

# Money matters: Significant knowledge gaps exist about basic finance

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## SUMMARY

The goal of this study was to assess the basic financial knowledge and money saving skills of high school students and adults. Surveys containing basic questions about investments, loans, interest rates, taxes, credit, and other common personal financial subjects were given to 50 minors and 40 adults. With this study, we had four hypotheses. Firstly, we hypothesized that subjects would answer about 30-40% of the questions correctly. Secondly, we hypothesized that adults would perform better than minors due to greater lifetime experience with financial matters. We also hypothesized that male and female minors would perform similarly. Our last prediction was that male and female adults would perform similarly. Our results indicate that the respondents had a poor understanding of financial concepts. The results obtained from this study supported all four hypotheses. Overall, the subjects demonstrated poor proficiency in financial matters with a mean correct response of 33.1%. While there was a statistically significant difference in financial knowledge between adults and minors ( $p < 0.05$ ), the differences between males and females for both groups, minors and adults, were not statistically significant ( $p > 0.05$ ).

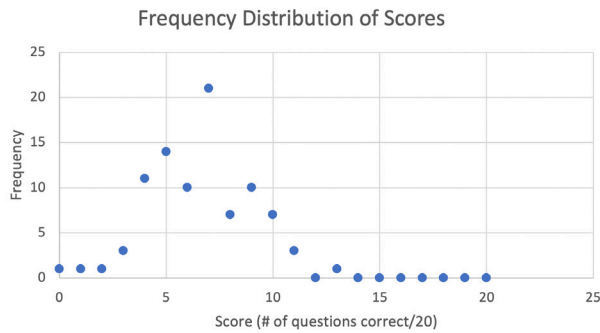
## INTRODUCTION

Financial planning is an essential and critical life skill that is necessary for preparing for unexpected financial crises, preparing for expensive life events such as a home purchase or college expenses, and developing disciplined investing to help prepare for a secure retirement. Multiple studies have shown that Americans have a poor understanding of basic personal finances (1). According to a study of 1,000 Americans over the age of 30, 55% of participants did not know about having a stable financial plan and only half knew what a 401(k) was (2). Multiple studies have shown that in general, the US population is poorly prepared for an unexpected financial disaster (3). According to the Federal Reserve, 40% of Americans do not have money saved for emergencies (4), and it is estimated that the average family is not prepared to handle a \$400 emergency (5). Many families are unprepared for major purchases such as home or car purchases, and often lack skills at comparing and assessing different loan terms to ensure family and financial stability. Due to a low comfort level with making such decisions, some choose to

avoid making them altogether and forego home ownership out of fear or lack of understanding about loans, interest rates, and compounding (6). Many families are unprepared for college expenses and college loans can become a significant financial burden that may take decades to pay off (7). A study of 2002 adults by TD Ameritrade showed that 51% of respondents did not think they will have enough money saved when they retire, 60% did not know how much money they needed to save for retirement, and 72% believed that Social Security will be insufficient to cover their retirement costs (8). Retirement planning has remained a significant cause of worry due to poor financial skills, inadequate savings, and poor investment skills. One-quarter of Americans have no money saved for their retirement (4). Furthermore, 25% of Americans do not pay their bills on time (9) and fall victim to predatory lending, the malicious act of putting a borrower in debt because they are unable to pay back the loan (10). Minorities are especially susceptible to predatory lending (10). According to an analysis of the decline of Black wealth by Avis-Jones DeWeever, the executive director of the National Council of Negro Women, African Americans and Latinos were 30% more likely to receive subprime loans with high rates than Caucasians (10). Borrowing with unfavorable credit card terms creates an abyss of financial debt that is very difficult to surmount (11–13).

Few people have the education necessary to judiciously use tax planning, insurance, and retirement vehicles to their advantage. With no structured core education on basic finance in the school system, most American adults learn such skills from an elder relative or a work colleague, or “figure it out” on their own (14). The educational system has not done enough to provide Americans with basic finance knowledge (15). Experts respond to this by pushing for finance lessons in schools (4, 16). The results of our current study corroborate their claim.

With this study, we had four hypotheses. First, we hypothesized that subjects would answer about 30-40% of the questions correctly. Secondly, we hypothesized that adults would perform better than minors due to greater lifetime experience with financial matters. We also hypothesized that male and female minors would perform similarly. Our last prediction was that male and female adults would perform similarly. We first conducted extensive research to figure out what the most crucial financial topics to know are. We then distributed surveys to participants asking questions related



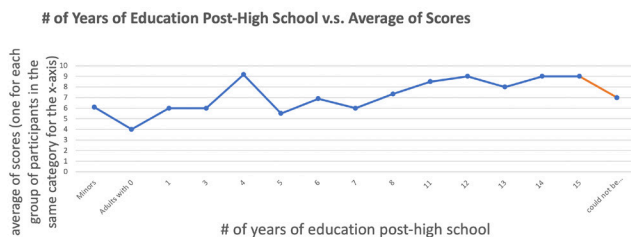
**Figure 1:** The frequency distribution of the number of questions answered correctly. The frequency distribution of scores was heavily right-skewed, indicating that the majority of participants received lower scores, and the minority received higher scores.

to these topics. We found that people in our community were significantly lacking in their financial knowledge. The results are significant not only for our community but also everywhere in the world where these financial concepts are applicable.

### RESULTS

We wanted to assess the basic financial knowledge level of minors and adults because Rickards High School did not offer any finance classes and this was likely to have been the case in earlier years as well. We looked at four aspects of the data: (1) the overall accuracy of participants, (2) the difference between adults and minors, (3) the difference between male and female minors, and (4) the difference between adult males and adult females. The surveys were printed out and given to some participants, but the questions and answer choices were read aloud to other participants over the phone. Questions were about various topics, such as investment into the stock market and a college savings plan. We scored participants based on how many questions they answered correctly, as each question was intended to have exactly one correct answer. We analyzed the data and did t-tests to compare these groups.

The Frequency Distribution of Scores was obtained by counting the number of participants that answered 1 question correctly, the number of participants that answered 2 questions correctly, and so on until every survey that was

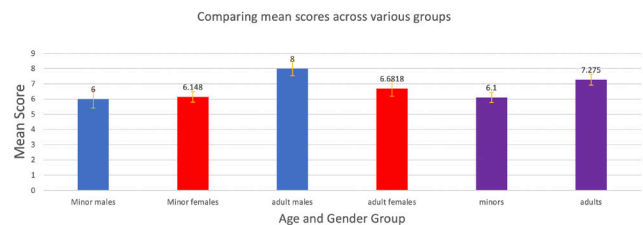


**Figure 2:** The effect of the number of years of postsecondary education on subjects' scores. It does not seem like the number of years of postsecondary education had an impact on subjects' scores. This is more evidence that financial education in the community is severely insufficient and needs to be managed more properly. The last "increment" on the x-axis states "could not be determined/not provided".

used was counted. It was similar to a normal, bell-shaped distribution curve at the beginning. However, it was skewed to the right because no participant scored higher than 13 correct answers. Furthermore, the graph did not look like there was either a positive correlation or a negative correlation between the two variables; rather, it appeared as if there was no correlation between them (**Figure 1**).

We also decided to utilize education level as another variable, since we had asked for the adults in our survey to write the number of years of postsecondary education they had. Using Excel, we created a line graph incorporating this variable and analyzed it. The line graph depicted the number of years of postsecondary education against the average of scores for each category on the x-axis. The analysis suggested that adults with a postsecondary education performed better, on average, than minors without a postsecondary education. It was apparent that adults with zero years of postsecondary education tended to earn lower scores, on average, than both minors and adults with education post-high school, as the average score for adults with zero years of education post-high school was less than those for all other categories in the graph. However, it did not seem very clear that for the entire sample, those with more years of education post-high school performed better, on average, than those with fewer years (**Figure 2**). Therefore, we concluded that on average, for this sample, while having education post-high school helps people with understanding these very important financial topics, the concrete number of years of education post-high school does not play much of a role in boosting people's knowledge of critical financial concepts.

Minors had the most success answering, "Which of the following if purchased is the best investment?" (66% correct) and the most difficulty answering, "If you have a job that pays \$10 an hour and you work 40 hours a week you can expect a weekly paycheck of?" (4% correct). Adults had the most success answering, "Which of the following if purchased is the best investment?" (95% correct) and the most difficulty answering, "If you purchase a bond and interest rates rise, what will happen to the price of the bond?" (5% correct). Participants in general had the most success answering,



**Figure 3:** How differences in gender influenced subjects' scores. Differences in gender did not significantly influence subjects' scores. However, adults did significantly better on the surveys than did minors. n=21, 27, 18, 22, 50, and 40, respectively; p-values for each pair of respective two groups= 0.90 (not statistically significant), 0.07 (not statistically significant), 0.02 (statistically significant); the error bars (each small bar that corresponds to each bigger bar) show the standard errors of the mean, which give the uncertainty or variability of each measurement.

Question	Correct Answer	% of participants who answered correctly	% of minors who answered correctly	% of adults who answered correctly
At what age should people start saving and investing?	0–10	15.6	8	25
A college savings plan for a child should be started when the child is	Born	70	62	80
How much money is needed to start investing?	\$1	42.2%	32	55
Which statement is true?	Having a credit card raises your credit score if bills are paid	56.7	54	60
Of the following choices, which would best allow your money to grow long term?	Stock market	33.3	18	52.5
What does a fully funded college tuition plan cover?	Four years of college tuition	28.9	26	35
Which of the following if purchased is the best investment?	A home	78.9	66	95
If you have a job that pays \$10 an hour and you work 40 hours a week you can expect a weekly paycheck of	\$300	10	4	17.5
If you have limited funds, which of the following should they be used for first?	Credit card bill payment in full	47.8	46	50
Which of the following is TRUE?	The average salary in the US is directly proportional to the highest level of education received.	20	20	20
How much money will the typical married couple retiring at age 65 spend on out-of-pocket costs for health care throughout their retirement (in today's dollars)?	\$266,000	7.8	8	7.5
If you purchase a bond and interest rates rise, what will happen to the price of the bond?	Fall	14.4	22	5
What is the average annual rate of inflation for college tuition around the country?	8 percent	36.7	44	27.5
Which of the following is a TRUE statement about 15-year mortgage loans compared to standard 30-year mortgage loans?	Typically, a 15- year mortgage requires higher monthly payments and lower total interest over the life of the loan.	50	38	65
Suppose you owe \$1,000 on a loan and the interest rate you are charged is 20% per year compounded annually. If you didn't pay anything off, at this interest rate, how many years would it take for the amount you owe to double?	2–4 years	24.4	22	27.5
A 529 plan is:	A college investment plan that earns tax- free income as it grows	25.6	32	17.5
What is a flexible spending account?	A tax-exempt savings account exclusively for health benefits.	20	20	20
If you foster a pet from a nonprofit charitable organization, can you claim a tax deduction?	Yes, but you can only write off certain items like food, shelter, and medical expenses.	38.9	40	37.5
If you lend money to a friend and she doesn't pay you back, can you write it off?	Under certain circumstances, it can be deducted under capital loss rules.	14.4	20	7.5
Which of these is the worst mistake for filing taxes?	Not filing at all when you are owed a refund.	24.4	26	22.5

**Table 1:** Percentage of correct answers based on minors, adults, and participants in general. Here we see that overall, the adults outperformed the minors. However, adults did not outperform minors drastically.

“Which of the following if purchased is the best investment?” (78.9% correct) and the most difficulty answering, “How much money will the typical married couple retiring at age 65 spend on out-of-pocket costs for health care throughout their retirement (in today's dollars)?” (7.8% correct).

Overall, minors answered a mean of 30.5% (6.1/20) of the questions correctly. The median score for minors was 32.5% (6.5/20). The mean score for male minors was 30% (6/20), and the median was also 30%. The mean score for female minors was 30.7% (6.1/20), and the median was 35% (7/20). The mean for adults was 36.4% (7.3/20), and the median was

35% (7/20). The mean for male adults was 40% (8/20), and the median was also 40%. The mean for female adults was 33.4% (6.7/20), and the median was 30% (6/20).

There was no statistically significant difference between the performances of male and female minors ( $p = 0.90$ ) (**Figure 3**). Also, there was no statistically significant difference between the performances of male and female adults ( $p = 0.07$ ) (**Figure 3**). However, there was a statistically significant difference between the performances of minors and adults ( $p = 0.02$ ) (**Figure 3**).

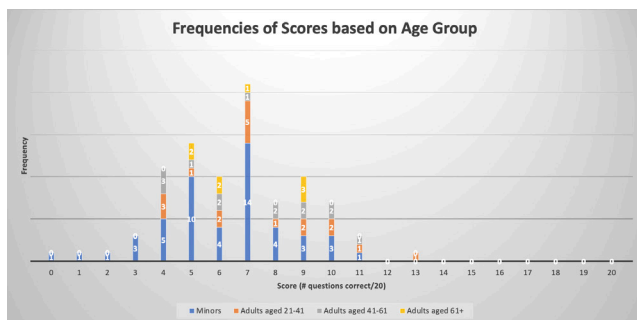
We also divided subjects based on age group into the

Scores (#correct/20)	Frequency	Frequency2	Frequency3	Frequency4
	Minors	Adults aged 21-41	Adults aged 41-61	Adults aged 61+
0	1	0	0	0
1	1	0	0	0
2	1	0	0	0
3	3	0	0	0
4	5	3	3	0
5	10	1	1	2
6	4	2	2	2
7	14	5	1	1
8	4	1	2	0
9	3	2	2	3
10	3	2	2	0
11	1	1	1	0
12	0	0	0	0
13	0	1	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0

**Figure 4:** The effect of age group on subjects' scores. Although it looks as if age group did not have a significant impact on scores, the statistically significant difference between minors' and adults' scores can be explained by the fact that the subjects who earned the lowest scores were minors.

following categories: Minors, Adults aged 21-41, Adults aged 41-61, and Adults aged 61 or older. While the data do tell us that scores of 0, 1, 2, and 3 were only earned by minors and that a score of 13 was only earned by adults aged 21-41, the data overall do not show that being older makes one more likely to be more knowledgeable about crucial financial concepts. However, the data do suggest that being an adult does make one more likely to be more knowledgeable about the financial topics tested compared to being a minor (Figures 4 & 5). Therefore, this data is consistent with our original hypothesis that adults would perform better than minors, on average.

To get a more detailed view of the performance of adults versus minors in this study, we calculated the percentage of adults answering correctly for each question, and we did the same for minors (Figure 6). We can see that the percent of adults who answered questions 1-9, 14, and 15 correctly were all greater than the corresponding percentage of minors who answered these questions correctly. Furthermore, the percent of correct answers among the minors were the same as those among the adults for questions 10 and 17 (both of these percentages, as well as the overall percentage of participants



**Figure 5:** Frequency distribution of number of questions answered correctly based on age group. Although it looks as if age group did not have a significant impact on scores, the statistically significant difference between minors' and adults' scores can be explained by the fact that the subjects who earned the lowest scores were minors.

	MALE ADULTS	FEMALE ADULTS	ALL ADULTS	MINOR MALES	MINOR FEMALES	ALL MINORS	TOTAL
MEAN SCORE	8/20 (40%)	6.7/20 (33.5%)	7.3/20 (36.5%)	6/20 (30%)	6.1/20 (30.5%)	6.1/20 (30.5%)	6.6/20 (33%)
MEDIAN SCORE	8/20 (40%)	6/20 (30%)	7/20 (35%)	6/20 (30%)	7/20 (35%)	6.5/20 (32.5%)	7/20 (35%)
MODE	9/20 (45%)	4/20 (20%)	7/20, 9/20 (35%, 45%)	7/20 (35%)	7/20 (35%)	7/20 (35%)	7/20 (35%)
RANGE	9	7	9	10	9	11	13
STANDARD DEVIATION	2	2.3	2.3	2.7	1.8	2.3	2.3

**Table 2:** Measures of Distribution Chart. In general, participants did not score high enough on this test to be considered in a financially sound situation.

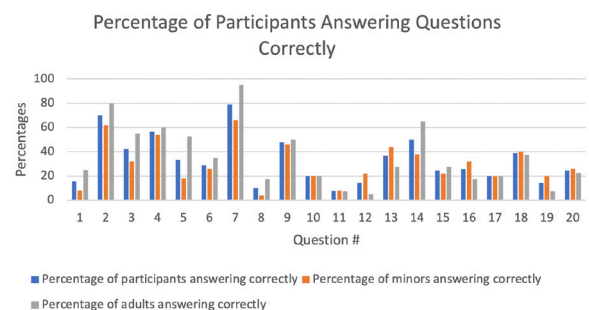
answering the questions correctly was 20%). For the rest of the questions, a greater percentage of minors answered correctly (Figure 6). Although a greater percentage of adults answered correctly for the majority of questions, the adults did not outperform the minors by a wide margin; however, the difference between adults' and minors' performances was statistically significant (Figures 3 & 6).

**DISCUSSION**

This study demonstrated that American adults and minors have a poor understanding of personal finance. Evidence was found to support all four hypotheses — participants answered on average only 30–40% of the questions correctly. Adults performed better than minors; males and females in both groups, minors and adults, performed similarly. Adults had a higher mean score (7.3) than minors (6.1), and this knowledge differential between adults and minors was statistically significant. Additionally, there was no statistically significant difference between males and females in either group — minors ( $p = 0.90$ ) or adults ( $p = 0.07$ ). Overall, this study supported the conclusion that Americans have poor knowledge of basic finance.

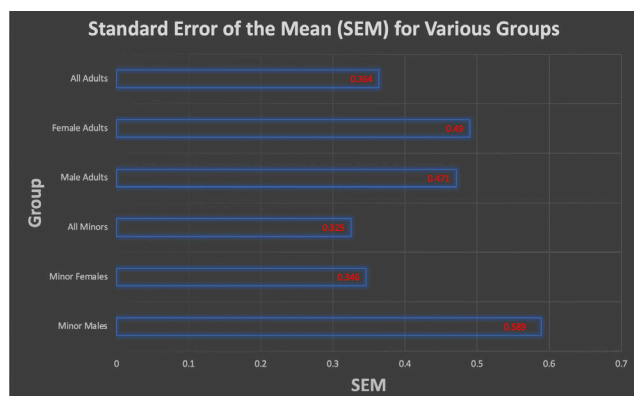
It was realized that Question 11 contained much bias as it asked, “How much money will the typical married couple retiring at age 65 spend on out-of-pocket costs for health care throughout their retirement (in today’s dollars)?” instead of asking for the average amount of money spent by married couples retiring at age 65 for these costs throughout their retirement or something of that nature.

One of the strengths of our study is that we tested knowledge on a variety of financial topics, such as investments, retirement plans, loans, and taxes. Our study



**Figure 6:** Performances of minors vs. adults. Here we see that overall, the adults outperformed the minors. However, adults did not outperform minors drastically.





**Figure 7:** The overall variabilities of adults and minors were roughly equal. The SEM is the probability that a sample mean (the mean score of the participants in this case) is representative of the true population mean (the mean score that would be for everyone similar to people who took the survey in this case).

also incorporated the participants' ages and genders, so that we could compare results across gender and education level. However, our study was limited by self-selection of subjects in a survey methodology. Therefore, the external validity, or the degree to which the results can be applied to other populations, may be limited. To increase the generalizability of this work, in a future study, we could utilize a larger sample with wider geographic distribution to better represent the US population. We could also collect more detailed demographic information of the test subjects to account for other potentially important differences between population subsets.

This study highlighted the pervasive lack of knowledge about basic personal finance among minors and adults. While there is a consensus that this is an essential and critical life skill that is necessary for financial well-being, there has been little interest in educating students and adults about basic finance. Studies have shown that the average US family may not be prepared to handle a relatively minor financial emergency due to limited savings and poor planning. Home ownership and college expenses become even more out of reach as they are larger expenses. It is unfortunate but understandable, then, that many fall victim to predatory lending or a vicious borrowing cycle from unfavorable credit card terms. Judicious use of tax planning, insurance, and retirement vehicles is often only done by a minority of Americans. Retirement planning has remained a significant cause of financial stress and worry for the majority. It is no longer adequate to learn such skills from an untrained friend or relative, by "trial and error", or by "figuring it out". A structured core education on basic finance offered in the school system has become essential and would go far towards alleviating these financial worries and improving the financial knowledge gap that is prevalent among the populace.

Even though it is crucial that everyone must undergo financial training in high school, such training need not be very rigorous, like AP or IB classes. The training may and should include "hands-on", interactive activities that are enjoyable for students, so that they can learn these critical,

life-saving skills while also having fun. This, in turn, will make students more engaged in their financial training; therefore, it will be much more effective than mandating students to read from their textbooks. There are a variety of ways to accomplish this goal, including but not limited to 1) having students practice filing their taxes, utilizing credit cards, and paying bills, just as they would as an adult, among other important financial activities; 2) having students play fun games that also teach them about these significant financial concepts; and 3) having students compete with others to win awards in competitions that teach them important financial skills (such as stock market investing-related competitions). Financial literacy-gearred clubs or organizations in schools that students may join, such as Money Matters to Students (17) would also be effective. The most effective option is to make finance classes mandatory in high school, and highly encourage students to participate in financial literacy clubs and/or classes before high school, as this will impact many more people. Nevertheless, for the time being, more schools of various tiers should develop clubs like Money Matters to Students and help advocate for more financial literacy awareness-raising opportunities for the world until we can attain this goal.

## MATERIALS AND METHODS

### Permission and Participants

Surveys were given to 50 minors and 40 adults. Each participant gave informed consent. Minors were students at James S. Rickards High School, a large public high school (1300 students) in a large city (Tallahassee, FL, population estimate 190,000). Adults included teachers from James S. Rickards High School, family, and friends of the author. Out of the minors, 27 were female, 21 were male, and 2 did not give a gender. Among the adults, 18 were male and 22 were female. Among the 33 adults who reported their number of years of education post-high school, the mean number of years of education beyond high school was  $220/33 =$  approximately 6.67 (7 adults did not report). Among minor males, the mean age was  $325.0002/21 =$  about 15.4762 (for 21 minor males). Among minor females, the mean age was  $416/26 = 16$  (out of 26 females that gave their ages, one age could not be understood). The overall mean age for minors was  $(325.0002+416)/(21+26) = 15.76596$  (21+26 = 47 minors' ages could be obtained). Among adults, the mean age of 21 female adults was  $899/21 =$  approximately 42.8095, with one adult female's age unable to be determined. The adult male mean age was  $881/17 =$  approximately 51.8235, for 17 males. One adult male's true age could not be determined. The overall adult mean age was  $(881+899)/(17+21)=890/19 =$  approximately 46.8421.

### Survey Design and Testing

To create the surveys, extensive research was conducted to determine what the most crucial financial concepts to know about were. Example questions were obtained via the

Internet. Based on the results, an original set of 20 questions was generated, with the financial concepts found to be most important. Out of all 20 questions on the survey, Questions 1, 2, 5, 7, 9, 11, and 20 were classified as subjective, while the rest of the questions were classified as objective questions. The intention was for there to be a mix of both subjective and objective questions, because the subjective questions should still have a clear correct, or best, answer, as in all of them except 11. The subjective questions were meant to test the participants' ability to make the wisest possible financial decision in a given scenario. The objective questions were intended to assess the participants' knowledge of the important facts of finance, such as in Question 3 ("How much money is needed to start investing?"), because knowing the facts is as crucial as being able to make the most intelligent financial decisions in certain situations. It was further noted that because all except one of the subjective questions had an apparent best answer, the subjectivity would not significantly interfere with proper, conventional statistical analysis of the data. We pooled all of the objective and subjective questions in our analysis so as to obtain an overall idea of the participants' financial skills and knowledge. Some surveys were given in classrooms and each of these participants were given a hard copy. The participants were asked not to use the internet or other resources, such as books, and not to work together with others to answer the questions. The participants in classrooms were given surveys at the same time to avoid any discussions about the surveys. Seventy-four of the participants received a hard copy of the questionnaire and the other 16 participants were asked questions over the phone. Eighty-eight of the participants were residents of the state of Florida, and two were from Pennsylvania and New York. T-tests were used to analyze the data.

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