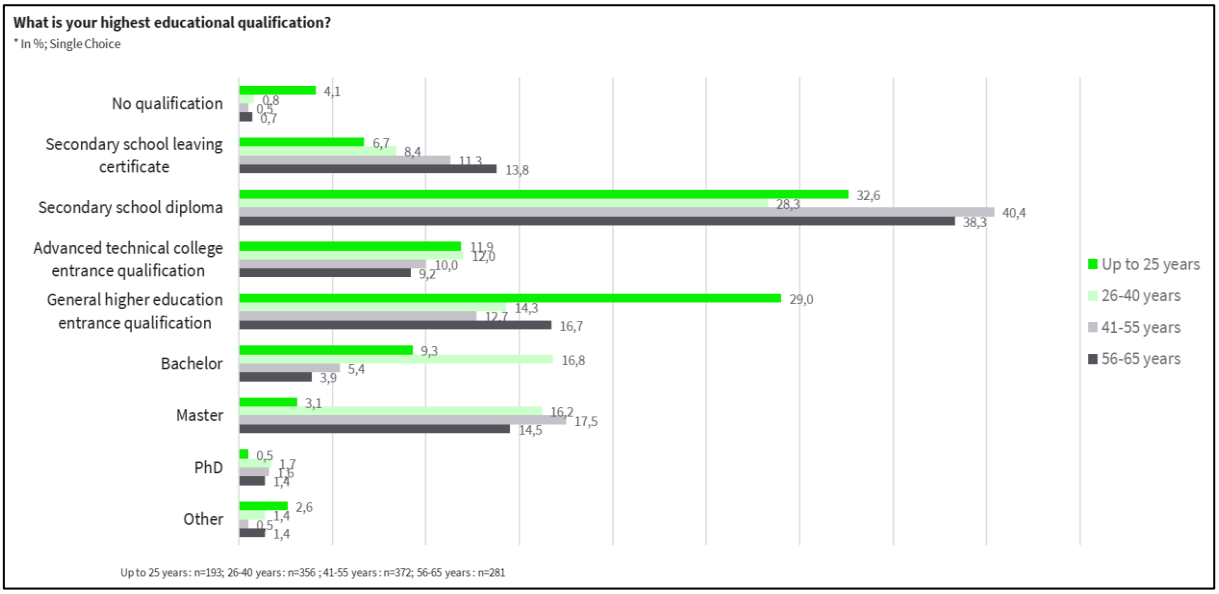


Figure 5. Highest educational qualification by age group

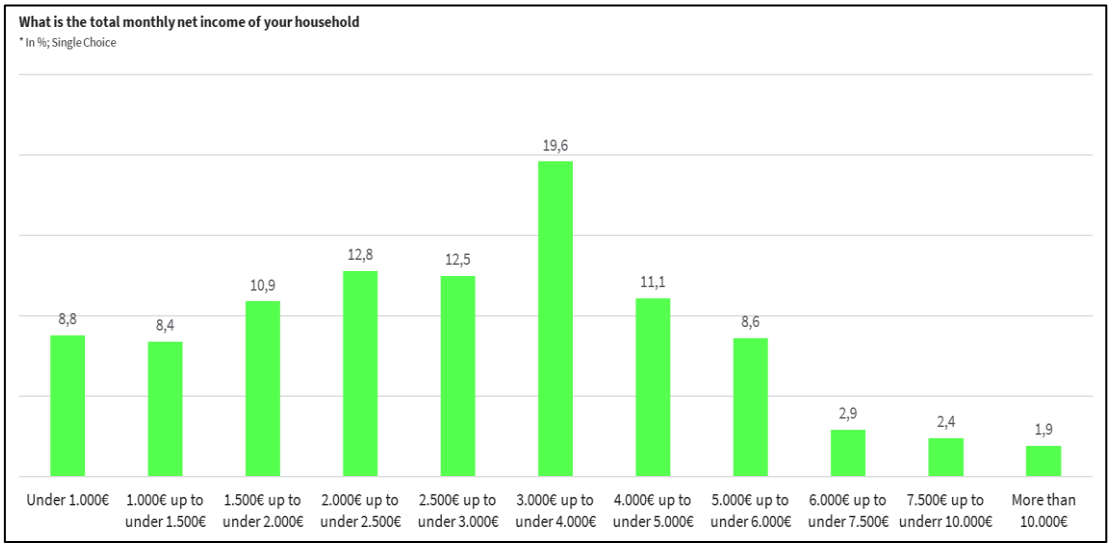


Figure 6. Monthly net income of the sample analyzed

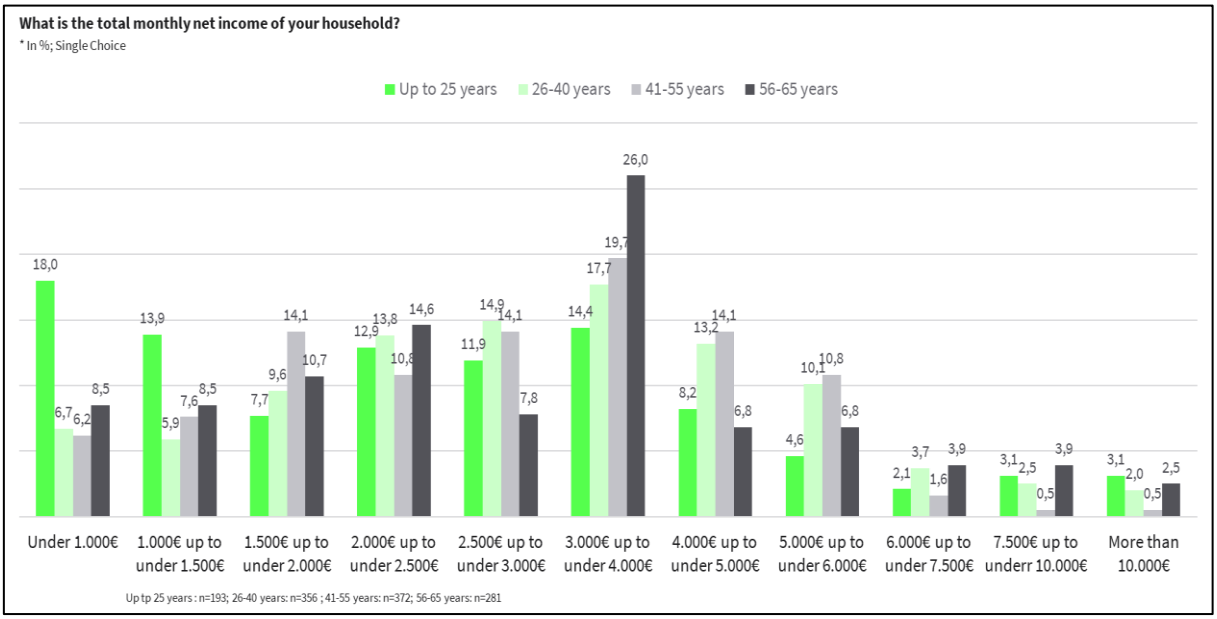


Figure 7. The monthly net income of the sample examined by age group

Concerning the relevance of financial literacy, 92.3% of respondents consider it to be very important or somewhat important. This result also applies across all generations and age groups. When asked about their individual assessment of the status of their own financial literacy, 79.7% of all respondents stated that they rated this as fairly good to very good. The remaining percent considered their own financial literacy to be rather poor to very poor. Across all age groups, the vast majority of respondents felt that their own financial literacy was fairly good to very good. There is a tendency for the positive assessment to increase with age. This can be attributed to a possible increase in experience in dealing with financial matters. However, only 49.2% of all respondents state that they feel financially educated as a result of their school education. The remaining 50.8% disagree with this view. The majority of the two youngest age groups do not consider themselves to be sufficiently financially educated because of their school education (see Figure 8-13).

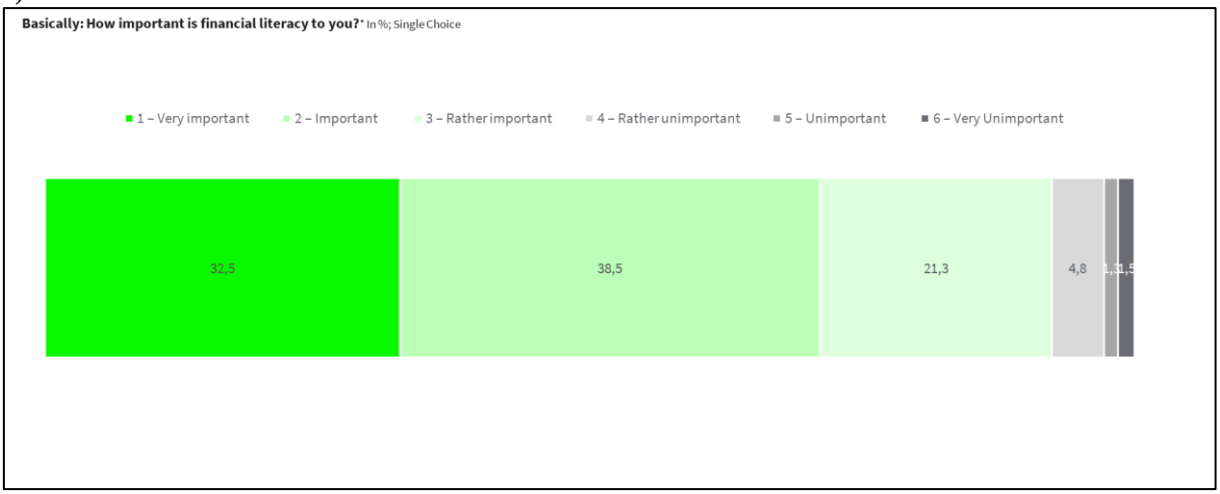


Figure 8. Self-assessed importance of own financial literacy by the respondents

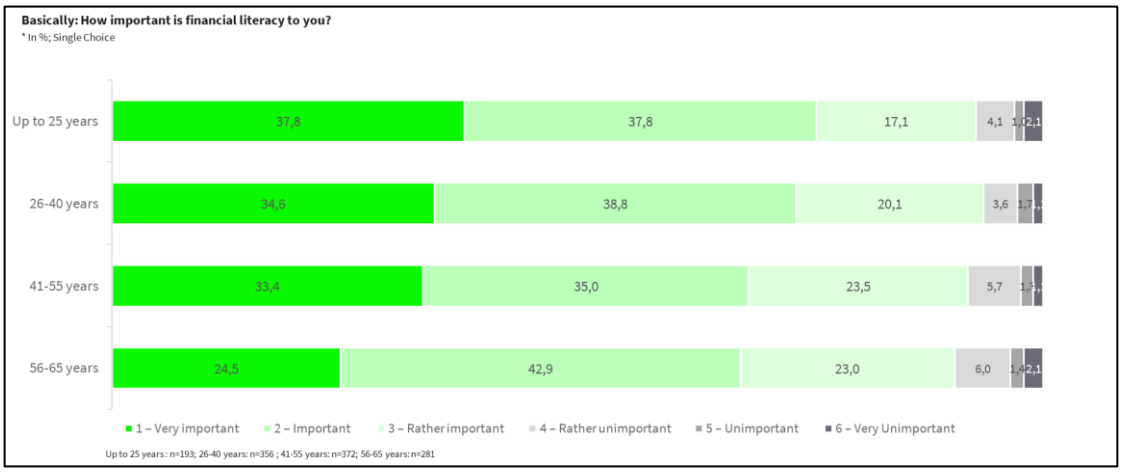


Figure 9. Self-assessed importance of own financial literacy by age group

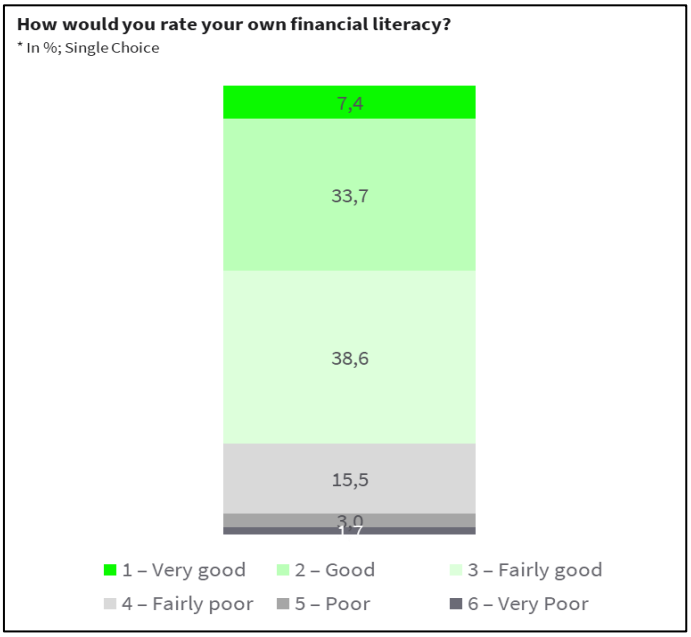


Figure 10. Self-assessed financial literacy of respondents

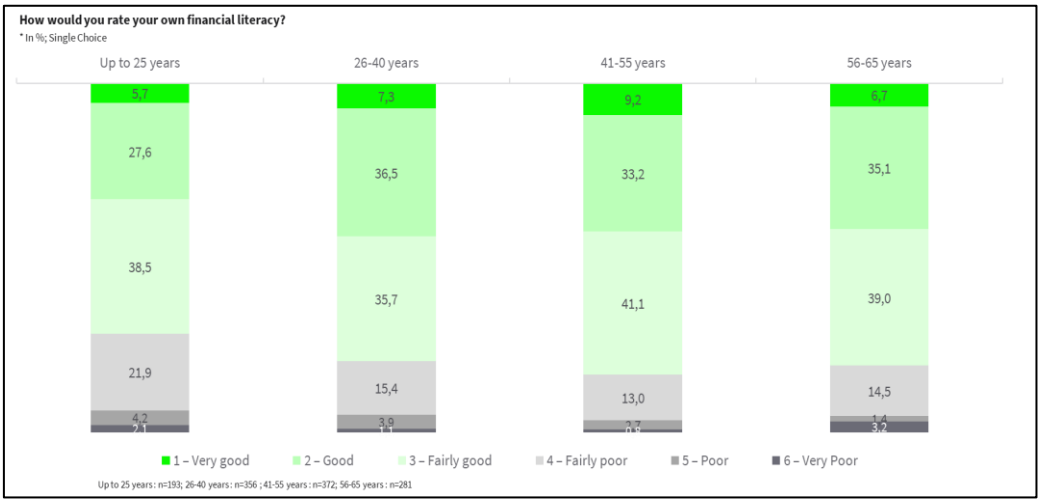


Figure 11. Self-assessed financial literacy of respondents by age group

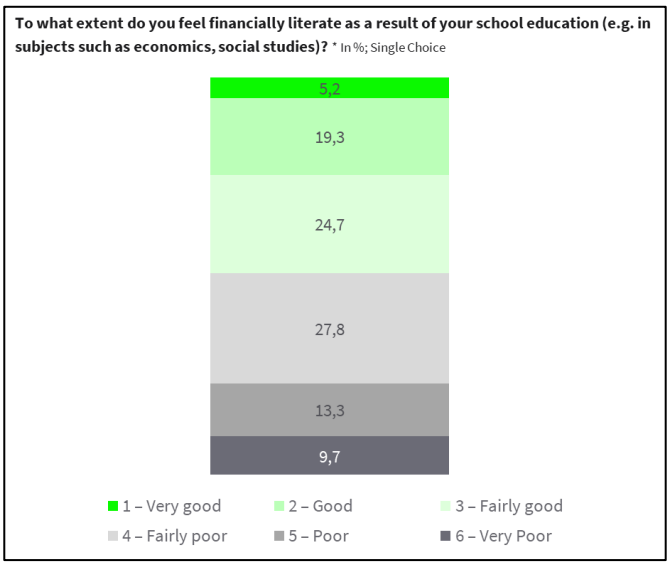


Figure 12. Self-assessed financial literacy through the respondents' school education

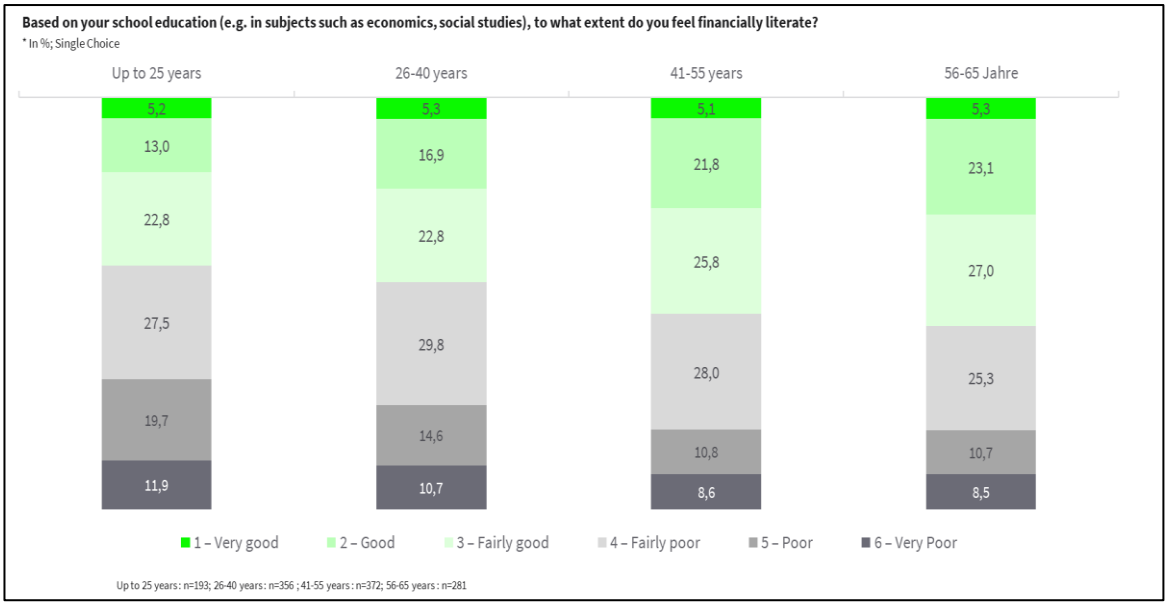


Figure 13. Self-assessed financial literacy through school education by age group

In addition to the positive self-assessment as an indicator of financial literacy, the measurement of actual circumstances shows a different result. The first subscore, the knowledge score, is calculated from the number of correct answers to seven questions on financial knowledge. This results in an average score of 4.9 with a standard deviation of 2.0 for this first dimension (see Table 1). The maximum number of points was achieved by 29.6% of all respondents, while 3.5% and 4.8% of respondents scored zero or one point respectively. Concerning the different age groups, the graph shows that the higher the age, the higher the score. In addition, 39.9% of the 56-65 age group achieved the highest score (see Figures 14 and 15).

Table 1. Descriptive statistics on the knowledge score

Mean value	4,91
Median	5,00
Variance	4,104
Standard deviation	2,026
Minimum	0
Maximum	7
Skew	-,739
Kurtosis	-,455

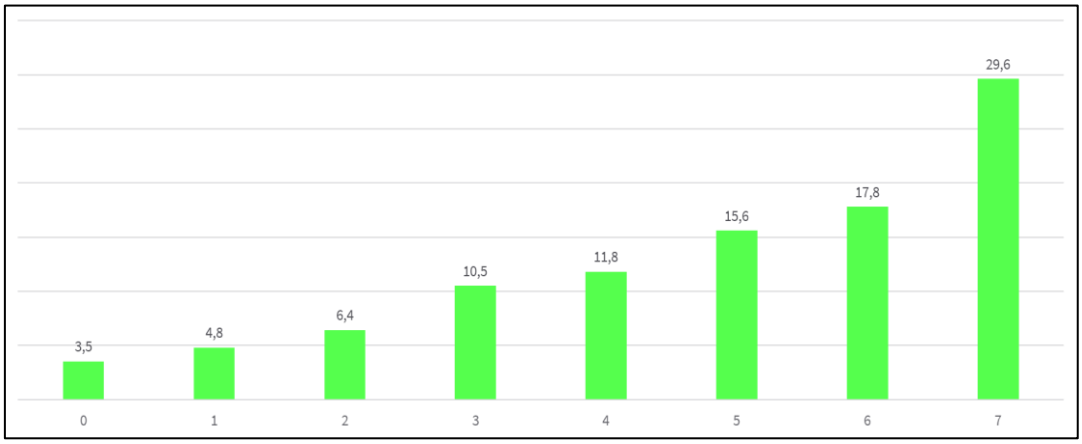


Figure 14. Frequency of respondents' knowledge score in percent on a scale from 0 to 7

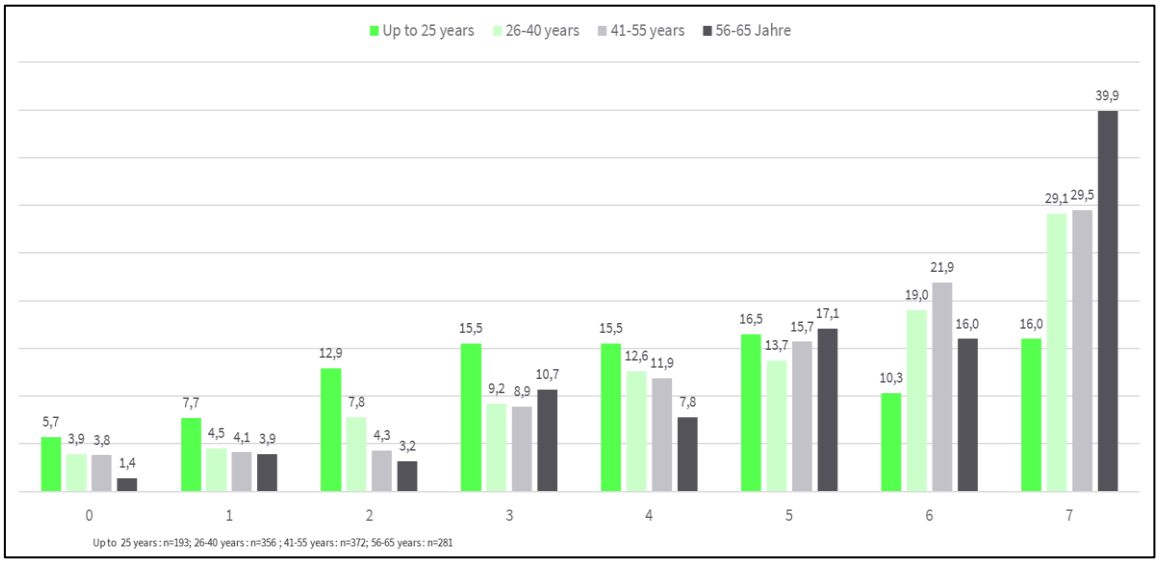


Figure 15. Frequency of respondents' knowledge score in percent on a scale from 0 to 7 by age group

The second score, the behavior score, is calculated from the number of "financially savvy" behaviors related to budgeting, actively saving, avoiding credit to make ends meet, selecting products, monitoring financial matters, achieving goals, making thoughtful purchases, and paying bills on time. Calculating the score for this dimension results in an average score of 3.7 points and a standard deviation of 1.65 (see Table 2). With a share of 24.4%, most respondents achieved a score of four points. However, only 0.6 % of all respondents achieved the maximum number. A value of zero was achieved by 1.3 %. Overall, the score for the behavior dimension is almost normally distributed across the entire data set. A distinction between the four age groups in the graph shows an almost equal distribution across all groups and no minor age-specific differences (see Figures 16 and 17). An initial conclusion can thus be that age does not influence "financially *savvy*" behavior such as budgeting, active saving, and avoiding loans to make ends meet.

Table 2. Descriptive statistics for the behavior score

Mean value	3,73
Median	4,00
Variance	2,735
Standard deviation	1,654
Minimum	0
Maximum	9
Skew	,284
Kurtosis	,089

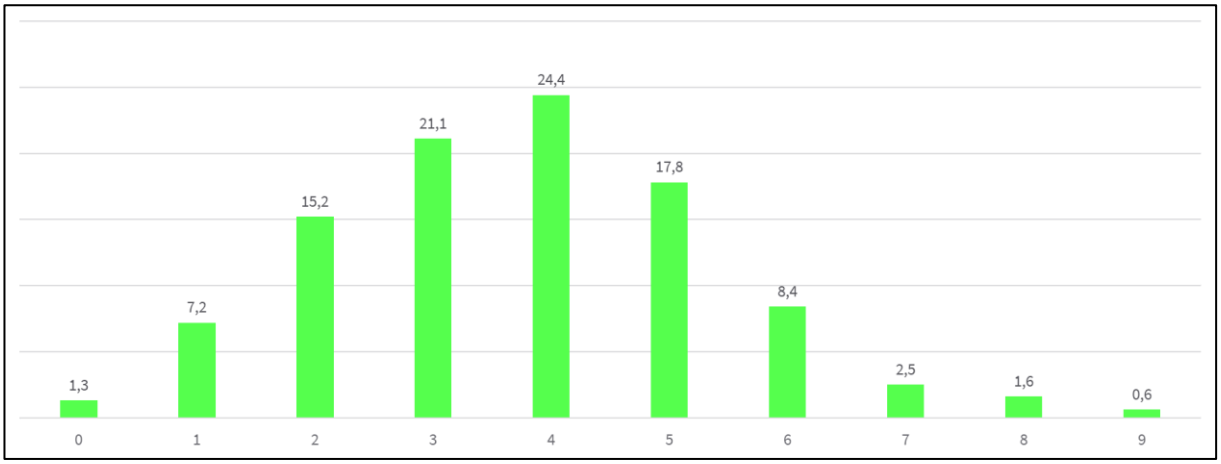


Figure 16. .Frequency of respondents' behavior score in percent on a scale from 0 to 9

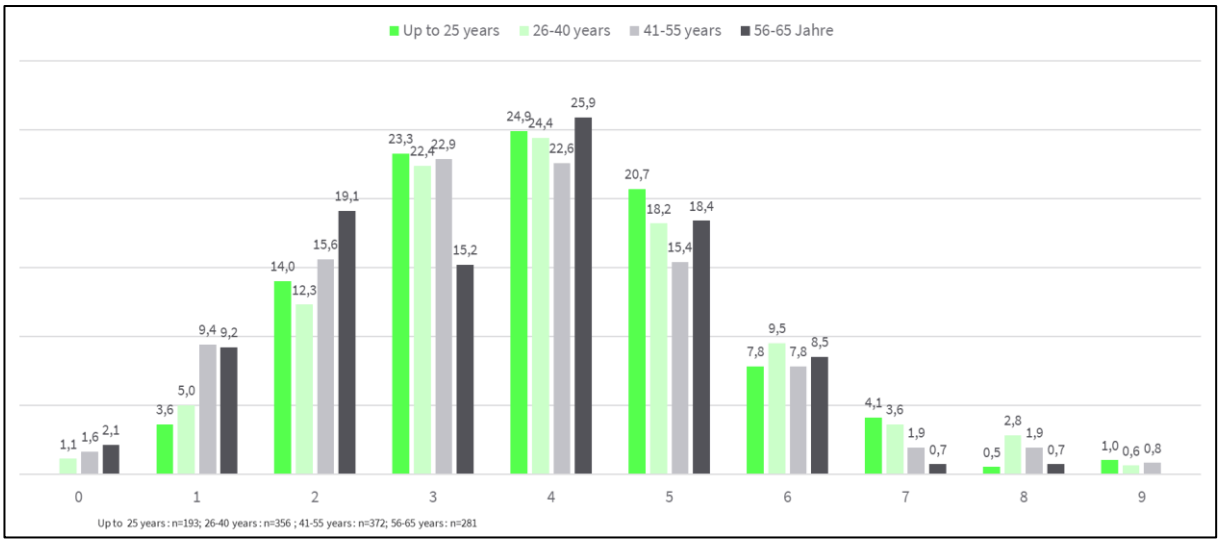


Figure 17. Frequency of respondents' behavior score in percent on a scale from 0 to 9 by age group

The third subscore (attitude) relates to the preference between spending and saving, long-term vs. short-term view, and is calculated as the average value from two attitude questions. The attitude score ranges from 0 to 4, resulting in an average score of 2.1 points and a standard deviation of 0.81 for all respondents (see Table 3). The most frequent score of two points was achieved by 30.8 % of respondents. A proportion of 2.1 % achieved zero points and a proportion of 3.4 % achieved the full score. A breakdown into the various age groups shows a very similar graphical distribution and only slight age differences (see Figures 18 and 19). It can therefore be assumed that there are no or only minor age-specific differences for this sub-score.

Table 3. Descriptive statistics on the attitude score

Mean value	2,123
Median	2,000
Variance	,658
Standard deviation	,8115
Minimum	,0
Maximum	4,0
Skew	-,172
Kurtosis	,321

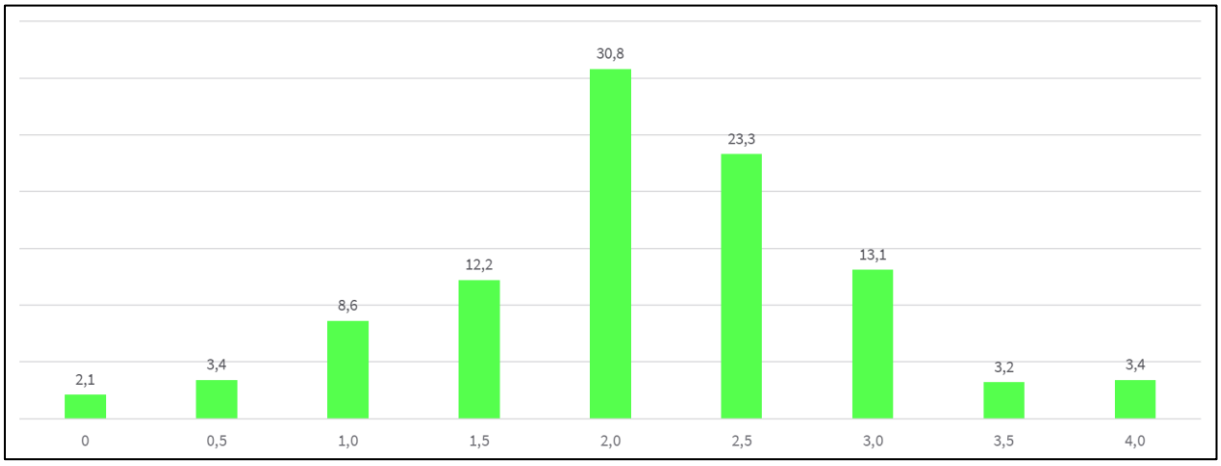


Figure 18. Frequency of respondents' attitude score in percent on a scale from 0 to 4

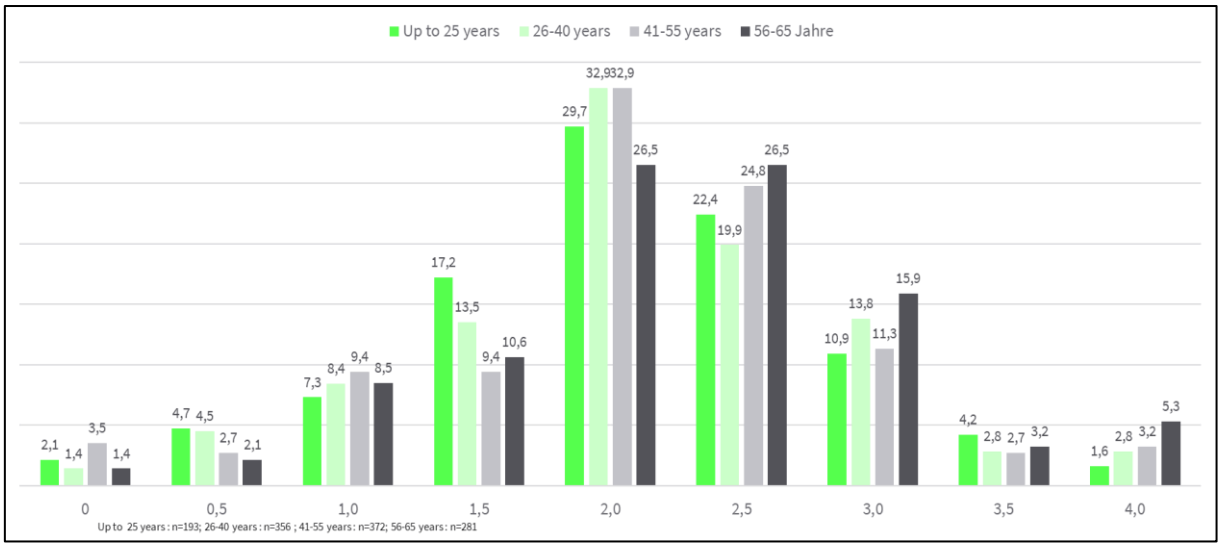


Figure 19. Frequency of respondents' attitude score in percent on a scale from 0 to 4 by age group

The total score (final score) for financial literacy is the sum of the three previous scores: knowledge, behavior, and attitude. It can be any value between 0 and 20. For financial literacy in Germany, this results in an average rounded score of 10.74, which is just over half of the possible points (see Table 4). The corresponding standard deviation is 3.0. A look at the distribution of the final score shows that neither 19 nor 20 nor zero points are available as a final score. An accumulation of the points achieved lies in the range between 9 and 14 points. A breakdown of the four age groups shows different average values. The youngest age group achieved the lowest score of 9.97. The 56 to 65 age group achieved the highest score of 11.10 (see Figures 20 and 21). The analysis shows that although financial literacy does exist in Germany, the extent measured using the OECD toolkit is low. At the same time, a difference between the generations becomes apparent. A higher score is achieved with increasing age. This indicates better financial literacy. The descriptive evaluation therefore shows that the respondents' self-assessment of their own financial literacy is very good. In contrast, the measurement of the current status reveals a very different picture. Furthermore, the initial analysis of the data points to possible differences between the generations.

Table 4. Descriptive statistics on the final score

Mean value	10,7392
Median	11,0000
Variance	9,001
Standard deviation	3,00012
Minimum	1,00
Maximum	18,00
Skew	-,439
Kurtosis	-,292

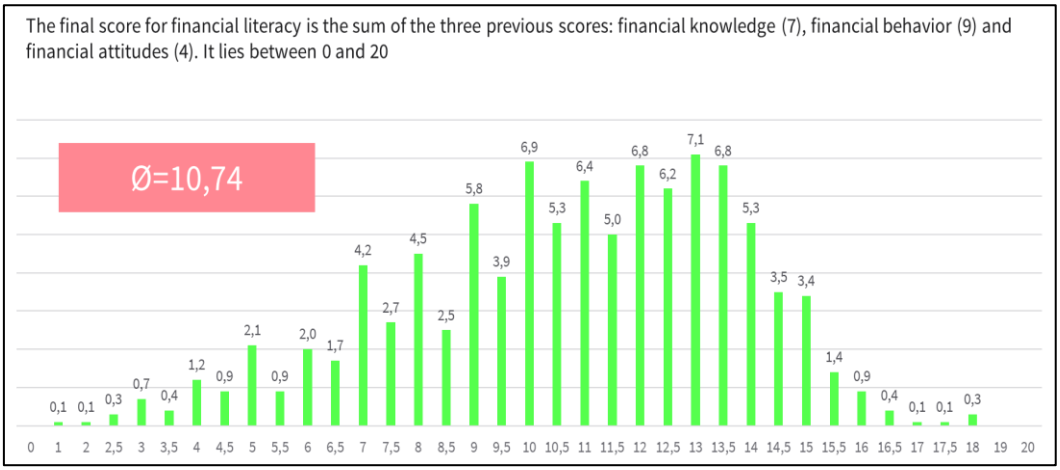


Figure 20. Frequency of respondents' final score in percent on a scale from 0 to 20

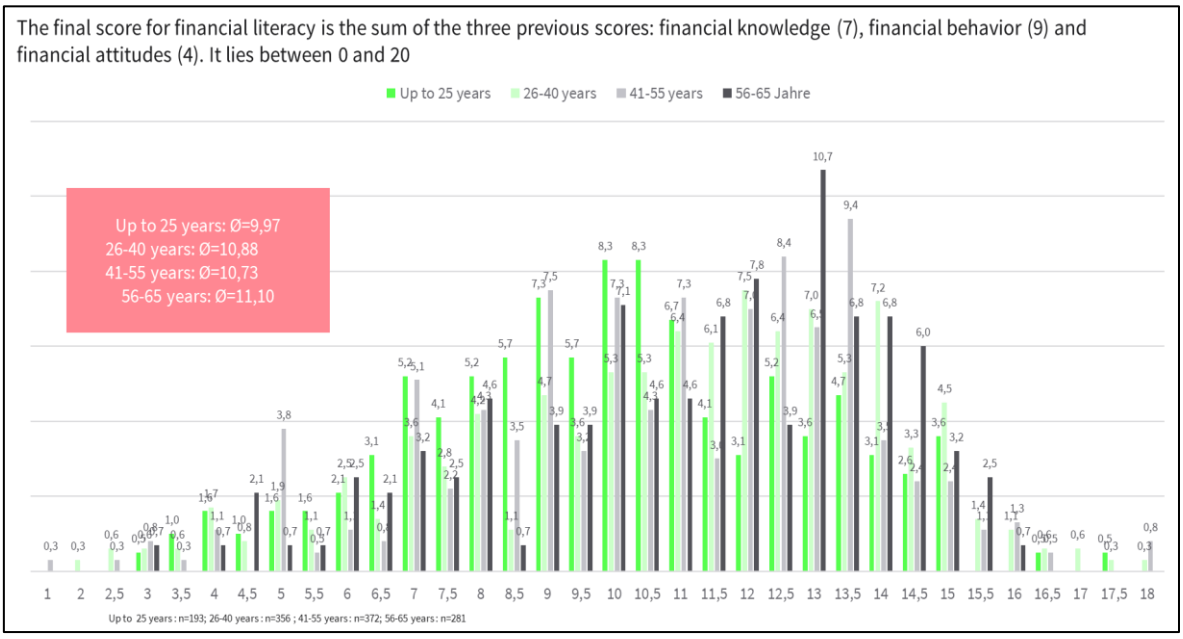


Figure 21. Frequency of respondents' final score in percent on a scale from 0 to 20 by age group

4.2 Regressions

Regression analysis is an important component of exploratory data analysis (Schäfer, 2010; Steland, 2013). This form of analysis is used to examine the relationship between a dependent variable and one or more independent variables. Consequently, regression analysis is an important tool in exploratory data analysis as it provides a sound insight into variable relationships, makes predictions, identifies patterns, and assesses the strength and direction of the relationship between variables. For the exploratory data analysis chosen in this study, a regression analysis is therefore carried out as part of a multiple linear regression to examine individual components of financial literacy in more detail.

For the regression analysis to be interpreted meaningfully, the following conditions (Gauss-Markov assumptions) must be met (Bortz & Schuster, 2010):

- Linearity: There must be a linear relationship between the dependent and independent variables
- Homoscedasticity: The residuals must have a constant variance
- Normality: Normally distributed error component
- No multicollinearity: No high correlation between the independent variables
- No autocorrelation: The error component should have no autocorrelation

The coefficient of determination (R^2) and the corrected R ²are interpreted according to Cohen (1988):

- low/weak variance explanation |R ²| = .02
- mean/moderate variance resolution |R ²| = .13
- high/strong variance explanation |R ²| = .26

The first multiple regression analysis (see Table 5) considers the knowledge subscore as the dependent variable and attempts to find out how the independent variables (i) net income, (ii) importance of financial literacy, (iii) educational qualification, (iv) own assessment of financial literacy and (v) school education explain this. The control of the prerequisites shows a linear relationship between the variables in the graphical checks (scatter diagram). The same method can be used to confirm the existence of homoscedasticity. The histogram and the P-P diagram also show normally distributed error terms. The multicollinearity check using tolerance/VIF indicates no tolerance value below 0.1 and no VIF values above 10, meaning that there is no multicollinearity between the predictors. There is also no autocorrelation, as the Durbin-Watson statistic is very close to two. With an R-squared of 0.169, the model indicates that 16.9% of the variance in the dependent variable can be explained by the independent variables. The corrected R-squared (0.167) is similar so the model provides a moderate explanation of variance. The ANOVA analysis shows that the regression model is statistically significant overall ($F(4,1197) = 61.008$, $p < .001$). All estimated coefficients are significant at a high level ($p < .001$, $p = .005$). Interestingly, the assessment of being financially literate through school education in subjects such as economics and social studies has a negative influence on the knowledge score (B = -.308, $p < .001$). This indicates that people who feel less financially educated because of their school education have a lower knowledge score. A possible explanation for this may be that lessons in subjects such as economics or social studies either do not sufficiently address financial issues or that respondents do not perceive the content as relevant or helpful for their financial literacy.

Table 5. Multiple regression analysis for the knowledge subscore

Model summary[a]						
Model	R	R-square	Corrected R-squared	Standard error of the estimator	Durbin-Watson statistics	
1	,441	,195	,152191	1,853	1,963	
ANOVA						
Model		Sum of squares	df	Mean of the squares	F	Sig.
1	Regression	993,280	5	198,656	57,881	<,001
	Non-standardized residuals	4104,820	1196	3,432		
	Total	5098,100	1201			
Coefficients						
		Non-standardized coefficients		Standardized coefficients		
Model		Regression coefficient B	Std. error	Beta	T	Sig.
1	(constant)	1,841	,315		5,839	<,001
	Importance of financial literacy	,161	,057	,081	2,812	,005
	Assessment of your own financial literacy	,286	,063	,141	4,550	<,001
	To what extent do you feel financially educated as a result of your school education (e.g. in subjects such as economics, social studies)?	-,308	,043	-,202	-7,247	<,001
	What is your highest educational qualification?	,285	,032	,244	9,000	<,001
	What is the total monthly net income of your household?	,142	,023	,170	6,153	<,001

[a] Dependent variable: knowledge

The second regression analysis has the Behavior subscore as the dependent variable and the same independent variables as in the previous model (see Table 6). The prerequisites were checked in the same way as in Model 1 and yielded the same results, meaning that all conditions were met. The results of Model 2 show an R-squared of 0.155, which indicates that 15.5% of the variation in the dependent variable can be explained by the independent variables. The corrected R-squared is almost the same and is 0.152. Overall, Model 2 provides a moderate variance explanation, like Model 1. The Durbin-Watson statistic of 1.903 is close to two, indicating that there is no autocorrelation in the residuals. The ANOVA analysis shows that the regression analysis is statistically significant overall. All independent variables, except for the constant, are statistically highly significant ($p < .001$, $p = .003$). This means that all variables can be used to explain the Behavior subscore and to describe financial literacy. It is interesting to note that in Model 2, the regression coefficient for the variable "To what extent do you feel financially educated as a result of your school education" is weakly positive. This is a difference to all the models presented here.

Table 6. Multiple regression analysis for the behavior subscore

Model summary[b]					
Model	R	R-square	Corrected R-squared	Standard error of the estimator	Durbin-Watson statistics
2	,394	,155	,152	1,517	1,903

ANOVA						
Model		Sum of squares	df	Mean of the squares	F	Sig.
2	Regression	505,373	5	101,075	43,925	<,001
	Non-standardized residuals	2752,104	1196	2,301		
	Total	3257,478	1201			

Coefficients						
		Non-standardized coefficients		Standardized coefficients		
Model		Regression coefficient B	Std. error	Beta	T	Sig.
2	(constant)	,190	,258		,735	,463
	Importance of financial literacy	,257	,047	,162	5,482	<,001
	Assessment of your own financial literacy	,252	,052	,156	4,888	<,001
	To what extent do you feel financially educated as a result of your school education (e.g. in subjects such as economics, social studies)?	,103	,035	,084	2,956	,003
	What is your highest educational qualification?	,095	,026	,102	3,665	<,001
	What is the total monthly net income of your household?	,101	,019	,150	5,319	<,001

[b] Dependent variable: behavior

The third regression analysis has the Attitude subscore as the dependent variable and the same independent variables as in the previous models (see Table 7). An examination of the prerequisites shows that all conditions are also fulfilled here. However, Model 3 has only a low ability to predict the dependent variable (Attitude), as the R-squared (0.042) explains only 4.2% of the variance in the dependent variable by the predictors. The corrected R-squared (0.038) is also very low, meaning that the overall variance explanation is weak. The Durbin-Watson statistic of 1.990 is very close to two, which indicates that there is no autocorrelation in the residuals. The ANOVA analysis provides the result of a statistically significant regression analysis as a whole. Concerning the regression coefficients, it is clear that net income and educational qualification are not significant and therefore have no influence on the Attitude subscore. The remaining coefficients are significant at different levels and are positive with one exception. This concerns the "Assessment of feeling financially educated through school education", which is negative in this model. This means that people with a lower financial attitude (Attitude subscore) tend to feel less financially educated because of their school education. Overall, the third model provides the least explanatory content on the topic of financial literacy compared to the other models.

The final regression model includes the final score of financial literacy in Germany as the dependent variable (see Table 8). According to the OECD toolkit, this final score results from the addition of all three sub-scores (OECD, 2022). An examination of the conditions for multiple linear regression shows that, as in the previous models, all conditions are met. The present model yields an R-squared of 0.255, which means that 25.5% of the variation in the dependent variable is explained by the independent variables. The corrected R-squared value is similarly high and is 0.252. The model is therefore at the interpretation limit according to Cohen (1988) between moderate and strong variance explanation. The Durbin-Watson statistic is 1.908, thus ruling out a positive autocorrelation in the residuals. The ANOVA statistic shows that the model is significant overall ($p < .001$). The regression coefficients are all highly significant ($p < .001$) and thus provide information about the strength and direction of the relationship between the dependent variable and the independent variables. All coefficients are positive with one exception. The exception concerns "To what extent do you feel financially educated through your school education (e.g. in subjects such as economics, social studies)". As in models 1 and 3, there is a negative relationship here. This means that the worse the respondents feel financially educated by their school, the lower the final score for financial literacy.

Table 7. Multiple regression analysis for the attitude subscore

Model summary[c]						
Model	R	R-square	Corrected R-squared	Standard error of the estimator	Durbin-Watson statistics	
3	,205	,042	,038	,7917	1,990	
ANOVA						
Model		Sum of squares	df	Mean of the squares	F	Sig.
3	Regression	32,746	5	6,549	10,450	<,001
	Non-standardized residuals	749,574	1196	,627		
	Total	782,319	1201			
Coefficients						
		Non-standardized coefficients		Standardized coefficients		
Model		Regression coefficient B	Std. error	Beta	T	Sig.
3	(constant)	1,752	,135		12,996	<,001
	Importance of financial literacy	,076	,025	,097	3,090	,002
	Assessment of your own financial education	,069	,027	,087	2,580	,010
	To what extent do you feel financially educated as a result of your school education (e.g. in subjects such as economics, social studies)?	-,103	,018	-,172	-5,680	<,001
	What is your highest educational qualification?	,016	,014	,035	1,180	,238
	What is the total monthly net income of your household?	-,007	,010	-,021	-,691	,489

[c] Dependent variable: attitude

Table 8. Multiple regression analysis for the final score

Model summary[d]						
Model	R	R-square	Corrected R-squared	Standard error of the estimator	Durbin-Watson statistics	
4	,505	,255	,252	2,62011	1,908	
ANOVA						
Model		Sum of squares	df	Mean of the squares	F	Sig.
4	Regression	2807,173	5	561,435	81,782	<,001
	Non-standardized residuals	8210,529	1196	6,865		
	Total	11017,702	1201			
Coefficients						
		Non-standardized coefficients		Standardized coefficients		
Model		Regression coefficient B	Std. error	Beta	T	Sig.
4	(constant)	3,783	,446		8,480	<,001
	Importance of financial literacy	,495	,081	,170	6,096	<,001
	Assessment of your own financial literacy	,607	,089	,204	6,827	<,001
	To what extent do you feel financially educated as a result of your school education (e.g. in subjects such as economics, social studies)?	-,309	,060	-,137	-5,129	<,001
	What is your highest educational qualification?	,396	,045	,231	8,842	<,001
	What is the total monthly net income of your household?	,236	,033	,192	7,221	<,001

[d] Dependent variable: final score

5. Discussion of the Results

The explorative evaluations of the data show a very differentiated picture concerning financial literacy in Germany and therefore allow a diverse discussion of the results. On the one hand, financial literacy is seen as very important or important by the majority of respondents. On the other hand, the measurement using the OECD toolkit shows a very different picture. For 1202 respondents, the average final score for financial literacy in Germany was 10.74 out of a possible 20 points. Compared to the OECD survey (2020a) the results presented here reveal a lower level of financial literacy in Germany. In the OECD survey, OECD (2020a) of 1003 participants in Germany achieved an average final score of 13.9 points out of a possible 21 points. In comparison with the current measurement of financial literacy by the OECD (2023) shows different results. Here, an average final financial literacy score of 15.2 points was achieved out of 1,000 people surveyed. One difference between both OECD studies is that the present analysis reveals differences between the generations in terms of the importance, self-assessment, and status of financial literacy and that the scope is

greater. These points were measured in the OECD (2020a, 2023) and were not considered. The generational differences in financial literacy shown in this study, both for self-assessment and for the final score, can be attributed to a possible age-related increase in experience in dealing with financial matters.

The low level of financial literacy in Germany shown in the evaluation is in line with the survey by the European Commission (2023) which found that only 18% of EU citizens have a high level of financial literacy, 64% have a medium level and the remaining 18% have a low level. However, there are major differences between the member states. In only four member states more than a quarter of citizens achieve a high level of financial literacy (Netherlands, Sweden, Denmark, and Slovenia), whereas Germany never belongs to the top group in the two sub-scores examined (knowledge and behavior). The statement that can be derived from these results, namely that there is room for improvement in financial literacy in Germany, is also in line with the findings of Bucher-Koenen and Knebel (2021) whose analysis of the data from the study on the economic situation of private households shows that financial literacy is not universally widespread and that there has been no change in the spread of financial knowledge.

The regression analyses carried out provide moderate to high variance clarification of the independent variables. Except for respondents' own assessment of how financially educated they feel because of their school education, all other variables are positive and significant, meaning that they can be used to explain the extent of financial literacy overall and the individual subscores. All regression models allow the conclusion that the less financially educated respondents feel because of their schooling, the lower their financial literacy. This can be attributed to the fact that there is no standardized subject of business or economics in Germany. The federal structure of education also means that education is the responsibility of the federal states, which have different curricula and subjects with different focuses. It also varies between the federal states whether such a subject is generally offered, whether participation is voluntary or compulsory, and in which grade it is offered (Bucher-Koenen & Knebel, 2021). The explanatory model of the Attitude subscore is also the least meaningful. The variables listed here explain the financial attitude only very weakly or not at all due to insignificant values. It can be assumed that the relationship is possibly of a moderating nature or can be described more precisely using another regression method.

6. Summary

With the start of the new millennium, financial literacy has increasingly become the focus of academics and governments, as it is seen as an important complement to managing market behavior. This can be achieved by strengthening financial literacy at both an individual and societal level. In Germany, too, financial literacy has become more of a political focus. In March 2023, the "Financial Education Initiative" was launched by the Federal Ministry of Finance and the Federal Ministry of Education and Research. For the first time, politicians recognized that there are major deficits in financial literacy in Germany and therefore, there is a clear need for improvement and catching up. To measure the level of financial literacy, scientists, countries and international organizations have started to measure the level of financial literacy. However, financial literacy encompasses a broad spectrum of content-related concepts, different definitions, and various measurement concepts. For this study, the "OECD/INFE Toolkit for Measuring Financial Literacy and Financial Inclusion" from 2022 was used to measure financial literacy in Germany, and the corresponding OECD definition was used. In addition to several advantages, the main reasons for this use are the high level of application orientation and the international comparability of this scale. The evaluation of this newly collected primary data is carried out methodically with the help of explorative data analysis. This is intended to uncover unknown characteristics, patterns, correlations, and structures in the data. At the same time, a better understanding of the data set is generated to formulate and test targeted hypotheses in subsequent evaluations.

The explorative evaluations provide new and comprehensive results on the topic of financial literacy. They reveal an extremely differentiated picture of Germany. It shows that many respondents consider financial literacy to be rather important to very important and rate their own financial literacy as rather good to very good. However, the measurement of financial literacy shows that out of a total of 20 possible points, only an overall average of 10.7 points is achieved. In addition, differences can be found between the age groups, with the score increasing with age. Multiple linear regressions with all subscores and the final score as the dependent variable, and different independent variables, yield highly significant results and explain a moderate to strong amount of variance. The explanatory variables for financial literacy include the respondent's self-assessment of their financial literacy, their view on its importance, net income, educational background, and how well they feel their school education prepared them financially.

Since an explorative approach is meant to pave the way for examining the results of new studies, some approaches for future research can be outlined. The regressions show distinct and partly conflicting results compared to the other subscores, especially for the Attitude subscore. This suggests that the relationship may not be direct, but rather that the listed variables have a moderating effect. In this case, it is a good idea to re-examine and describe the relationship from a different angle using alternative regression methods or a moderation analysis. Meanwhile, the obtained data can be used to test additional hypotheses and models of financial literacy.

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Authors' contributions

Sample: Prof. Dr. Treu were responsible for study design and revising. Prof. Dr. Treu was responsible for data collection. Ms. Elss was responsible for statistical calculation and Prof. Dr. Treu revised it. Prof. Dr. Treu drafted the manuscript, and Ms. Elss revised it. All authors read and approved the final manuscript.

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Data sharing statement

No additional data are available.

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