How Does Parental Education Affect Consumer Financial Literacy? Evidence from the USA

Abstract: This study investigates the impact of parental education on consumer financial literacy and tests the mediating role of early financial education. Using data from the 2021 National Financial Capability Study, this study uses the methods of OLS and ordered probit gression and suggests that parental education significantly and positively impacts consumer financial literacy. In addition, the study finds that early financial education plays a partial mediating role between parental education and consumer financial literacy. The result suggests that early financial education can help bridge the gap between parental financial literacy levels and provide opportunities for all children to acquire financial knowledge and skills. The findings indicate the importance of investing in early financial education to improve financial literacy and promote financial inclusion.

Keywords: Parental education, financial literacy, early financial education, mediating effect

1. Introduction

"Consumers need to make decisions that affect their financial wellbeing in daily life. A high degree of financial literacy escorts toward better financial decisions" [1]. "Managing income is a key factor in socioeconomic success and is widely recognized as a necessary skill" [2]. "Moreover, Financial literacy is vital for sound financial decision-making and wellbeing" [3]. Financial wellbeing is feeling financially secure, sufficiently free from worries, and satisfied with overall financial condition [4]. Prior studies suggest that "financial literacy is pertinent to having equitable financial inclusion in the economy" [5].

"However, despite the universally recognized importance of financial literacy, levels of it vary significantly according to the 2019 National Survey of Financial Literacy and Inclusion (SNLIK)" [6]. "Individuals with poor financial literacy are more

likely to lack confidence when interpreting credit terms and exhibit confusion over financial concepts. They are also less likely to engage in behavior that might help them improve their awareness of the credit market" [7]. "Consumers with higher levels of financial literacy are more likely to hold risky financial assets than those with lower levels" [8]. Additionally, these differences are often closely linked to an individual's socioeconomic background, level of education, and cultural environment.

Certain evidences show that the levels of financial literacy were impacted through financial socialization: The process by which individuals acquired financial knowledge and learned attitudes and behaviors that influenced their financial behavior. Financial socialization could occur through home, school, and work. However, studies showed that family influence had the strongest impact on financial socialization [9]. "Parents are critical in the intergenerational transfer of financial skills, and the extent of that transfer appears to have significant social and economic implications. Additionally, parental education is crucial for the quality relationship between parents and children, and it directly affects the child's progress and further life path" [10]. Thus, among the factors explored as influencing financial literacy, this paper employs parental education as the vital variable to see whether it significantly influences financial literacy. However, research claims that parents did not need a higher education to significantly influence consumer financial literacy [9]. Hence, this paper also examined the potential mechanisms by which parental education influences consumer financial literacy, namely the mediating role of early financial education. Evidence shows that early financial education may considerably influence consumer financial literacy.

The level of parental education, as an important component of family influence, has a potential impact on children's financial literacy. Parents transmit their values, attitudes, and knowledge, including ideas about money, investment, and finance, to their children through the family environment, educational practices, and life models [11]. "For instance, children learn their first lessons observationally, even before they can speak, watching their parents shop and manage tangible family resources. In families, this learning occurs as part of family social interactions, whether or not parents intend to teach. Moreover, young adults draw on knowledge and experiences they have

gained to a considerable extent from their parents as part of family socialization processes" [12]. Other studies have revealed that "language and socialization experiences of parents as well as those of the children can influence economic and financial knowledge of young adults" [13].

This study uses data from the 2021 National Financial Capability Survey (NFCS), with parental education as the independent variable and consumer financial literacy as the dependent variable while controlling for variables such as age, gender, ethics, marriage, status, and income. The effect of parental education on consumer financial literacy is estimated using the approaches of the OLS and ordered probit regression. Income underpins parents' ability to foster desirable financial practices in their children, which could lead to better financial literacy [14]. The robustness tests use the ordered logit regression model to exclude the effect of income heterogeneity.

Finally, this study will test the mediating effect of early financial education using an ordered probit model and expect a positive correlation coefficient. Through these analyses, this study expects to gain insights into the complex relationship between parental education level, early financial education, and consumers' financial literacy and to provide more effective policy recommendations and educational measures to improve personal financial management and help consumers better implement the financial decisions to achieve financial wellbeing successfully.

2. Literacy Review

2.1 Previous Study on Parental Education

Parental education has been widely recognized as a significant factor influencing children's development and wellbeing. Parents serve as important socializing agents, providing children with their first lessons through observational learning [14]. Even before they can speak, children learn by watching their parents manage family resources and make financial decisions.

Research has consistently demonstrated the positive impact of parental education on children's educational outcomes. Financial education from parents during childhood is linked with a greater frequency of healthy financial behaviors in emerging adulthood [15]. Moreover, the importance of parental education is amplified as children progress

through their education journey.

Beyond academic achievement, parental education also plays a crucial role in shaping children's financial literacy. Parents with higher education levels tend to have more knowledge about financial management and are more likely to engage in positive financial behaviors, such as saving, budgeting, and investing [16]. These behaviors are transmitted to children through observation and direct instruction, fostering a foundation for financial literacy.

The relationship quality between parents and children is another important factor influenced by parental education. Parents with higher education levels are more likely to have positive and supportive relationships with their children, which in turn contributes to children's overall wellbeing and life outcomes [10].

Recognizing the vital role of parental education, it is imperative to strengthen parental competencies and provide accessible educational opportunities for parents. By addressing barriers to parenting education, parents can be empowered to fulfill their responsibilities effectively and positively impact their children's lives.

2.2 Previous Study on Financial Literacy

"In recent years, there has been a growing recognition of the importance of financial literacy. By strengthening the demand side of the market, financial literacy enables people to be more confident and informed in how they interact with industry participants and engage with financial products and services" [17]. "More schools should teach financial literacy that introduces younger people to investing and wealth-building concepts" [18].

To be specific, financial literacy, a multifaceted concept, has been delineated in various ways across literature, sometimes interchangeably with terms like financial capability, economic literacy, debt literacy, financial education, and financial knowledge [19-21]. Financial literacy was also defined as encompassing knowledge comprehension of financial concepts and risks alongside the skills, motivation, and confidence necessary to apply this knowledge effectively in diverse financial contexts, and its overarching goal is to enhance both individual and societal financial wellbeing and facilitate active participation in economic activities [22]. Additionally, financial

literacy is regarded as the capacity to make informed financial decisions leading to financial wellbeing.

The ramifications of inadequate financial literacy extend to personal and official spheres, with improved financial literacy correlating positively with enhanced financial management. There is research underscores the impact of financial literacy in practice. For example, it could increase civil servant cooperatives' performance, emphasizing its pivotal role in organizational effectiveness [23]. Similarly, financial literacy could positively affect competence and business performance in small and medium-sized textile industries [24]. Furthermore, proper financial literacy among business leaders leads to strategic financial decision-making, ensuring long-term viability and sustainability for their companies [25]. Moreover, the role of financial literacy extends to microfinance institutions (MFIs), where its impact on performance and sustainability is contingent on sound financial literacy practices and active engagement with rural communities [6]. While there is considerable focus on financial literacy within microfinance, particularly in Indonesia, there remains a dearth of studies specifically addressing this issue using a financial literacy index. It underscores the ongoing importance of exploring and understanding intricate financial literacy.

2.3 Previous Study on Parental Education and Consumer Financial Literacy

Parental education significantly influences consumer financial literacy, as evidenced by numerous studies. Parents transmit their values, attitudes, and knowledge, including ideas about money, investment, and finance, to their children through the family environment, educational practices, and life models [26]. In addition, parental involvement as crucial for enhancing financial literacy, stressing the importance of continual teaching and practicing financial tasks within the home environment [27]. "Parents can significantly impact a child's financial literacy by teaching important nuances of finance and more so by exhibiting and engaging in positive financial behavior" [28].

"Children growing up in the families where parents had higher education levels benefit and will have an advantage of developing better money management skills and habits early in life compared to the children from the families with lower level of

parental education" [29]. "Plus, Parents with a high income and higher education tend to financially socialize their children more than those with a low income and lower level of education" [30].

"Financial literacy and financial education play a central role in asset accumulation, shaping individuals' attitudes, behaviors, and decisions in ways that ultimately affect their financial and social wellbeing" [31]. "The acquisition of financial skills begins with parental teaching and role modeling, which provides children with their first exposure to concepts of saving and money management" [32]. Because such parental instruction is crucial to children's later financial outcomes, children whose parents lack basic financial literacy may be further disadvantaged by the absence of financial instruction at home.

Overall, parental education and financial education are essential components of consumer financial literacy. By providing their children with financial knowledge, skills, and values, parents can empower them to make informed financial decisions and achieve financial wellbeing throughout their lives. Based on these arguments, this study puts forward the following hypotheses about how dose parental education affects consumer financial literacy.

Hypothesis 1(H_1): Given economic resources and other control variables, parental education level has a significant positive effect on consumer financial literacy.

Hypothesis 2 (H_2): Given economic resources and other control variables, early financial education mediates the effect of parental education level on consumer financial literacy.

The conceptual framework of this study consists of three main components: the independent variable (parental education), the dependent variable (consumer financial literacy) and the mediating variable (early financial education). Gender, age, race, whether being married, whether having dependent children, and family income were also considered as control variables.

The independent variable is parental education because the level of parental education is the starting point of the study and represents a potential source of financial literacy and skills in the home environment [31]. "The mediating variable is early

financial education for early exposure to financial concepts helps students develop positive financial habits from a young age. These habits, such as saving regularly and making informed spending decisions, tend to persist into adulthood, contributing to long-term financial well-being" [32]. Hence, early financial education serves as a mediating variable that may be influenced by the level of parental education and, in turn, the consumer financial literacy of children. Plus, the dependent variable is consumer financial literacy for that consumer financial literacy is the end point of the study and represents an individual's ability to make and manage financial decisions. It was measured by two sets of variables, subjective knowledge and objective knowledge. And gender, age, race, whether being married, whether having dependent children, and family income are used as control variables to ensure the robustness of the results of the study and to rule out the potential impact of these variables on consumer financial literacy.

3. Method

3.1 Data

In this study, the sample data being employed was from the 2021 National Financial Capability Study State-by-State Survey Instrument, a national survey designed to assess the knowledge, attitudes, and behaviors of U.S. adults regarding personal finance and the economy. The survey utilized a stratified multistage sampling methodology to draw 13,554 respondents from the U.S. adult population. The sample was representative in terms of demographic characteristics (e.g., age, gender, race, education, and income).

The survey utilized the following three sampling procedures: first, stratified sampling, which divided the United States into geographic regions and randomly selected counties or districts within each region. Second is multistage sampling, in which household addresses are drawn from census blocks within each county or region by randomization methods. Lastly, there is random sampling, in which a respondent aged 18 years and above is drawn from the household members in each selected address through the randomization method. All respondents in the sample were above 18 years of age and the number of respondents reached a representative number of 13,554.

3.2 Model specification and variables

In this study, the dependent variable was consumer financial literacy, measured by two sets of variables: subjective knowledge and objective knowledge. Objective knowledge was measured by one 6-point scale with the question. In the survey, five financial literacy questions were about interest rate, inflation, bond price, mortgage, and stock, respectively. If the respondent provided a correct answer, the variable was coded 1, 0 otherwise. An index of objective knowledge was also created by counting the number of correct answers, and the value of this variable ranged from 0 to 6.

Another set of variables was subjective knowledge, measured by one 7-point scale with the question "On a scale from 1 to 7, where 1 means very low and 7 means very high, how would you assess your overall financial knowledge?" Perceived financial capability was measured with a 7-point scale. The question was worded, "How strongly do you agree or disagree with the following statement? I am good at dealing with day-to-day financial matters, such as checking accounts, credit and debit cards, and tracking expenses?" Responses ranged from 1 (strongly disagree) to 7 (strongly agree).

This study primarily investigates the impact of parental education (*pedu*)on consumer financial literacy, namely objective financial knowledge (*fks*) and subjective financial knowledge (*subfinkow*). The basic regression model is specified as follows:

$$fks = \alpha_0 + \sum_{j=1}^{N} \beta_j * pedu_i + \sum_{k=1}^{M} \beta_k * cv_{k,i} + \varepsilon_i \quad (1)$$

$$subfinkow = \alpha_0 + \sum_{j=1}^{N} \beta_j * pedu_i + \sum_{k=1}^{M} \beta_k * cv_{k,i} + \varepsilon_i \quad (2)$$

In Equation (1), the subscript *i* of the variables represents the sampling consumer individual, the superscript *N* stands for the number of parental education-related variables, and the superscript *M* is the number of control variables. In addition, ε represents the random disturbance term. In addition, the independent variable, parental education, was measured by one 7-point scale with the question, "What was the highest level of education completed by the person or any of the persons who raised you?" Specifically, 1 = Did not complete high school, 2 = High school graduate/GED, 3 = Some college, no degree, 4 = Associate's degree, 5 = Bachelor's degree, 6= Post

graduate degree.

More specifically, cv_k denotes the control variable k. In this study, following the practices of previous research on consumer financial literacy, several demographic and socioeconomic variables were included as control variables. For instance, prior study indicates that young adults with low-income backgrounds or who identified as minorities or females were less likely to have sound financial footing [33]. Therefore, several demographic and socioeconomic variables were included as control variables.

These were gender, age (Six categories: 1 = 18-24; 2 = 25-34; 3 = 35-44; 4 = 45-54; 5 = 55-64; 6 = 65+), race (White vs. Nonwhite), whether being married, whether having dependent children, education (Three categories: High school graduate or lower; Some college, no degree, Associate's degree, and Bachelor's degree some college; Postgraduate or higher), family income (Three categories, $15,000–$34,999, $35,000–$74,999, $75,000 or more). The control variables also included whether to have investments, a 401k account, a mortgage, an auto loan, and a credit card. These were binary variables with 1 as holding the account and 0 otherwise. These account status variables were used because several behavior variables in the study were relevant to these accounts. Perceived math ability was also used as a control variable with a 7-point scale in which a higher number indicates a stronger math ability. Previous research shows that cognitive abilities, including mathematical capability and the like, increase financial market participation, and this may affect financial satisfaction. The details are shown in Table 1.

Table 1. Variable specification

Variable	**Attribute**
Objective financial knowledge	Five financial literacy questions were about interest rate, inflation, bond price, mortgage, and stock, respectively.
Subjective financial knowledge	How strongly do you agree or disagree with the following statement?
Parental education	What was the highest level of education completed by the person or any of the persons who raised you?" 1 = Did not complete high school, 2 = High school graduate/GED, 3 = Some college, no degree, 4 = Associate's degree, 5 = Bachelor's degree, 6 = Post graduate degree.
Early financial education	1 = Received financial education before college graduation 0 = Received financial education after college

	graduation
Male	1 = Male, 0 = Female
Age 18 to 24	18-24
Age 25 to 34	25-34
Age 35 to 44	35-44
Age 45 to 54	45-54
Age 55 to 64	55-64
Age above 65	65+
High school or below	High school graduate or below
Some college to Bachelor's degree	Some college, no degree; Associate's degree; Bachelor's degree
Postgraduate degree or higher	Postgraduate degree or above
Being married	1 = Being married, 0 = Not married
Mathematical capability	From 1 (Not at all good at math) to 7 (Extremely good at math)
White and non-Hispanic	1 = White, 0 = Non-white
Number of financially depended children	How many children do you have who are financially dependent on you?
Annual income	1 = Less than $15,000; 2 = $15,000-$25,000; 3 = At least $25,000-$35,000； 4 = $35,000-$50,000; 5 = At least $50,000-$75,000; 6 = $75,000-$100,000; 7 = $100,000-$150,000; 8 = $150,000-$200,000; 9 = $200,000-$300,000; 10 = More than $300,000

Note: The contents are arranged by the authors.

3.3 Estimation method

According to the survey data, the variable of consumer financial literacy is not continuous but an ordered discrete variable (Ranging from 1 to 7). If the traditional OLS method is utilized for regression estimation, there may be problems of robustness and accuracy. Therefore, in this study, the OLS regression method is conducted, and then ordered probit regression is applied to improve the estimated results.

$$\Pr(fks) = \phi(\beta_0 + \beta_1 * pedu + \beta_2 * cv_k + \varepsilon) \quad (3)$$

$$\Pr(subfinknow) = \phi(\beta_0 + \beta_1 * pedu + \beta_2 * cv_k + \varepsilon) \quad (4)$$

Through ordered probit regression to improve the results of OLS regression, the probability distribution function of consumer life satisfaction is more identical to the characteristics of dependent variable data, which ensures the robustness and accuracy of the empirical results. In addition, the ordered probit regression is utilized to solve the likelihood function, which further improves the accuracy of the empirical results.

3.4 Statistical description

This article breaks down consumer financial literacy into two groups of variables:

Subjective financial knowledge and objective financial knowledge. Subjective financial knowledge is a subjective variable that reflects what kind of level the questioned would assess their overall financial knowledge. In terms of the survey data, 9.22% of the participants assumed their financial literacy knowledge was rather low, and 40.81% of the questioned considered their financial literacy was excellent.

Table 2 represents the results of the descriptive statistics. The observation of the total sample is 23871. For the dependent variable, the financial literacy score had a mean of 3.291, a median of 3, and a standard deviation of 1.494. It indicates that most respondents had some basic understanding of financial concepts, but there was considerable variation. Respondents have a high level of confidence in their financial knowledge, with a mean subjective financial knowledge score of 3.98 out of 5. However, there is high variability in the level of financial knowledge, with a standard deviation of 1.12. It means that some respondents are very knowledgeable about financial concepts while others are less knowledgeable. These results indicate that most respondents have a basic understanding of financial concepts and are confident in their ability to obtain financial advice. However, there were significant differences in levels of financial literacy.

As for the independent variables, respondents' parents' education level had a mean score of 3.490, a median of 4, and a standard deviation of 1.546. The result indicates that the majority of respondents' parents had a high school diploma or higher, but there was considerable variation.

Table 2 Descriptive Statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Objective financial knowledge	23,871	3.291	1.494	1	6
Subjective financial knowledge	23,871	5.131	1.295	1	7
Parental education	23,871	3.490	1.546	1	6
Early financial education	23,871	0.194	0.396	0	1
Male	23,871	0.474	0.499	0	1
Age 18 to 24	23,871	0.100	0.300	0	1
Age 25 to 34	23,871	0.167	0.373	0	1

Age 35 to 44	23,871	0.168	0.373	0	1
Age 45 to 54	23,871	0.172	0.377	0	1
Age 55 to 64	23,871	0.180	0.385	0	1
Age above 65	23,871	0.213	0.410	0	1
High school or below	23,871	0.244	0.430	0	1
Some college to Bachelor's degree	23,871	0.638	0.481	0	1
Postgraduate degree or higher	23,871	0.118	0.323	0	1
Being married	23,871	0.509	0.500	0	1
Mathematical capability	23,871	5.516	1.610	1	7
White and non-Hispanic	23,871	0.753	0.431	0	1
Number of financially depended children	23,871	0.646	1.043	0	4
Annual income	23,871	4.627	2.179	1	10

Note: The results are arranged by the authors.

4. Results and discussion

The data comes from the state-by-state survey of the NFCS 2021. This study is designed to assess the level of financial capability and financial literacy of residents in each U.S. state. As such, respondents are primarily adults from each U.S. state who were selected to participate in this study to provide information on personal financial behaviors and knowledge. Moreover, since the independent variable in this study is the level of parental education, the respondents' parental educational backgrounds were diverse. This includes levels ranging from never having received tertiary education to having advanced degrees in order to fully assess the impact of parental education level on the financial literacy of their children.

Because the NFCS is an interstate survey instrument, respondents were located in every state in the United States. This ensures that the results of the study are broad and representative of the level of financial literacy and the prevalence of early financial education in different regions. In conclusion, the respondents to this dissertation are primarily adults from all U.S. states with diverse ages, genders, educational backgrounds, income levels, and geographic distributions. By excluding extreme

income groups and analyzing appropriate control variables, this study is able to more accurately assess the impact of parental education level on consumer financial literacy and the mediating role of early financial education.

4.1 Results of correlation analysis

Table 3 reports the correlations among the variables of having accepted early financial education, sustainable financial education-related variables, and consumer financial literacy.

Most correlations are as expected. It shows that there is a positive correlation between factors such as the education level of parents, the education level of respondents, household income, and consumer financial literacy. For instance, both sets of dependent variables, including objective financial literacy and subjective financial literacy, are positively correlated with all other variables, indicating that the value of objective financial literacy tends to increase as the value of the other variables increases. More specifically, financial literacy is positively correlated with respondents' subjective assessment of their financial knowledge, and the correlated coefficient is 0.230 at a significance level of 1%. It suggests that individuals with higher levels of financial literacy are more likely to feel confident in their level of financial literacy. Moreover, Financial literacy is positively correlated with math capability, with a correlated coefficient is 0.277. It indicates that individuals with higher math skills are more likely to have a better understanding of financial concepts.

Additionally, parental education level is positively correlated with objective financial knowledge and subjective financial knowledge, indicating parental education level is positively correlated with consumer’s financial knowledge, indicating that individuals with more educated parents tend to have higher levels of financial literacy.

Table 3 Correlations between parental education and consumer financial literacy

Variables	Objective financial knowledge	Subjective financial knowledge	Parental education	Early financial education	Mathematical capability	Annual income
Objective financial knowledge	1.000					
Subjective financial knowledge	0.230***	1.000				
Parental education	0.175***	0.113***	1.000			
Early financial education	0.111***	0.158***	0.092***	1.000		
Mathematical capability	0.277***	0.419***	0.100***	0.104***	1.000	
Annual income	0.317***	0.272***	0.279***	0.066***	0.200***	1.000

4.2 Parental education and consumer financial literacy

Table 4 presents the estimation results of the regressions of parental education on consumer financial literacy. Column (1) represents the level of financial literacy measured using objective financial literacy. Column (2) indicates the use of consumers' self-assessed level of financial literacy scale. To compare the effect of parental education on consumer financial literacy, the items of parental education are added in Columns (3) and (4).

Table 4 Results of regressions of parental education on consumer financial literacy

Variables	**(1)** Objective financial literacy	**(2)** Subjective financial literacy	**(3)** Objective financial literacy	**(4)** Subjective financial literacy
Parental education			0.050***	0.022***
			(0.007)	(0.006)
Male	0.523***	0.164***	0.517***	0.161***
	(0.017)	(0.015)	(0.017)	(0.015)
Age 18 to 24	-0.824***	-0.367***	-0.858***	-0.382***
	(0.034)	(0.030)	(0.035)	(0.031)
Age 25 to 34	-0.770***	-0.323***	-0.800***	-0.335***
	(0.029)	(0.026)	(0.029)	(0.026)
Age 35 to 44	-0.722***	-0.352***	-0.747***	-0.363***
	(0.029)	(0.026)	(0.029)	(0.026)
Age 45 to 54	-0.364***	-0.339***	-0.378***	-0.345***
	(0.028)	(0.025)	(0.028)	(0.025)
Age 55 to 64	-0.192***	-0.211***	-0.200***	-0.214***
	(0.027)	(0.024)	(0.027)	(0.024)
Some college to Bachelor's degree	0.441***	0.062***	0.369***	0.031
	(0.021)	(0.018)	(0.023)	(0.020)
Postgraduate degree or higher	0.649***	0.172***	0.520***	0.116***
	(0.032)	(0.029)	(0.036)	(0.032)
Being married	-0.006	0.109***	0.002	0.112***
	(0.020)	(0.018)	(0.020)	(0.018)
Mathematical capability	0.146***	0.287***	0.145***	0.286***
	(0.005)	(0.005)	(0.005)	(0.005)
White and non-Hispanic	0.164***	-0.035*	0.158***	-0.038**
	(0.021)	(0.019)	(0.021)	(0.019)
Number of	-0.083***	0.038***	-0.083***	0.038***

financially depended children	(0.009)	(0.008)	(0.009)	(0.008)
Annual income	0.124***	0.088***	0.120***	0.087***
	(0.005)	(0.004)	(0.005)	(0.004)
Constant	1.586***	3.409***	1.516***	3.378***
	(0.075)	(0.066)	(0.075)	(0.067)
State dummies	Yes	Yes	Yes	Yes
Observations	23871	23871	23871	23871
Adjusted R^2	0.262	0.230	0.263	0.231

Notes: Standard errors are in parentheses. In addition, *, **, *** indicate the significant level of 10%, 5%, and 1%, repectively.

In all four models, the level of parental education is positively associated with consumer financial literacy, which indicates that individuals with more educated parents tend to have higher levels of financial literacy. Specifically, after controlling for other variables, each one-unit increase in parental education increases the objective financial literacy score by an average of 0.05 units and the subjective financial literacy score by an average of 0.022 units.

In Columns (1) and (2), most of the control variables are significant. Accordingly, the coefficients for gender are all negatively significant, which is identical to prior studies. Compared to female consumers, male consumers tend to have higher levels of financial literacy. Older individuals tend to be more financially literate than younger individuals. Consumers who are married have higher levels of financial literacy than unmarried individuals since the coefficients are significantly positive. With regard to math skills, Individuals with higher math skills tend to have higher levels of financial literacy than those with lower math skills. When it comes to the race, whites and non-Hispanics tend to have higher levels of financial literacy than other racial/ethnic groups. For household size, a greater household member population is significantly negative to financial literacy. Meanwhile, consumers who have higher and more stationary income will be qualified with higher financial literacy.

The results of Columns (3) and (4) support the contention that parental education level has a significant positive impact on consumers' financial literacy. Moreover, the results of Columns (3) and (4) quantify the impact of parental education on financial literacy and show that for every unit increase in parental education, the financial literacy

score increases by an average of 0.05 units (objective) or 0.022 units (subjective). It is critical to understand the role of parental education in improving financial literacy.

Table 5 represents the effect of parental education on consumer financial literacy with the model of Ordered Probit Estimates Examine. Additionally, the set of the variables of this model is the same as the regression results. It is critical to understand the role of parental education in improving financial literacy. Meanwhile, the effects of the control variable on consumer financial literacy are concurrent with the regression results. However, compared to the OLS estimates, the ordered probit estimates are more appropriate for situations where the dependent variable is an ordered categorical variable, such as financial literacy. The ordered probit model takes into account the ordered nature of the dependent variable and provides more accurate estimates.

Table 5 Results of regressions of parental education on consumer financial literacy

	(1)	(2)	(3)	(4)
	Objective financial literacy	Subjective financial literacy	Objective financial literacy	Subjective financial literacy
Parental education			0.040***	0.021***
			(0.005)	(0.005)
Male	0.418***	0.166***	0.413***	0.163***
	(0.014)	(0.014)	(0.014)	(0.014)
Age 18 to 24	-0.660***	-0.346***	-0.689***	-0.360***
	(0.028)	(0.028)	(0.028)	(0.028)
Age 25 to 34	-0.612***	-0.296***	-0.636***	-0.309***
	(0.024)	(0.024)	(0.024)	(0.024)
Age 35 to 44	-0.574***	-0.318***	-0.595***	-0.329***
	(0.024)	(0.024)	(0.024)	(0.024)
Age 45 to 54	-0.290***	-0.313***	-0.302***	-0.319***
	(0.023)	(0.023)	(0.023)	(0.023)
Age 55 to 64	-0.151***	-0.196***	-0.157***	-0.199***
	(0.022)	(0.022)	(0.022)	(0.022)
Some college to Bachelor's degree	0.356***	0.043**	0.299***	0.013
	(0.017)	(0.017)	(0.019)	(0.019)
Postgraduate degree	0.525***	0.165***	0.422***	0.112***

or higher				
	(0.026)	(0.027)	(0.030)	(0.030)
Being married	-0.005	0.095***	0.001	0.099***
	(0.016)	(0.016)	(0.016)	(0.016)
Mathematical capability	0.120***	0.258***	0.120***	0.257***
	(0.004)	(0.005)	(0.004)	(0.005)
White and non-Hispanic	0.132***	-0.030*	0.128***	-0.033*
	(0.017)	(0.017)	(0.017)	(0.017)
Number of financially depended children	-0.067***	0.040***	-0.067***	0.040***
	(0.007)	(0.007)	(0.007)	(0.007)
Annual income	0.100***	0.079***	0.097***	0.077***
	(0.004)	(0.004)	(0.004)	(0.004)
State dummies	Yes	Yes	Yes	Yes
Observations	23871	23871	23871	23871
Pseudo R^2	0.086	0.080	0.087	0.080

Notes: Standard errors are in parentheses. In addition, * , ** , *** indicate the significant level of 10%, 5%, and 1%, repectively.

4.3 Endogeneity and robustness check

This study also realizes that the problem of endogeneity may apply to the above regression models since the coefficients may not determine the causality between parental education and consumer financial literacy. Therefore, the potential endogeneity of sustainable financial education must be treated with care. This study employs the following instrument variables and conducts an ordered probit estimation to eliminate the impacts of endogeneity on the estimation results.

The ordered probit model with instrumental variables was conducted (see Columns (3) and (4) in Table 5). In terms of the Oprobit estimation result, the estimate of the coefficient on the instrument of parental education is positive and statistically significant, with the signs of other variables almost remaining unchanged. The coefficient of parental education in Columns (1) and (2) is greater than that in Columns (3) and (4), respectively, which implies that the endogeneity problem indeed exists, and instrument variables eliminate the impacts of endogeneity and make the estimation

results more accurate.

To examine the robustness of the estimates, this study first replaced the estimation approach of the OLS regression with ordered logit regression. Second, As the former research has investigated, parents with a higher income may be more proactive and confident in teaching their children about finances [34]. Income level may have an important impact on consumers' financial literacy, as people with higher incomes may have more resources and access to education, which increases their level of financial literacy. Conversely, those with lower incomes may not have access to adequate education and training due to resource constraints, resulting in lower levels of financial literacy. Therefore, the potential endogeneity of parental education must be treated with care. By excluding the two groups with the highest and lowest incomes, the impact of income differences on the results can be reduced, allowing for a better analysis of the impact of parental education on consumer financial literacy. Thus, to eliminate the impacts from outliers by income, this study kept the samples of age between the 15000 and the 30000. Table 6 presents the results of the robustness check.

Table 6 Robustness check

Variables	**(1)**	**(2)**	**(3)**	**(4)**
	Objective financial literacy	Subjective financial literacy	Objective financial literacy	Subjective financial literacy
Parental education	0.071***	0.039***	0.032***	0.022***
	(0.009)	(0.009)	(0.006)	(0.006)
Male	0.726***	0.283***	0.424***	0.178***
	(0.024)	(0.024)	(0.015)	(0.015)
Age 18 to 24	-1.191***	-0.661***	-0.739***	-0.332***
	(0.049)	(0.049)	(0.032)	(0.031)
Age 25 to 34	-1.093***	-0.567***	-0.645***	-0.321***
	(0.041)	(0.041)	(0.025)	(0.025)
Age 35 to 44	-1.019***	-0.585***	-0.614***	-0.329***
	(0.042)	(0.042)	(0.025)	(0.026)
Age 45 to 54	-0.514***	-0.554***	-0.306***	-0.321***
	(0.039)	(0.039)	(0.024)	(0.024)
Age 55 to 64	-0.273***	-0.341***	-0.166***	-0.200***
	(0.037)	(0.037)	(0.023)	(0.023)

Some college to Bachelor's degree	0.504***	0.017	0.316***	0.020
	(0.032)	(0.033)	(0.020)	(0.020)
Postgraduate degree or higher	0.736***	0.169***	0.435***	0.122***
	(0.051)	(0.051)	(0.031)	(0.031)
Being married	0.003	0.160***	-0.012	0.106***
	(0.028)	(0.028)	(0.017)	(0.017)
Mathematical capability	0.201***	0.479***	0.124***	0.263***
	(0.008)	(0.008)	(0.005)	(0.005)
White and non-Hispanic	0.234***	-0.065**	0.113***	-0.028
	(0.030)	(0.030)	(0.019)	(0.019)
Number of financially depended children	-0.107***	0.069***	-0.068***	0.035***
	(0.013)	(0.013)	(0.008)	(0.008)
Annual income	0.166***	0.135***	0.103***	0.072***
	(0.007)	(0.007)	(0.005)	(0.005)
State dummies	Yes	Yes	Yes	Yes
Observations	23871	23871	21107	21107
Pseudo R^2	0.087	0.083	0.081	0.076

Notes: Standard errors are in parentheses. In addition, * , ** , *** indicate the significant level of 10%, 5%, and 1%, repectively.

In Columns (1) and (2), the coefficient of parental education is positive and statistically significant. In Columns (3) and (4), the coefficients of parental education remain significantly positive for all specifications. In terms of the robust results reported in Table 6, there is a robust relationship between parental education and consumer financial literacy, namely, sustainable parental education significantly and positively contributes to consumer financial literacy.

4.4 Mediating effect

Consumer financial education is defined as the basic financial knowledge education for consumers in high schools, universities, and workplaces [35]. As the former studies used the participants before 24 as the variable to observe the effects of parental education, therefore, this study employs the respondents when they received the financial education before college graduation as the early financial education. A survey of undergraduates at an Australian university showed that financial education led to a positive increase in objective and subjective financial literacy, which improved

personal financial decision-making [36]. Through early financial education, parents can teach their children basic concepts and skills about finance, such as saving, budget management, and money management skills.

By using early financial education as a mediating variable, it can better understand how parenting influences a child's consumer financial literacy in adulthood by affecting their early financial education. The study of this mediating relationship can shed light on the transmission mechanism of early financial education between parental education and consumer financial literacy and thus guide the policy and practice levels to improve the level of financial literacy.

Therefore, in this paper, early financial education (*efedu*) is chosen as a mediating variable in order to explore the mediating role between parental education and consumer financial literacy.

$$\Pr(edfu) = \phi(\beta_0 + \beta_1 * pedu + \beta_2 * cv_k + \varepsilon) \quad (5)$$

Table 7 The mediating effects of early financial education

Variables	**(1)**	**(2)**	**(3)**
	Early financial education	Objective financial literacy	Subjective financial literacy
Early financial education		0.197***	0.357***
		(0.017)	(0.018)
Parental education	0.025***	0.039***	0.018***
	(0.007)	(0.005)	(0.005)
Male	0.120***	0.408***	0.154***
	(0.020)	(0.014)	(0.014)
Age 18 to 24	0.587***	-0.722***	-0.420***
	(0.038)	(0.029)	(0.028)
Age 25 to 34	0.167***	-0.646***	-0.326***
	(0.034)	(0.024)	(0.024)
Age 35 to 44	0.031	-0.598***	-0.335***
	(0.035)	(0.024)	(0.024)
Age 45 to 54	0.135***	-0.309***	-0.334***
	(0.033)	(0.023)	(0.023)
Age 55 to 64	0.131***	-0.164***	-0.214***

	(0.031)	(0.022)	(0.022)
Some college to Bachelor's degree	0.374***	0.283***	-0.017
	(0.028)	(0.019)	(0.019)
Postgraduate degree or higher	0.436***	0.403***	0.078***
	(0.042)	(0.030)	(0.030)
Being married	0.045*	-0.002	0.096***
	(0.023)	(0.016)	(0.016)
Mathematical capability	0.090***	0.116***	0.252***
	(0.007)	(0.004)	(0.005)
White and non-Hispanic	-0.061**	0.131***	-0.027
	(0.024)	(0.017)	(0.017)
Number of financially depended children	0.017	-0.068***	0.038***
	(0.010)	(0.007)	(0.007)
Annual income	0.013**	0.096***	0.077***
	(0.005)	(0.004)	(0.004)
State dummies	Yes	Yes	Yes
Observations	23871	23871	23871
Pseudo R^2	0.045	0.088	0.085

Notes: Standard errors are in parentheses. In addition, * , ** , *** indicate the significant level of 10%, 5%, and 1%, repectively.

In all three models, early financial education is positively associated with consumer financial literacy, which means that individuals with early financial education tend to have higher levels of financial literacy. Specifically, individuals with early financial education have an average of 0.197 units higher objective financial literacy scores and 0.357 units higher subjective financial literacy scores. The results suggest that early financial education plays a partial mediating role in the impact of parental education on consumers' financial literacy, which implies that the effect of parental education level on financial literacy works partly through early financial education.

Furthermore, early financial education and parental education positively contribute to consumer financial literacy, both objective and subjective, which emphasizes the mediating role of early financial education in transmitting the effects of parental education on consumer financial literacy.

5. Conclusions and implications

This study provides insight into the impact of parental education on consumer financial literacy and examines the mediating role played by early financial education. Using data from the 2021 National Family Financial Capability Study state survey instrument, this study provides comprehensive evidence that parental education has a significant positive impact on consumer financial literacy and that early financial education plays a partially mediating role between parental education and consumer financial literacy. The findings consistently show that individuals with higher levels of parental education have higher levels of financial literacy, which is as hypothesized in *H*1. It may be due to the fact that higher levels of parental education mean that parents are more likely to have financial knowledge and skills that they can pass on to their children. In addition, parents with higher levels of education may be more likely to live in environments conducive to the development of financial literacy, such as having greater access to financial information and opportunities.

This study also finds that early financial education plays a partial mediating role between parental education and consumer financial literacy, which is consistent with the H (2). It suggests that early financial education can help bridge the gap between parents' levels of financial literacy and provide opportunities for all children to acquire financial knowledge and skills. It is particularly important for children whose parents are less financially literate, as they may not receive adequate financial guidance from their parents. To ensure the robustness of the results, the study uses a variety of econometric methods, including the OLS, ordered probit, and ordered logit regression models. The study also tests the effect of income heterogeneity by excluding the two highest and lowest income groups. The results of the robustness tests indicate that the positive relationship between parental education and consumer financial literacy is maintained across models and samples.

The results of this study have important implications for policymakers and educators. First, the study emphasizes the important role of parental education in improving children's financial literacy. Therefore, policies should focus on increasing the level of financial literacy of all parents and emphasize the need to work on strengthening parental competencies. For example, by providing financial education

courses and counseling services to increase the level of financial literacy of parents and in turn, the financial literacy of the next generation.

Second, the research highlights the potential of early financial education to promote financial inclusion and improve overall financial health. Policymakers should invest in early financial education programs that provide opportunities for all children to gain financial knowledge and skills. For example, policymakers should develop early financial education programs that can be integrated into school curricula or offered by community-based organizations and non-profits. It is especially important for children whose parents are less financially literate.

As the former studies suggested, little is known about the relational aspects of the socialization of financial self-sufficiency during adolescence and the transition to adulthood. The results indicate that parents can be both direct teachers and useful role models in the financial development of their children. From adolescence and through the transition to adulthood, parents' ongoing enactment of these roles lays the foundation for sound young adult financial attitudes and behavior. Given the importance of financial wellbeing to many indicators of college student success, such parental investment in the financial skills and knowledge of their adolescents may pay substantial dividends in terms of youth health, adjustment, and academic success. Meanwhile, in the future, it will be important to continue to study the effects of financial education on the financial literacy of youth. As the economy changes and becomes more complex, education methodologies will continue to develop and change as well. The studies on financial literacy can help determine how the key concepts of financial literacy will change and develop. As financial literacy is an important area of successful adulthood, these tasks need to be continually taught and practiced in the home by parents and entire families, where they can be modeled, taught, and implemented most effectively.

Moreover, research findings suggest that income gaps are associated with financial literacy gaps. It has been shown that parents with a higher income are more likely to engage in parental financial behavior, which will, in turn, have an impact on the financial literacy of young adults. Therefore, policymakers should develop targeted interventions for low-income families to reduce financial literacy gaps. These

interventions may include financial education classes for low-income parents and early financial education programs for low-income children and teens. Furthermore, policymakers should conduct campaigns to raise public awareness of the importance of financial literacy. These campaigns could focus on helping people understand financial concepts and tools and providing information on how to access financial education resources.

There are a number of limitations to this study. For instance, this study only examined the impact of parental education and early financial education on consumer financial literacy. Future research could explore other possible influences, such as peer influence, schooling, and media influence. Moreover, this paper emphasizes the importance of early financial education, yet the quality of early childhood education is hard to judge, potentially leading to failure. And the examination system of this may need further exploration. Despite these limitations, this study provides valuable insights into the relationship between parental education, early financial education, and consumer financial literacy. The findings emphasize the importance of investing in parenting and early financial education to improve financial literacy and promote financial inclusion.

Data Availability Statement

The datasets analyzed for this study can be found at: http://www.usfinancialcapability.org/downloads.php.

Acknowledgments

This research was funded by the Annual Research Fund of the Course Ideological and Political Education at the University of International Business and Economics.

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