Personal Financial Literacy Among U.S. Medical Students

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Abstract

Background: Personal financial literacy is associated with successfully managing debt, investing for retirement, and coping with financial strain. Though medical students occupy a financially unique niche due to high debt, little is known about their financial literacy. In this study, the authors’ objective was to assess financial literacy among medical students and to evaluate demographic, educational, and financial factors associated with financial literacy.

Methods: In March to April 2015, the authors administered a cross-sectional survey to all first- (M1) and fourth-year (M4) medical students at seven geographically distributed U.S. medical schools. The survey measured performance on a financial literacy assessment, educational debt burden, and past retirement contributions.

Results: The survey response rate was 37.5% (1052/2806). Students answered 47.4% of the financial literacy questions correctly. Factors associated with higher (above-the-median) financial literacy performance included male gender (Odds ratio [OR] = 2.19; 95% confidence interval [CI]: 1.70–2.83; P <0.01), joint MD/MBA degree (OR = 2.47, 95% CI: 1.24–4.90; P = 0.02), finance-related undergraduate major (OR = 5.79, 95% CI: 1.02–32.92; P = 0.05), self-assessed financial knowledge (OR = 1.79, 95% CI: 1.45–2.20; P <0.01), and confidence in personal financial management (OR = 1.19, 95% CI: 1.01–1.42; P = 0.05). Financial literacy among M4s who had received school-provided personal financial counseling or information was not significantly higher than those who had not received it (50.7% vs. 50.0%, P = 0.79). A 1 percentage point increase in financial literacy performance was associated with a 3% increase in the odds of contributing to a tax-advantaged retirement account (OR = 1.03, 95% CI: 1.02–1.05; P <0.01) and over a $600 decrease in debt (β = -$642, 95% CI: -$1123–$161; P <0.01).

Discussion: Financial literacy among both first-year and fourth-year U.S. medical students was low. School-provided personal financial counseling or information for fourth-year students was not associated with improved
financial literacy. Students with higher financial literacy incurred less debt and were more likely to invest for retirement.

**Keywords:** medical education, medical students, financial literacy, personal finance

**Introduction**

In 2014, graduating medical students in the United States (U.S.) had accumulated an average of nearly $150,000 in educational loans (Association of American Medical Colleges, 2014b). This high debt burden and many years of deferred income due to training puts physicians at a unique disadvantage (Dhaliwal & Chou, 2007). Financial strain is associated with increased stress and burnout (Collier, McCue, Markus, & Smith, 2002; McNeely, Perez, & Chew, 2013). For most medical students, their first full-time employment after college is residency training (Liebzeit, Behler, Heron, & Santen, 2011), and better preparation to manage these circumstances could yield many potential benefits (Dhaliwal & Chou, 2007; Greene & Puder, 2002) for individual physicians and the physician workforce as a whole. Educational debt impacts career choices, potentially lowering interest in fields such as primary care that have lower average compensation than other specialties (Grayson, Newton, & Thompson, 2012; Rosenblatt & Andrilla, 2005).

Financial literacy can be defined as having the knowledge and skills to manage money effectively (President's Advisory Council on Financial Literacy, 2009). Lower financial literacy is associated with challenges related to managing debt (Lusardi & Tufano, 2009), investing for retirement (Hastings & Tejeda-Ashton, 2008; Lusardi & Mitchell, 2007, 2009, 2011; Van Rooij, Lusardi, & Alessie, 2007), and coping with times of financial strain (Lusardi, Schneider, & Tufano, 2011). Evidence suggests that training in personal finance prior to medical school may be inadequate (Chen & Volpe, 1998; Mandell, 2008). However, the level of financial literacy among medical students themselves has not been well examined.

In this study, our objective was to assess the state of financial literacy among U.S. medical students and to evaluate demographic, educational, and financial factors that might predict higher or lower literacy levels. We surveyed first- and fourth-year students from geographically distributed medical schools to obtain a more representative sample and to assess perceptions at different points of medical training.

**Methods**

**Study Sample and Data Collection**

From March to April 2015, we conducted a multi-institutional, cross-sectional study of first-year (M1) (n = 1,390) and fourth-year (M4) (n = 1,416) medical students at seven U.S. medical schools: Michigan State University College of Human Medicine, the Perelman School of Medicine at the University of Pennsylvania, Saint Louis University School of Medicine, The Ohio State University College of Medicine, University of Alabama School of Medicine at UAB, University of Kansas School of Medicine, and University of Texas Southwestern Medical School. All students were invited to participate in an electronic questionnaire (Appendix 1). The authors chose these programs because of their geographic location, mix of public and private settings, large class size, and presence of an administrator willing to distribute the survey. We sent up to three weekly follow-up emails to non-respondents. We administered the survey using REDCap electronic data capture tools (Harris et al., 2009) at the University of Pennsylvania. Participants were informed that a drawing would be held for one $200 and four $25 Amazon.com gift cards, and
that if over 50 percent of the students at their institution responded, an additional drawing for twenty $5 gift cards would be conducted. No specific sources of funding were used. This study was reviewed by the University of Pennsylvania Institutional Review Board and deemed exempt.

Survey Design

The authors designed a 35-item questionnaire to evaluate the following characteristics: self-assessment of financial and mathematical knowledge (de Bassa Scheresberg, 2013), confidence in personal financial management, desire to learn more about personal financial management before graduating from medical school, financial literacy (related to saving/investing and debt), demographic factors (medical school attended, degree program enrolled in, age, ethnicity, race, gender, undergraduate major, reception of medical school-provided personal financial counseling or information, presence of recent earned income), and financial behavior (retirement account contributions and educational indebtedness). The self-assessment questions were measured on a seven-point Likert scale, with higher scores indicating higher math skill, financial knowledge, confidence in personal financial management, or desire to learn more about personal financial management. We adapted the financial literacy portion of the survey from the FINRA Financial Literacy Quiz ("Financial Capability Study," n.d.), Vanguard Investor Literacy Test ("2000 MONEY/Vanguard Investor Literacy Test," 2000), and validated debt literacy questions (Lusardi & Tufano, 2009). The survey also included the following free-response questions: "What concerns do you have about your training in personal finances?" and "Please provide examples of when more training in personal finances could have been beneficial."

Statistical Analysis

The authors tabulated survey responses and calculated a cumulative financial literacy score representing the percentage of questions that were answered correctly. In addition, we estimated a saving/investing subscore and a debt subscore using previously described methodology (Chen & Volpe, 1998). We excluded from the analysis respondents who did not answer all sixteen financial literacy questions or did not identify their institution.

We used analysis of variance (ANOVA) to determine if participants from various subgroups had different financial literacy. Employing previously described methods (Chen & Volpe, 1998), we divided participants into two subgroups using the median percentage of correct answers of the sample. Students with scores above the median were classified as those with relatively higher financial literacy performance, while students with scores equal to or below the median were classified as those with relatively lower financial literacy performance. We fit a logistic regression model to this dichotomous variable to identify associations with potential predictors (age, year, gender, race/ethnicity, degree program, undergraduate major, presence of recent earned income, self-assessed math skill, self-assessed financial knowledge, confidence in personal financial management, and desire to learn more about personal financial management). We fit a separate logistic regression model to contributions to tax-advantaged retirement accounts, to identify its association with financial literacy performance (as a percentage of questions answered correctly). We captured medical education debt as eight intervals between no debt and $500,000. Therefore, we fit an interval regression model to anticipated medical educational debt at graduation, to identify its association with financial literacy. The authors clustered all analyses by medical school. A $P$ value $\leq 0.05$ was considered statistically significant, and all analyses were two-sided. We performed analyses using Stata version 14.0 (StataCorp LP, College Station, Texas).

We analyzed content from the free-text responses using grounded theory (Glaser & Strauss, 1967). When using grounded theory, themes emerge from the content within the responses rather than using a pre-specified set of themes and then applying them to the responses. First, three reviewers (KJ, JL, SG) read responses to half the questions to identify common themes. Second, to ensure that each reviewer coded comments appropriately, we
selected 20% of the responses for each question at random and used them as the training set. Two reviewers (JL, SG) worked together using the training set to assign themes to each of the responses. Responses could be assigned multiple themes or none at all. Through that process, we modified the original set of themes to a more consistent set to which all reviewers agreed. Third, the remaining responses made up the evaluation set, and the two reviewers worked independently to code these responses. Fourth, for comments with differences in coding between the two reviewers, a third reviewer (KJ) was used to adjudicate the disagreement to finalize the coding for the presence or absence of themes. We combined the coding of all responses into a single set for analysis. Kappa statistics were estimated to assess interrater reliability between the two reviewers (JL, SG).

**Results**

The overall response rate was 37.5% (1052/2806) and varied by medical campus from 28.9% to 45.6%. Among respondents, 99.0% (1041/1052) answered all sixteen financial literacy questions and identified their institution. About half of the sample were M1s (534/1041) and the other half (507/1041) were M4s. Table 1 displays the sample demographics, which were similar to those of medical students nationally (Association of American Medical Colleges, 2014a, Association of American Medical Colleges, 2014b) along with other self-reported information related to experience with finances. Only 4.8% (48/1041) of students had an undergraduate degree in a finance or business-related major. By the end of medical school, only 270 M4s (56.6%) stated that they had received personal financial counseling or information from their medical school. M1s and M4s had similar self-assessment of overall financial knowledge (Mean on 7-point Likert scale = 3.9; Standard deviation [SD] = 1.3).

The percentage of students who correctly answered each of the financial literacy questions is displayed in Table 2. Among all respondents, 47.4% of questions were answered correctly. Students performed the best on questions related to compound interest (97.7%), interest payments over the term of a mortgage (93.7%), and inflation (85.7%). Students performed the worst on questions related to time value of money (13.6%), taxation of student loan interest (16.7%), and the relationship between bond prices and interest rates (19.4%).

The unadjusted financial literacy scores and subscores are displayed in Table 3 by class year and by demographic characteristic. M4s answered a slightly higher percentage of questions correctly than M1s (50.2% vs. 44.6%, \( P < 0.01 \)). Age was associated with financial literacy (\( P < 0.01 \)), with younger students aged 20-24 answering slightly fewer questions correctly (43.5%) than older students. Gender also had a significant association with performance, with male respondents answering more questions correctly than female respondents (54.0% vs. 41.4%, \( P < 0.01 \)). In addition, performance varied by undergraduate major (\( P < 0.01 \)) and medical degree program (\( P = 0.03 \)), with finance-related undergraduate majors (69.8%) and joint MD/MBA majors (69.5%) answering more questions correctly. Recently earned income (49.2% vs. 45.5%, \( P = 0.01 \)) and recent retirement plan contributions (60.4% vs. 46.2%, \( P < 0.01 \)) were associated with higher financial literacy. Financial literacy among M4s who had received school-provided personal financial counseling or information was not significantly higher than those who had not received it (50.7% vs. 50.0%, \( P = 0.79 \)).

Table 4 presents the adjusted logistic regression estimates of overall financial literacy performance on potential predictors. Factors associated with higher (above-the-median) financial literacy performance on the assessment included male gender (Odds ratio [OR] = 2.19; 95% confidence interval [CI]: 1.70 – 2.83; \( P < 0.01 \)), joint MD/MBA degree (OR = 2.47, 95% CI: 1.24 – 4.90; \( P = 0.02 \)), finance-related undergraduate major (OR = 5.79, 95% CI: 1.02 – 32.92; \( P = 0.05 \)), self-assessed financial knowledge (OR = 1.79, 95% CI: 1.45 – 2.20; \( P < 0.01 \)), and confidence in personal financial management (OR = 1.19, 95% CI: 1.01 – 1.42; \( P = 0.05 \)). M4s did not have significantly higher financial literacy performance than M1s (OR = 1.20, 95% CI: 0.93 – 1.55; \( P = 0.13 \)).
Among the 589 (56.6%) students with recent earned income, those with higher financial literacy performance on the assessment were more likely to contribute to tax-advantaged retirement accounts (IRA, 401(k), and 403(b)) than those with lower financial literacy (OR = 1.03, 95% CI: 1.02 – 1.05; \(P < 0.01\)). Specifically, each 1 percentage point increase in financial literacy performance was associated with an expected 3% increase in the odds of contributing to a retirement account. In addition, students with higher financial literacy also tended to have lower indebtedness (\(\beta = -642\), 95% CI: -$1123 – $161; \(P < 0.01\)). Specifically, each 1 percentage point increase in financial literacy performance was associated with an expected decrease in indebtedness of over $600.

Table 5 displays respondents’ concerns about personal finance training. The most frequently reported concerns among the 569 (54.7%) students who responded to the first free-response question were related to generally insufficient training (45.0%), saving/investing (29.2%), and debt management (22.1%). Among the 478 (45.9%) students who responded to the second question, 233 (48.7%) stated that additional training in personal finance would have been beneficial either before or during medical school. The most common areas in which respondents thought they would benefit from additional personal finance training were debt management (35.4%) and saving/investing (17.6%). Kappa statistics were generally high across all thematic categories: concerns about personal finance training (mean = 0.83), times requiring additional personal finance training (mean = 0.86), and situations requiring additional personal finance training (mean = 0.90), indicating excellent interrater agreement (Viera & Garrett, 2005).

**Discussion**

In this study, we found that most first-year and fourth-year U.S. medical students had low financial literacy and were not well prepared to manage personal finances. Moreover, the lack of improvement in financial literacy between the first and fourth years of medical school, the large proportion of M4s stating they had not received any medical school-provided personal financial counseling or information, and the lack of difference in financial literacy among students who received personal financial counseling or information and those who did not, all suggest that current curricula are insufficient in preparing medical students to manage their personal finances throughout their careers. Our findings may have significant implications for medical schools and policymakers who are interested in reforming undergraduate medical training to better prepare young physicians to manage educational debt, save and invest wisely, and learn the financial aspects of practice management.

Previous studies have called for medical schools and residency programs to increase financial awareness among medical students and residents (Glaspy, 2005; Greene & Puder, 2002; J. M. Teichman et al., 2001; J. M. H. Teichman et al., 2005). Successful financial education programs must be tailored to specific groups, as preferences and economic situations vary (Lusardi & Mitchell, 2014; Lusardi, Mitchell, & Curto, 2010). In addition, providing financial education before individuals make significant financial decisions is critical (Lusardi et al., 2010). Medical students face some of their most significant financial challenges in medical school and residency, including incurring federal or private student loan debt, incurring credit card debt, purchasing or leasing a residence or car, filing tax returns, investing, and contributing to tax-exempt and tax-deferred retirement accounts.

The low financial literacy related to saving/investing concepts among medical students found in this study is consistent with the results of previous studies examining financial literacy and behavior among resident and attending physicians. Dhaliwal and Chou found that the average score of internal medicine interns on the Vanguard/Money Investor Literacy Test was only forty percent (Dhaliwal & Chou, 2007). Similarly, the 2013 Report on U.S. Physicians’ Financial Preparedness, a national survey of physicians conducted by AMA Insurance, revealed that forty-eight percent of physicians considered themselves behind schedule in retirement preparedness and that having enough money to retire was the top concern among every age cohort surveyed (AMA Insurance,
2013). These findings suggest that poor financial literacy and behavior among medical students may persist throughout their careers.

In this study, a number of demographic variables were found to influence financial literacy, consistent with results of previous studies of the general population (Hung, Parker, & Yoong, 2009; Lusardi et al., 2010) and physicians (AMA Insurance, 2013). Personal financial education may be particularly important for younger students, female students, students not majoring in a finance-related field, and students with lower self-assessed financial knowledge and confidence in personal financial management, as all these groups were found to have lower financial literacy than average.

In general, medical students seemed to desire additional training in personal finance. Nearly half of those who left comments explicitly stated that their current training was insufficient, and nearly half stated that additional training would have been beneficial either before or during medical school. Similarly, Mizell et al. found that residents had a high level of interest in personal finance and practice management, but felt unprepared to deal with these issues (Mizell et al., 2014). Saving/investing and debt management may be topics that personal finance training should emphasize.

Finally, while more study is needed, the associations described in this study suggest that improving financial literacy among medical students may lead to improved financial behavior, specifically lower medical educational indebtedness and increased retirement saving. This association may be particularly important in the setting of poor debt management, as Teichman et al. reported that fifty-one percent of urology residents had paid interest charges on credit cards in the past year and twelve percent maintained a credit card balance of greater than $10,000 (J. M. Teichman et al., 2001). An inverse association between financial literacy and debt burden, as well as a positive association between financial literacy and retirement planning (Lusardi & Mitchell, 2007), have been found in the general population (Lusardi & Tufano, 2009). Medical students’ underutilization of tax-advantaged retirement accounts is concerning, as their financial advantage over time is substantial (J. M. Teichman et al., 2001). Failure to contribute to retirement accounts may persist into residency, as a previous study found that most interns had not enrolled in or made changes in asset allocation to a tax-deferred retirement account (Dhaliwal & Chou, 2007). The shift toward increased specialization with its additional years of deferred income may make early contributions to retirement accounts especially important.

Additional research should identify a core set of personal finance concepts that medical students would benefit from learning as well as explore the effectiveness of different training methods in personal finance. Personal finance curricula may need to focus specifically on time value of money, student loans, asset classes, and asset allocation, as medical students performed most poorly in these areas.

Our study is subject to several limitations. First, associations from cross-sectional studies cannot establish causal relationships. Second, our sample was not random but rather represented geographically diverse public and private institutions. Therefore, results from this non-random sample may not generalize to the overall medical student population. Fortunately, the distributions of age, gender, race, ethnicity, degree program, and anticipated medical education debt among respondents were similar to national medical student demographics provided by the Association of American Medical Colleges (AAMC) (Association of American Medical Colleges, 2014a, Association of American Medical Colleges, 2014b). Third, we had a low response rate. Finally, since participants completed the survey online, it is possible that they may have used outside resources to answer the questions, inflating the measured performance.
Conclusion

In a survey of U.S. medical students, we found that financial literacy among U.S. medical students was low. Moreover, current curricula were not associated with improved financial literacy among students, and fourth-year students were no more financially literate than first-year students after controlling for age and other factors. The low financial literacy among students is concerning, as medical students occupy a unique niche with higher levels of educational debt. Medical schools and policymakers should consider and evaluate new methods to improve financial literacy among medical students.

Table 1. Characteristics of Survey Sample and U.S. Medical Students
| Characteristics                          | Survey Sample No. (%) | U.S. Medical Students % |
|-----------------------------------------|-----------------------|-------------------------|
|                                         | Overall (n = 1,041)   | M1 (n = 534)            | M4 (n = 507)  |
| Age, y                                  | 25.5 (3.1)            | 23.9 (2.6)              | 27.2 (2.5)   | 26.0 |
| Gender                                  |                       |                         |              |
| Men                                     | 485/979 (49.5)        | 238/494 (48.0)          | 247/485 (50.1) | 52.2 |
| Race/Ethnicity                          |                       |                         |              |
| Non-Hispanic - White                    | 684/991 (69.0)        | 349/501 (69.7)          | 335/490 (68.4) | 61.9 |
| Non-Hispanic - Black                    | 49/991 (4.9)          | 20/501 (4.0)            | 29/490 (5.9)  | 7.3  |
| Non-Hispanic - Other*                   | 200/991 (20.2)        | 98/501 (19.6)           | 102/490 (20.8) | 24.1 |
| Hispanic                                | 58/991 (5.9)          | 34/501 (6.8)            | 24/490 (4.9)  | 9.6  |
| Degree program                          |                       |                         |              |
| MD                                      | 872/963 (90.6)        | 443/486 (91.2)          | 429/477 (89.9) | 90.9 |
| Joint MD/PhD                            | 50/963 (5.2)          | 25/486 (5.1)            | 25/477 (5.2)  | 3.2  |
| Joint MD/MPh                            | 21/963 (2.2)          | 9/486 (1.9)             | 12/477 (2.5)  | 1.1  |
| Joint MD/MBA                            | 8/963 (0.8)           | 6/486 (1.2)             | 2/477 (0.4)   | 0.5  |
| Joint MD/Other                          | 12/963 (1.3)          | 3/486 (0.6)             | 9/477 (1.9)   | 1.3  |
| School-provided personal financial counseling or information during M4 |                       |                         |              |
| Received                                | N/A                   | N/A                     | 270/477 (56.6) |      |
| Undergraduate major                     |                       |                         |              |
| Accounting, Business, Finance, or Economics | 48/1001 (4.8)    | 23/508 (4.5)            | 25/493 (5.1)  |      |
| Earned income in 2013 or 2014           | Yes                   | 589/999 (59.0)          | 404/507 (79.7) | 185/492 (37.6) |      |
| Retirement plan contributions if eligible|                       |                         |              |
| Individual Retirement Arrangement (IRA) | 87/589 (14.8)        | 52/404 (12.9)           | 35/185 (18.9) |      |
| 401(k)                                  | 39/589 (6.6)          | 33/404 (8.2)            | 6/185 (3.2)   |      |
| 403(b)                                  | 16/589 (2.7)          | 14/404 (3.5)            | 2/185 (1.5)   |      |
| Other retirement plan                   | 44/589 (7.5)          | 30/404 (7.4)            | 14/185 (7.6)  |      |
| Expected medical educational loan debt at graduation |                       |                         |              |
| No debt                                 | 187/984 (19.0)        | 100/499 (20.0)          | 87/485 (17.9) | 17.9 |
| $1 - $50,000                            | 86/984 (8.7)          | 35/499 (7.0)            | 51/485 (10.5) | 9.9  |
| $50,001 - $100,000                      | 85/984 (8.6)          | 43/499 (8.6)            | 42/485 (8.7)  | 9.6  |
| $100,001 - $150,000                     | 128/984 (13.0)        | 76/499 (15.2)           | 52/485 (10.7) | 14.1 |
| $150,001 - $200,000                     | 180/984 (18.3)        | 91/499 (18.2)           | 89/485 (18.4) | 23.9 |
| $200,001 - $300,000                     | 252/984 (25.6)        | 113/499 (22.6)          | 139/485 (28.7) | 21.6 |
| $301,000 - $400,000                     | 56/984 (5.7)          | 33/499 (6.6)            | 23/485 (4.7)  | 2.8  |
| $400,001 - $500,000                     | 10/984 (1.0)          | 8/499 (1.6)             | 2/485 (0.4)   | 0.3  |

| Mean (SD)                              |                        |                        |                |
| Self-assessment questions               |                        |                        |                |
| I am pretty good at math.†              | 6.0 (1.1)              | 5.9 (1.2)              | 6.0 (1.0)      |
| How would you assess your overall financial knowledge?‡ | 3.9 (1.3)              | 3.9 (1.3)              | 3.9 (1.3)      |
| I feel confident in my ability to manage my personal finances over the next 5 years.† | 5.0 (1.5)              | 5.0 (1.5)              | 5.1 (1.4)      |
| Before I graduate from medical school, I would like to learn more about how to manage my personal finances.‡ | 5.9 (1.2)              | 5.9 (1.2)              | 6.0 (1.1)      |
| Topics in which respondent identified an interest in learning more |                       |                        |                |
| Saving/Investing                        | 855 (82.1)             | 424 (79.4)             | 431 (85.0)     |
| Tax planning                            | 737 (70.8)             | 372 (69.7)             | 365 (72.0)     |
| Retirement planning                     | 712 (68.4)             | 343 (64.2)             | 369 (72.8)     |
| Insurance/risk management               | 699 (67.1)             | 352 (65.9)             | 347 (68.4)     |
| Debt management                         | 659 (63.3)             | 343 (64.2)             | 316 (62.3)     |

† Includes Asian, American Indian or Alaska Native, and Native Hawaiian or Other Pacific Islander
‡ Responses were on a 1-7 Likert scale, with 1 = “strongly disagree” and 7 = “strongly agree.”
§ Responses were on a 1-7 Likert scale, with 1 = “very low” and 7 = “very high.”
Table 2. Mean Percentage of Correct Responses to Each Survey Question, Each Category, and the Entire Survey

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|----------|--------------------------------------------------------------------------------------------------|

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| Concept                          | Question                                                                 | Overall | M1   | M4   |
|---------------------------------|--------------------------------------------------------------------------|---------|------|------|
| Saving/Investing                | From 1926 to 2013, the average total return per year for the U.S. stock market was: A) 4% per year B) 12% per year C) 22% per year D) 33% per year E) Don’t know* | 47.4    | 44.7 | 50.2 |
|                                 | Relationship between bond prices and interest rates                      |         |      |      |
|                                 | If interest rates rise, what will typically happen to bond prices? Rise, fall, stay the same, or is there no relationship? A) Rise B) Fall C) Stay the same D) No Relationship E) Don’t know* | 19.3    | 15.4 | 23.5 |
|                                 | Mutual fund costs                                                        |         |      |      |
|                                 | Generally, a portfolio that has 80% of its assets invested in stocks would be best suited for: A) An 18-year-old using the assets to pay for college expenses over the next 4 years B) A 35-year-old investing for retirement C) A 75-year-old investing for income and capital preservation D) None of the above E) Don’t know* | 21.0    | 21.2 | 20.9 |
|                                 | Effect of diversification on risk                                        |         |      |      |
|                                 | When you invest in a traditional 401(k) (an employer’s retirement savings plan), your contributions are taxed: A) When you withdraw them during retirement B) Before you invest them C) Once a year on or before April 15 D) When you reach age 65 E) Don’t know* | 34.4    | 31.7 | 37.3 |
|                                 | Eligibility to contribute to tax-deferred account                        |         |      |      |
|                                 | If you invest in a 401(k) plan at work, are you eligible to contribute to an IRA? A) Yes B) No C) Don’t know* | 45.3    | 39.7 | 51.3 |
|                                 | Effect of diversification on risk                                        |         |      |      |
|                                 | Imagine that the interest rate on your savings account is 1 percent a year and inflation is 2 percent a year. After one year, would the money in the account buy more than it does today, exactly the same, or less than today? A) More B) Same C) Less D) Don’t know* | 70.6    | 67.8 | 73.6 |
|                                 | Inflation                                                                |         |      |      |
|                                 | Suppose you have $100 in a savings account earning 2 percent interest a year. After five years, how much would you have? A) More than $102 B) Exactly $102 C) Less than $102 D) Don’t know* | 97.7    | 97.4 | 98.0 |
|                                 | Debt                                                                     |         |      |      |
|                                 | You purchase an appliance which costs $1,000. To pay for this appliance, you are given the following two options: a) Pay 12 monthly installments of $100 each; b) Borrow at a 20% annual interest rate and pay back $1,200 a year from now. Which is the more advantageous offer? A) Option (a) B) Option (b) C) They are the same D) Don’t know* | 47.3    | 44.4 | 50.4 |
|                                 | Time value of money                                                       |         |      |      |
|                                 | A) Option (a) B) Option (b) C) They are the same D) Don’t know*           | 13.6    | 11.4 | 16.0 |
|                                 | Taxation/student loans                                                   |         |      |      |
|                                 | Which of the following is true about the student loan interest deduction? A) It is limited to the lesser of $2,500 or the amount of interest you actually paid. B) You can claim the deduction as long as you are a dependent. C) The amount of the deduction is subtracted from your total tax to arrive at the amount owed. D) Your eligibility to take the deduction is not limited by your income. E) Don’t know* | 16.7    | 13.7 | 19.7 |
|                                 | Student loans                                                             |         |      |      |
|                                 | You owe $3,000 on your credit card. You pay a minimum payment of $30 each month. At an Annual Percentage Rate of 12% (or 1% per month), how many years would it take to eliminate your credit card debt if you made no additional new charges? A) Less than 5 years B) Between 5 and 10 years C) Between 10 and 15 years D) Never, you will continue to be in debt E) Don’t know* | 38.2    | 32.8 | 44.0 |
|                                 | Simple interest                                                           |         |      |      |
|                                 | Suppose you owe $1,000 on your credit card 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? A) 2 years B) Less than 5 years C) 5 to 10 years D) More than 10 years E) Don’t know* | 72.0    | 71.2 | 73.0 |
|                                 | Compound interest                                                         |         |      |      |
|                                 | Impact that term can have on total interest payments over the life of a mortgage A) A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage but the total interest over the life of the loan will be less. B) A 30-year mortgage typically requires higher monthly payments than a 15-year mortgage but the total interest over the life of the loan will be less. C) Don’t know* | 93.7    | 91.8 | 95.7 |
|                                 | Mean Correct Responses for the Entire Survey                              | 47.4    | 44.6 | 50.3 |

* Adapted from the Vanguard Investor Literacy Test (“2000 MONEY/Vanguard Investor Literacy Test,” 2000)

1 Adapted from the FINRA Financial Literacy Quiz (“Financial Capability Study,” n.d.)

1 Adapted from Lusardi and Tufano (2009) (Lusardi & Tufano, 2009)
Table 3. Mean Percentage of Correct Responses to Each Section by Demographic Group and Results of ANOVA
|                | Overall | M1        | M4        |
|----------------|---------|-----------|-----------|
| **Age, y**     |         |           |           |
| 20-24          | 43.5    | 43.2      | 44.1      |
| 25-29          | 48.7    | 48.1      | 49.7      | 508 |
| 30-34          | 61.7    | 63.8      | 58.1      | 60  |
| 35-39          | 62.5    | 63.3      | 61.1      | 12  |
| 40-44          | 58.8    | 66.0      | 46.7      | 5   |
| **Gender**     |         |           |           |
| Men            | 54.0    | 54.0      | 53.9      | 485 |
| Women          | 41.4    | 40.8      | 42.4      | 494 |
| **Race/Ethnicity** |       |           |           |
| Non-Hispanic – White | 49.0 | 48.7      | 49.4      | 684 |
| Non-Hispanic – Black | 41.6 | 41.4      | 41.8      | 49  |
| Non-Hispanic – Other | 45.3 | 45.9      | 44.3      | 200 |
| Hispanic       | 45.7    | 43.8      | 48.9      | 58  |
| **Degree program** |       |           |           |
| MD             | 47.5    | 47.4      | 47.6      | 872 |
| Joint MD/PhD   | 52.0    | 51.8      | 52.3      | 50  |
| Joint MD/MPH   | 42.0    | 40.0      | 45.2      | 21  |
| Joint MD/MBA   | 69.5    | 71.3      | 66.7      | 8   |
| Joint MD/Other | 58.3    | 55.8      | 62.5      | 12  |
| **School-provided personal financial counseling or information during M4** | | | |
| Yes            | 49.2    | 49.1      | 49.4      | 589 |
| No             | 45.5    | 45.2      | 46.0      | 410 |
| **Earned income in 2013 or 2014** | | | |
| Yes            | 49.2    | 49.1      | 49.4      | 589 |
| No             | 45.5    | 45.2      | 46.0      | 410 |
| **Retirement plan contributions (IRA, 401(k), or 403(b)) in 2013 or 2014 if eligible** | | | |
| Yes            | 60.4    | 62.8      | 56.3      | 126 |
| No             | 46.2    | 45.4      | 47.5      | 463 |
| **Expected medical educational loan debt at graduation** | | | |
| Yes            | 50.3    | 52.9      | 48.5      | 187 |
| No             | 51.8    | 52.7      | 50.4      | 86  |
| **P value**    | <0.01   | <0.01     | <0.01     |     |
| **Expected medical educational loan debt at graduation** | | | |
| Yes            | 50.3    | 52.9      | 48.5      | 187 |
| No             | 51.8    | 52.7      | 50.4      | 86  |
| **P value**    | <0.01   | <0.01     | <0.01     |     |
Table 4. Multivariable Logistic Regression Model of the Impact of Medical Students' Demographic and Self-Reported Characteristics on Their Financial Literacy

| Predictor                        | Measure                     | Odds ratio (95% CI) | P value |
|----------------------------------|-----------------------------|---------------------|---------|
| Age                              | Years                       | 1.10 (1.00-1.20)    | 0.07    |
| Year                             | M4                          | 1.20 (0.93-1.55)    | 0.13    |
|                                  | M1                          | -                   | -       |
| Gender                           | Male                        | 2.19 (1.70-2.83)    | <0.01   |
|                                  | Female                      | -                   | -       |
| Race                             | Black                       | 0.60 (0.3-1.2)      | 0.12    |
|                                  | Other                       | 0.79 (0.57-1.08)    | 0.11    |
| Ethnicity                        | Hispanic                    | 0.57 (0.26-1.25)    | 0.13    |
|                                  | Non-Hispanic                | -                   | -       |
| Degree program                   | Joint MD/MBA                | 2.47 (1.24-4.9)     | 0.02    |
|                                  | All other degree programs   | -                   | -       |
| Undergraduate major              | Accounting, Business, Finance, or Economics | 5.79 (1.02-32.92) | 0.05    |
|                                  | Other                       | -                   | -       |
| Presence of earned income in 2013 or 2014 | Yes                         | 1.34 (0.9-2.02)     | 0.12    |
|                                  | No                          | -                   | -       |
| Self-assessed math skill         | Score (1-7)                 | 0.98 (0.9-1.06)     | 0.53    |
| Self-assessed financial knowledge| Score (1-7)                 | 1.79 (1.45-2.2)     | <0.01   |
| Confidence in personal financial management | Score (1-7)           | 1.19 (1.01-1.42)    | 0.05    |
| Desire to learn more about personal finance | Score (1-7)           | 1.00 (0.91-1.11)    | 0.93    |

Table 5. Identified Themes from Medical Students' Responses Regarding Concerns About Personal Finance Training and Examples of Times and Situations Requiring Additional Personal Finance Training
| Topic and Theme | No. (%) | Overall (n = 569) |
|----------------|---------|------------------|
| Concerns About Personal Finance Training* | | |
| Insufficient personal finance knowledge/training | 256 (45.0) | |
| Saving/Investing | 166 (29.2) | |
| Debt management | 126 (22.1) | |
| Retirement planning | 71 (12.5) | |
| Budgeting/managing personal finances | 43 (7.6) | |
| Tax planning | 40 (7.0) | |
| Large asset purchases | 26 (4.6) | |
| Practice management | 16 (2.8) | |
| Times Requiring Additional Personal Finance Training† | Overall (n = 478) | |
| During medical school | 142 (29.7) | |
| Late (M3 and M4) | 80 (16.7) | |
| Early (M1 and M2) | 58 (12.1) | |
| Before medical school | 91 (19.0) | |
| Situations Requiring Additional Personal Finance Training‡ | Overall (n = 478) | |
| Debt management | 169 (35.4) | |
| Incurring debt | 86 (18.0) | |
| Repaying debt | 50 (10.5) | |
| Saving/Investing | 84 (17.6) | |
| Retirement planning | 39 (8.2) | |
| Budgeting | 39 (8.2) | |
| Tax planning | 30 (6.3) | |
| Large asset purchases | 27 (5.6) | |

* Kappa statistics: mean 0.83, range 0.53 to 0.96.
† Kappa statistics: mean 0.86, range 0.81 to 0.90.
‡ Kappa statistics: mean 0.90, range 0.82 to 0.98.
Previous Presentations

An earlier version of this work was presented as an oral abstract at the AMA Research Symposium, November 6, 2015, Atlanta, Georgia.

Take Home Messages

- Financial literacy among U.S. medical students is low and does not differ between first- and fourth-year medical students after controlling for age and other factors.
- Current school-provided personal financial counseling/information is not associated with an improvement in students’ financial literacy.
- Higher financial literacy among medical students is associated with positive financial behaviors, including contributing to tax-advantaged retirement accounts and incurring less debt.
- The findings suggest that medical schools should consider new methods to improve financial literacy among medical students.

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Acknowledgements

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Appendices
Med Student Financial Survey

The results of this study will be used to guide efforts to help med students and physicians manage their personal finances. This study has been approved by our institution’s IRB. The survey is voluntary and will be used for research purposes. All responses will be anonymous. If you have any questions, please email us. Thank you!

Please rate how strongly you agree or disagree the following statements by clicking the appropriate circle.

| Statement                                                                 | Strongly disagree | Disagree | Slightly disagree | Neither agree nor disagree | Slightly agree | Agree | Strongly agree |
|---------------------------------------------------------------------------|-------------------|----------|-------------------|---------------------------|----------------|-------|----------------|
| I am pretty good at math.                                                 |                   |          |                   |                           |                |       |                |
| I feel confident in my ability to manage my personal finances over the next 5 years. |                   |          |                   |                           |                |       |                |
| Before I graduate from medical school, I would like to learn more about how to manage my personal finances. |                   |          |                   |                           |                |       |                |

Please enter the most appropriate answer to each of the following questions.

| How would you assess your overall financial knowledge? | 1 (Very low) | 2 | 3 | 4 | 5 | 6 | 7 (Very high) |
|--------------------------------------------------------|--------------|---|---|---|---|---|----------------|
| What specific areas of personal finance would you like to learn more about? (Please select all that apply). |             |   |   |   |   |   |                |
|                                                      | Debt management | Saving/investing | Insurance/risk management | Tax planning | Retirement planning |

Please select the best answer to each of the following questions. If you don’t know the answer to a question, please select “Don’t know”.

Suppose you have $100 in a savings account earning 2 percent interest a year. After five years, how much would you have?

|                                           | More than $102 | Exactly $102 | Less than $102 | Don’t know |
|-------------------------------------------|----------------|---------------|----------------|------------|
|                                           |                |               |                |            |
Imagine that the interest rate on your savings account is 1 percent a year and inflation is 2 percent a year. After one year, would the money in the account buy more than it does today, exactly the same, or less than today?

- More
- Same
- Less
- Don't know

If interest rates rise, what will typically happen to bond prices? Rise, fall, stay the same, or is there no relationship?

- Rise
- Fall
- Stay the Same
- No Relationship
- Don't know

Which of the following is true about a 15-year mortgage vs. a 30-year mortgage?

- A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage but the total interest over the life of the loan will be less.
- A 30-year mortgage typically requires higher monthly payments than a 15-year mortgage but the total interest over the life of the loan will be less.
- Don't know

Which of the following is true about a stock mutual fund vs. a single company’s stock?

- Buying a stock mutual fund usually provides a safer return than a single company's stock.
- Buying a single company’s stock usually provides a safer return than a stock mutual fund.
- Don't know

If a fund charges an expense ratio of 1% in 2015:

- You will pay a one-time fee amounting to 1% of the number of shares held in the account.
- Your fund investment's returns will be reduced by 1% in 2015.
- Your fund investment is reduced by 1% at the time you buy shares.
- You will pay a sales charge of 1% to a broker at the time you buy shares.
- Don't know

When you invest in a traditional 401(k) (an employer’s retirement savings plan), your contributions are taxed:

- When you withdraw them during retirement
- Before you invest them
- Once a year on or before April 15
- When you reach age 95
- Don't know

If you invest in a 401(k) plan at work, are you eligible to contribute to an IRA?

- Yes
- No
- Don't know

From 1926 to 2013, the average total return per year for the U.S. stock market was:

- 4% per year
- 12% per year
- 22% per year
- 33% per year
- Don't know

If you own only U.S. stocks in your investment portfolio, can you reduce your overall risk by adding international stocks?

- Yes
- No
- Don't know
Generally, a portfolio that has 80% of its assets invested in stocks would be best suited for:

- An 18-year-old using the assets to pay for college expenses over the next 4 years
- A 35-year-old investing for retirement
- A 75-year-old investing for income and capital preservation
- None of the above
- Don't know

Which of the following is true about the student loan interest deduction?

- It is limited to the lesser of $2,500 or the amount of interest you actually paid.
- You can claim the deduction as long as you are a dependent.
- The amount of the deduction is subtracted from your total tax to arrive at the amount owed.
- Your eligibility to take the deduction is not limited by your income.
- Don't know

Which of the following is true regarding standard vs. graduated repayment plans?

- The interest rate for a graduated repayment plan is typically higher than that for a standard repayment plan.
- Graduated repayment plans have fixed rates, whereas standard repayment plans have variable interest rates.
- The total interest paid over the life of the loan will be higher for a standard repayment plan than for a graduated repayment plan.
- Graduated repayment plans are ideal for students who expect their incomes to rise substantially over the repayment period.
- Don't know

Suppose you owe $1,000 on your credit card 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 years
- Less than 5 years
- 5 to 10 years
- More than 10 years
- Don’t know

You owe $3,000 on your credit card. You pay a minimum payment of $30 each month. At an Annual Percentage Rate of 12% (or 1% per month), how many years would it take to eliminate your credit card debt if you made no additional new charges?

- Less than 5 years
- Between 5 and 10 years
- Between 10 and 15 years
- Never, you will continue to be in debt
- Don’t know

You purchase an appliance which costs $1,000. To pay for this appliance, you are given the following two options: a) Pay 12 monthly installments of $100 each; b) Borrow at a 20% annual interest rate and pay back $1,200 a year from now. Which is the more advantageous offer?

- Option (a)
- Option (b)
- They are the same
- Don’t know

Please enter the most appropriate answer to each of the following questions.

What concerns do you have about your training in personal finances?

__________________________

Please provide examples of when more training in personal finances could have been beneficial.

__________________________
Which medical school do you attend?

- Michigan State University College of Human Medicine
- University of Texas Southwestern Medical School
- Saint Louis University School of Medicine
- The Ohio State University College of Medicine
- University of Alabama School of Medicine at UAB
- University of Kansas School of Medicine
- University of Pennsylvania Perelman School of Medicine

Please select your year in medical school.

- M1
- M2
- M3
- M4

Have you received any personal financial counseling/information yet during your M4 year from your school?

- Yes
- No

Please select the degree program you are currently enrolled in or are most likely to pursue.

- MD
- Joint MD/PhD
- Joint MD/MPH
- Joint MD/MBA
- Joint BA/MD or Joint BS/MD
- Joint MD/Other

Please enter your age in years.

Please select your gender.

- Male
- Female
- Other

Please select your ethnicity.

- Hispanic or Latino
- Not Hispanic or Latino

Please select your race.

- American Indian or Alaska Native
- Asian
- Black or African American
- Native Hawaiian or Other Pacific Islander
- White

Was your undergraduate major in one of the following fields: Accounting, Business, Finance, or Economics?

- Yes
- No

Did you have any earned income (research/internship stipends, wages, salaries, tips, self-employment income) in 2013 or 2014?

- Yes
- No

Did you make any contributions to any of the following retirement plans in 2013 or 2014? (Please select all that apply.)

- Individual Retirement Arrangement (IRA)
- 401(k)
- 403(b)
- Other retirement plan

How much do you EXPECT to owe on your medical school educational loans when you graduate from medical school?

- No debt
- $1 - $50,000
- $50,001 - $100,000
- $100,001 - $150,000
- $150,001 - $200,000
- $200,001 - $300,000
- $301,000 - $400,000
- $400,001 - $500,000
Declarations

The author has declared that there are no conflicts of interest.

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