

Article

Financial Literacy and Exercise Behavior in the United States

Pattaphol Yuktadatta , Mostafa Saidur Rahim Khan *  and Yoshihiko Kadoya 

School of Economics, Hiroshima University, 1-2-1 Kagamiyama, Higashihiroshima 739-8525, Japan; d206295@hiroshima-u.ac.jp (P.Y.); ykadoya@hiroshima-u.ac.jp (Y.K.)

* Correspondence: khan@hiroshima-u.ac.jp

Abstract: Lack of exercise is an important public health issue in the United States due to its link to obesity and other health risk factors. Despite several policy interventions, many Americans do not exercise sufficiently. Given recent findings that financial literacy helps to improve people's rational decision-making ability and encourages people to exercise in Japan, we conduct a similar study for the United States, which has also been experiencing lack of exercise but has a different cultural setting. Culture has important influences on decision making and exercise behavior. This study investigates whether financial literacy is associated with exercise behavior in the United States. We used Osaka University's 2010 Preference Parameters Study dataset and performed a probit regression analysis to test our hypothesis that financially literate people are likely to exercise more. In support of our hypothesis, we find that Americans with better financial literacy are more likely to exercise at least once a week. Additionally, financial education has a similar association with exercise behavior. Our results suggest that authorities could consider using financial literacy as an alternative policy intervention to promote regular exercise among the American population.

Keywords: exercise; financial literacy; rationality; culture; United States



Citation: Yuktadatta, P.; Khan, M.S.R.; Kadoya, Y. Financial Literacy and Exercise Behavior in the United States. *Sustainability* **2021**, *13*, 9452. <https://doi.org/10.3390/su13169452>

Academic Editor: Gianpiero Greco

Received: 6 July 2021

Accepted: 19 August 2021

Published: 23 August 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

A recent study finds a significantly positive relationship between financial literacy and regular exercise behavior in Japan [1]. The study claims that financial literacy, being a decision-making tool, helps people behave more rationally, thereby motivating them to exercise regularly. Ono et al.'s [1] findings motivated us to investigate the association between financial literacy and exercise behavior in the United States, which differs culturally and socio-economically from Japan [2–4]. Evidence from Japan does not apply directly to the United States because cultural identity, cultural perspective and cultural expectations influence exercise behavior [5]. As people from collective societies are more likely to exercise [5–9], culture may influence the rationality explanation of exercise behavior. Thus, studying exercise behavior using financial literacy as a proxy for rational decision-making ability should be revisited in an individualistic country like the United States. Lack of exercise is an important public health issue in the United States, which has seen an obesity epidemic since the 1990s [10–13]. McAllister [14] argues that lack of exercise is one of the main contributors to this phenomenon [14]. Thus, it is important to observe the potential use of financial literacy as a rational decision-making instrument to promote regular exercise in the United States.

According to the National Center for Health Statistics [15], the United States saw low rates of exercise in the 2000s. Only 15% and 18.2% of American adults aged 18 and above met the exercise guidelines in 2000 and 2008, respectively [15,16]. Thus, the Obama Administration introduced the “Let’s Move!” initiative to promote exercise and healthy eating habits in the United States [17,18]. Meanwhile, multiple local governments began investing in public infrastructure to promote walkability in their communities [19]. Furthermore, many doctors across the United States began prescribing exercise to patients [20–22]. Exercise began to increase because of these policies and practices. Overall, 24.2% of adults

met the exercise guidelines in 2018 [15]. Unfortunately, this improvement is insufficient to address the obesity epidemic in the United States; three-quarters of Americans still do not exercise enough and the obesity rate remains unresolved [23]. As Ono et al. [1] find that financial literacy can enhance people's rationality and address the lack of exercise problem in Japan, we believe that financial literacy may also help address the same issue in the United States.

Our study examines lack of exercise from the perspectives of imperfectly rational framework and the irrational choice framework and proposes a solution based on rational decision-making ability following the study by Ono et al. [1]. Based on the health capital model of Grossman [24,25], we consider regular exercise as an investment in health capital and a catalyst for productivity and utility enhancement. However, cognitive limitations might influence people to underestimate benefits of exercise, which could ultimately lead to insufficient exercise. Additionally, emotion and social stimulus might influence human rationality regarding exercise behaviors [26]. We argue that irrational health behavior like lack of exercise could be mitigated by improving rational decision-making ability through financial literacy and financial education. Several studies demonstrate that financially literate people are less likely to engage in risky behaviors such as smoking [27,28] and gambling [29]. Moreover, several studies provide evidence of the role of financial literacy in rational economic decisions [30–38], financial decisions [31,33,38–41] and investment decisions [27,42]. Financial literacy also encourages people to make good decisions related to healthcare [43], which ultimately improves their long-term health status [44]. In the similar vein, O'Neill et al. [45] found a positive association of financial behavior with health outcomes while O'Neill et al. [46] found a positive association of financial behavior with physical activity where frequent planning behavior appeared to mediate these associations. These findings support our argument that financially literate people are more likely to make rational decisions because they understand problems objectively and value information properly, which eventually leads to better cognitive ability and rationality.

This study explores the relationship between financial literacy, financial education and exercise behavior in the United States. Given that Grossman's health capital model [24,25] posits that regular exercise is a form of health investment, we hypothesize that people with better financial literacy or financial education are more likely to make the rational decision to exercise regularly. This study contributes to the existing literature in at least two ways. First, to the best of our knowledge, this is the first study to examine the relationship of financial literacy and financial education with exercise behavior in the American population. Second, as our research provides empirical evidence on the relationship between financial literacy and a rational behavior like exercise, our study offers extensive support to the existing literature on how financial literacy can improve rational decision-making. In addition to these academic contributions, our results offer an effective guideline in formulating sustainable healthcare and public health policies, which could ultimately alleviate lack of exercise in the United States in a sustainable way.

2. Data and Methods

2.1. Data

This study uses data from the Preference Parameters Study (PPS) conducted by the Institute of Social and Economic Research at Osaka University. The PPS is a panel survey, which collects information on socioeconomic characteristics and preferences data of individuals of Japan, the United States, China and India. The panel survey was conducted in every year from 2003 to 2013. In this study, we utilized data from the 2010 wave of the panel survey conducted in the United States, which contained information on exercise behavior, financial literacy and socioeconomic characteristics and preferences. The respondents of the survey are from the District of Columbia and other 48 states (except Alaska and Hawaii), which are representative of the population of the United States. The panel survey used the multistage stratified random sampling method to select prospective participants. A structured questionnaire was used to collect information from

prospective participants, which included dichotomous, multiple and scaling questions on demographic, socio-economic and psychological characteristics and preferences of the prospective participants. The reason for using the 2010 wave of the survey is that this wave includes questions on financial literacy and exercise behavior, which recent waves do not have. The dataset contains responses from 7046 respondents. However, after removing samples with missing values on financial literacy and exercise behavior (3215 responses), our final sample consists of 3831 responses, or 54.37% of the total responses.

2.2. Variables

Our dependent variable is “regular exercise,” which is based on the 2010 PPS multiple-choice question “Do you exercise?” Respondents can choose 1 out of 5 choices: almost every day, a few times a week, once a week, about once a month and do not exercise at all. Similar to Ono et al. [1], our hypothesis is that people with better financial literacy are more likely to exercise regularly or at least once a week. We adopt this hypothesis based on O'Donovan et al.'s [47] finding that exercise only once or twice per week can reduce mortality. We therefore create the binary variable regular exercise equal to 1 if respondents exercise at least once a week and 0 if respondents exercise about once a month or not at all.

Our main explanatory variable, financial literacy, is based on Lusardi and Mitchell's financial literacy measurement questions [48], which we provide in Appendix A. These questions test mathematical ability and the understanding of basic financial concepts such as interest rates, inflation and risk diversification, which are the basic foundations for making sensible investments. Due to its simplicity and adaptability, several studies used these questions to measure financial [1,28,29,49–53]. However, other studies question the reliability of these questions [54,55]. On the other hand, Nicolini and Haupt [56] argue that these questions are still practical and dependable. For these reasons, we use these questions to measure and quantify respondents' financial literacy, where we add 1 to the score for each correct answer and zero for incorrect answers, following prior studies [1,29,34,36,38,50]. We then calculate the total score and normalize it to 1. The financial literacy variable thus ranges from 0 to 1.

The other main explanatory variable, financial education, is based on the PPS survey multiple choice question, “Did you receive any compulsory financial education when you were in high school?” If the respondent answered “yes,” we input a value of 1 for financial education. If the respondent answered “no” or “do not know,” then we input a value of 0 for financial education. Prior studies using the 2010 PPS dataset also adopt this approach [27,42,53].

Similar to Ono et al. [1], our study includes demographic and socioeconomic variables, behavior variables and perception variables as control variables. We summarize these variables and their descriptions in Table 1.

Table 1. Variable definitions.

Variables	Definitions
Regular exerciser	Binary variable: 1 = regular exercise (exercise once a week or more) and 0 = otherwise
Financial literacy	Continuous variable: Average score of Lusardi and Mitchell's financial literacy measurement questions (Appendix A)
Financial education	Binary variable: 1 = received compulsory financial education in high school and 0 = otherwise
Male	Binary variable: 1 = male and 0 = female
Age	Respondent's age
Age squared	Age squared

Table 1. *Cont.*

Variables	Definitions
University degree	Binary variable: 1 = obtained university degree and 0 = otherwise
Marriage	Binary variable: 1 = married and 0 = otherwise
Divorce	Binary variable: 1 = divorced or separated and 0 = otherwise
Household size	Continuous variable: Number of people currently living in the household
Children	Binary variable: 1 = have child/children and 0 = otherwise
Unemployed	Binary variable: 1 = respondent is unemployed and 0 = otherwise
Household income	Continuous variable: Annual earned income before taxes and with bonuses of the entire household in 2009 (unit: USD)
Log of household income	Log (household income)
Household assets	Continuous variable: balance of financial assets (savings, stock, insurance, etc.) of the entire household (unit: USD)
Log of household assets	Log (household assets)
Current smoker	Binary variable: 1 = current smoker (sometimes—more than two packs a day) and 0 = non-smokers (do not smoke at all, quit, or hardly smoke)
Current drinker	Binary variable: 1 = current drinker (drink sometimes—five cans of beer daily) and 0 = otherwise
Frequent gambler	Binary variable: 1 = frequent gambler (gamble once a week or more) and 0 = otherwise
Myopic view of the future	Binary variable: 1 = agree and completely agree with the statement “Since the future is uncertain, it is a waste to think about it” and 0 = otherwise
Level of risk preference	Continuous variable: Percentage score from the question “Usually, when you go outdoors, how high does the probability of rain have to be before you take an umbrella?”
Current level of happiness	Continuous variable: Percentage score from the question “Overall, how happy would you say you are currently?”
Anxiety about health	Binary variable: 1 = agree and completely agree with the statement “I have anxiety about my health” and 0 = otherwise

2.3. Descriptive Statistics

As illustrated in Table 2, we find that 65.65% of PPS respondents are regular exercisers. Our respondents’ average financial literacy score is 0.6981 and around 12% of respondents received financial education in high school. The National Financial Capability Study [57] also reported an above-average financial literacy score, i.e., 2.72 out of 5 among American populations. We also find that most respondents are female (54.71%), while some respondents obtained a university degree (40.20%). The average respondents are middle-aged people around 49 years old. Many of the respondents are married (63.33%) and have at least one child (71.97%). Meanwhile, a few of them are divorced (6.37%) or unemployed (2.22%). On average, the respondents’ households comprised 2.79 members and had annual household incomes of around 67,000 U.S. dollars and household assets worth about 194,000 dollars. For average behavior, we find that 40.38% of the respondents are current drinkers, 13.7% are smokers and only 7.62% are frequent gamblers. Meanwhile, we find that people generally have a high happiness level (71.1%), while some have anxiety about their health (31.4%). In addition, people are somewhat risk-takers. On average, they will take an umbrella with them if the chance of rain is 66.35%. Lastly, a few respondents have a myopic view of the future; 10.44% of the respondents totally agreed with the statement, “Since the future is uncertain, it is a waste to think about it”.

Table 2. Descriptive Statistics.

Variable	Mean	Standard Deviation (SD)	Min	Max
Main variables				
Regular Exerciser	0.6565	0.4749	0	1
Financial Literacy	0.6981	0.3155	0	1
Financial Education	0.1240	0.3296	0	1
Other variables				
Male	0.4529	0.4978	0	1
Age	49.30	15.89	15.00	96.00
Age Squared	2683.34	1625.95	225.00	9216.00
University degree	0.4020	0.4904	0	1
Marriage	0.6333	0.4820	0	1
Divorce	0.0637	0.2442	0	1
Household size	2.79	1.47	1	13
Children	0.7197	0.4492	0	1
Unemployed	0.0222	0.1473	0	1
Household income	67,501.96	48,617.02	5000.00	210,000.00
Log of household income	10.77	0.95	8.52	12.25
Household assets	194,648.90	292,005.20	12,500.00	1,250,000.00
Log of household assets	11.14	1.49	9.43	14.04
Current smoker	0.1370	0.3439	0	1
Current drinker	0.4038	0.4907	0	1
Frequent gambler	0.0762	0.2654	0	1
Myopic view of future	0.1044	0.3058	0	1
Level of risk preference	0.6635	0.2843	0	0.9900
Current level of happiness	0.7110	0.2231	0	1
Anxiety about health	0.3140	0.4642	0	1
Observations	3831			

Overall, we find that people with different characteristics mostly have different exercise behavior, as we report in Tables 3–5.

First, Table 3 illustrates the heterogeneity of exercise behavior among different age cohorts. Although we find that the older age cohort (aged 51 and above) and the youngest age cohort (aged 30 or less) have a similar proportion of regular exercisers, at around 68%, the other age cohorts have a vastly different proportions of regular exercisers. The second youngest age cohort (aged 31–40) has the lowest proportion (59.86%) of exerciser, while the middle-age cohort (aged 41–50) has around 63%. This vast difference implies that age may have a sizable effect on exercise behavior, *ceteris paribus*.

Table 3. Distribution of exercise behavior by age group.

Exercise Behavior	Age					Total
	<=30	31–40	41–50	51–60	>=61	
Exercise once a week or more	390	340	543	620	622	2515
	69.77%	59.86%	63.07%	67.25%	67.54%	65.65%
Otherwise	169	228	318	302	299	1316
	30.23%	40.14%	36.93%	32.75%	32.46%	34.35%
Total	559	568	861	922	921	3831
	100%	100%	100%	100%	100%	100%
Mean difference	F = 4.44 ***					

Note: *** $p < 0.01$.

Table 4. Distribution of exercise behavior by demographic characteristic.

Exercise Behavior	Gender		Education		Unemployed		Total
	Female	Male	Below University Degree	University Degree and Above	No	Yes	
Exercise once a week or more	1349	1166	1410	1105	2472	43	2515
	64.36%	67.20%	61.55%	71.75%	65.99%	50.59%	65.65%
Otherwise	747	569	881	435	1274	42	1316
	35.64%	32.80%	61.55%	71.75%	65.99%	50.59%	34.35%
Total	2096	1735	2291	1540	3746	85	3831
	100%	100%	100%	100%	100%	100%	100%
Mean difference	$t = -1.8454 *$		$t = -6.5582 ***$		$t = 2.9595 ***$		

Note: *** $p < 0.01$, * $p < 0.10$.**Table 5.** Distribution of exercise behavior by risky health behavior.

Exercise Behavior	Current Smoker		Current Drinker		Frequent Gambler		Total
	No	Yes	No	Yes	No	Yes	
Exercise once a week or more	2216	299	1480	1035	2331	184	2515
	67.03%	56.95%	64.80%	66.90%	65.87%	63.01%	65.65%
Otherwise	1090	226	804	512	1208	108	1316
	32.97%	43.05%	35.20%	33.10%	34.13%	36.99%	34.35%
Total	3306	525	2284	1547	3539	292	3831
	100%	100%	100%	100%	100%	100%	100%
Mean difference	$t = 4.5277 ***$		$t = -1.3462$		$t = 0.9864$		

Note: *** $p < 0.01$.

Second, Table 4 shows that people with different demographic characteristics like gender, education and employment status also have different exercise behavior. For gender, we find a gender exercise gap, where the proportion of male exercisers (67.2%) is greater than the proportion of female exercisers (64.36%) at a 10% significance level. We also find an education exercise gap, where the proportion of respondents with a university degree who regularly exercise (71.75%) is significantly greater than those with less education (61.55%) at a 1% significance level. Simultaneously, we find an employment exercise gap between the unemployed (50.59%) and employed (65.99%) at a 1% significance level. These differences may imply that gender, education and employment status affect exercise behavior, *ceteris paribus*.

Finally, Table 5 illustrates that exercise behavior varies among smokers and non-smokers. Respondents who do not smoke at all, quit smoking, or hardly smoke exercise more than current smokers at a 1% significance level. On the other hand, exercise behavior does not vary on other risky behaviors; respondents who do not drink at all, quit drinking, or hardly drink do not exercise more or less than do current drinkers at a 10% significance level. Our results are similar for gambling behavior.

2.4. Methodology

We perform a probit regression analysis to test our hypothesis that people with better financial literacy and financial education are more likely to exercise regularly or at least once a week. We first estimate the effect of financial literacy on exercise behavior using Equation (1). Then, we estimate the effect of financial education on exercise behavior using Equation (2). Finally, we estimate the effects of both financial literacy and financial education on exercise behavior using Equation (3).

$$Y_i = f(FL_i, X_i, \varepsilon_i) \quad (1)$$

$$Y_i = f(FE_i, X_i, \varepsilon_i) \quad (2)$$

$$Y_i = f(FL_i, FE_i, X_i, \varepsilon_i), \quad (3)$$

where Y_i is the exercise behavior of the i th respondent (regular exerciser or otherwise), FL is average financial literacy score, FE is financial education status, X is a vector of respondent's characteristics and ε is the error term.

This study could have econometric problems such as multicollinearity. Explanatory variables, such as financial literacy, university degree, household income and household assets might be correlated. Watanapongvanich et al. [53] argue that the respondents with higher education might have better financial knowledge, higher incomes and more assets. Due to this possible problem, we examined the correlation between the variables and variance inflated test (VIF test), where the result is available upon request. We find that our VIF value is below 10. Hence, our study does not suffer from multicollinearity problems.

For each of Equations (1)–(3), we develop 4 models using different control variables. Below, we provide an example of our model specifications for Equation (1). Models 1, 2, 3, and 4 are shown in Equations (4), (5), (6), and (7) respectively.

Exercise behavior _{i} (1 = regular exerciser and 0 = otherwise)

$$\begin{aligned} &= \beta_0 + \beta_1 \text{financial literacy}_i + \beta_2 \text{male}_i + \beta_3 \text{age}_i + \beta_4 \text{age squared}_i + \beta_5 \text{university degree}_i \\ &+ \beta_6 \text{marriage}_i + \beta_7 \text{divorce}_i \\ &+ \beta_8 \text{household size}_i + \beta_9 \text{children}_i + \beta_{10} \text{unemployed}_i + \beta_{11} \log \text{of household income}_i \\ &+ \beta_{12} \log \text{of household assets}_i + \varepsilon_i \end{aligned} \quad (4)$$

Exercise behavior _{i} (1 = regular exerciser and 0 = otherwise)

$$\begin{aligned} &= \beta_0 + \beta_1 \text{financial literacy}_i + \beta_2 \text{male}_i + \beta_3 \text{age}_i + \beta_4 \text{age squared}_i + \beta_5 \text{university degree}_i \\ &+ \beta_6 \text{marriage}_i + \beta_7 \text{divorce}_i \\ &+ \beta_8 \text{household size}_i + \beta_9 \text{children}_i + \beta_{10} \text{unemployed}_i + \beta_{11} \log \text{of household income}_i \\ &+ \beta_{12} \log \text{of household assets}_i + \varepsilon_i \beta_{13} \text{current smoker}_i + \beta_{14} \text{current drinkers}_i \\ &+ \beta_{15} \text{frequent gamblers}_i + \varepsilon_i \end{aligned} \quad (5)$$

Exercise behavior _{i} (1 = regular exerciser and 0 = otherwise)

$$\begin{aligned} &= \beta_0 + \beta_1 \text{financial literacy}_i + \beta_2 \text{male}_i + \beta_3 \text{age}_i + \beta_4 \text{age squared}_i + \beta_5 \text{university degree}_i \\ &+ \beta_6 \text{marriage}_i + \beta_7 \text{divorce}_i \\ &+ \beta_8 \text{household size}_i + \beta_9 \text{children}_i + \beta_{10} \text{unemployed}_i + \beta_{11} \log \text{of household income}_i \\ &+ \beta_{12} \log \text{of household assets}_i + \varepsilon_i \beta_{13} \text{current smoker}_i + \beta_{14} \text{current drinkers}_i \\ &+ \beta_{15} \text{frequent gamblers}_i + \beta_{16} \text{myopic view of the future}_i + \beta_{17} \text{level of the risk preference}_i + \varepsilon_i \end{aligned} \quad (6)$$

Exercise behavior _{i} (1 = regular exerciser and 0 = otherwise)

$$\begin{aligned} &= \beta_0 + \beta_1 \text{financial literacy}_i + \beta_2 \text{male}_i + \beta_3 \text{age}_i + \beta_4 \text{age squared}_i + \beta_5 \text{university degree}_i \\ &+ \beta_6 \text{marriage}_i + \beta_7 \text{divorce}_i \\ &+ \beta_8 \text{household size}_i + \beta_9 \text{children}_i + \beta_{10} \text{unemployed}_i + \beta_{11} \log \text{of household income}_i \\ &+ \beta_{12} \log \text{of household assets}_i + \varepsilon_i \beta_{13} \text{current smoker}_i + \beta_{14} \text{current drinkers}_i \\ &+ \beta_{15} \text{frequent gamblers}_i + \beta_{16} \text{myopic view of the future}_i + \beta_{17} \text{level of the risk preference}_i \\ &+ \beta_{18} \text{current level of the happiness}_i + \beta_{19} \text{anxiety about health}_i + \varepsilon_i \end{aligned} \quad (7)$$

Equation (4) (Model 1) estimates the association between regular exercise and financial literacy after controlling respondents' socioeconomic status such as gender, age, education, marital status, children, unemployment, household size, log of household income and log of household assets. Similarly, Equation (5) (Model 2) estimates the association between regular exercise and financial literacy after controlling respondents' socioeconomic status and risky health behaviors such as smoking, drinking alcohol and gambling. In Equation (6) (Model 3), we control myopic view of the future and risk preference in addition to respondents' socioeconomic status and risky health behavior. Finally, in Equation (7) (Model 4),

we control current happiness level and anxiety about health variables in addition to what we control in Equation (6).

3. Results

We report the probit regression analysis results using financial literacy as the main explanatory variable in Table 6 and Table 8 and financial education as the main explanatory variable in Tables 7 and 8. These tables also report the results using the similar model specifications. The first column displays the estimates of the explanatory variable(s) and the demographic variables of gender, age, education, marital status, household size, children, unemployment status and household financial status. The second column includes these estimates as well as the estimates of the risky health behavior variables. The third column adds the myopic view of the future and level of risk preference variables. The last column adds the current level of happiness and anxiety about health variables.

Table 6. Probit model regression results: Financial literacy as the main explanatory variable.

Variable	Dependent Variable: Regular Exerciser			
	Model 1	Model 2	Model 3	Model 4
Financial literacy	0.176 ** (0.0728)	0.168 ** (0.0730)	0.169 ** (0.0731)	0.153 ** (0.0738)
Male	0.00486 (0.0437)	0.0148 (0.0442)	0.0280 (0.0444)	0.0330 (0.0447)
Age	−0.0138 * (0.00799)	−0.0117 (0.00806)	−0.0132 (0.00808)	−0.00718 (0.00815)
Age squared	0.000127 * (0.00008)	0.000106 (0.00008)	0.000118 (0.00008)	0.000064 (0.00008)
University degree	0.142 *** (0.0473)	0.127 *** (0.0477)	0.119 ** (0.0479)	0.111 ** (0.0481)
Marriage	−0.0400 (0.0598)	−0.0466 (0.0601)	−0.0459 (0.0602)	−0.0686 (0.0604)
Divorce	−0.0390 (0.0961)	−0.0378 (0.0961)	−0.0364 (0.0961)	0.0123 (0.0967)
Household size	−0.0135 (0.0175)	−0.0150 (0.0175)	−0.0137 (0.0176)	−0.00972 (0.0177)
Children	−0.0667 (0.0628)	−0.0622 (0.0629)	−0.0584 (0.0629)	−0.0987 (0.0635)
Unemployed	−0.289 ** (0.141)	−0.272 * (0.141)	−0.271 * (0.141)	−0.211 (0.140)
Log of household income	0.0226 (0.0278)	0.0213 (0.0280)	0.0237 (0.0281)	0.00822 (0.0283)
Log of household assets	0.107 *** (0.0175)	0.105 *** (0.0175)	0.105 *** (0.0176)	0.0957 *** (0.0177)
Current smoker		−0.140 ** (0.0626)	−0.139 ** (0.0627)	−0.118 * (0.0630)
Current drinker		0.00733 (0.0446)	0.00646 (0.0447)	−0.00408 (0.0449)
Frequent gambler		−0.0691 (0.0813)	−0.0704 (0.0813)	−0.0408 (0.0818)
Myopic view of the future			−0.150 ** (0.0686)	−0.112 (0.0692)
Level of risk preference			−0.198 *** (0.0757)	−0.210 *** (0.0760)
Current level of happiness				0.641 *** (0.0992)
Anxiety about health				−0.164 *** (0.0465)
Constant	−0.743 ** (0.315)	−0.716 ** (0.317)	−0.570 * (0.320)	−0.807 ** (0.329)
Observations	3831	3831	3831	3831
Log likelihood	−2400	−2397	−2391	−2359
Chi ² statistics	129.1	135.3	147.3	209.3
p-value	0	0	0	0

Note: Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 7. Probit model regression results: Financial education as the main explanatory variable.

Variable	Dependent Variable: Regular Exerciser			
	Model 1	Model 2	Model 3	Model 4
Financial education	0.367 *** (0.0694)	0.367 *** (0.0694)	0.372 *** (0.0695)	0.351 *** (0.0699)
Male	0.00736 (0.0435)	0.0178 (0.0440)	0.0313 (0.0442)	0.0358 (0.0445)
Age	−0.0120 (0.00798)	−0.00996 (0.00805)	−0.0114 (0.00807)	−0.00567 (0.00813)
Age squared	0.000115 (0.00008)	0.000094 (0.00008)	0.000106 (0.00008)	0.000055 (0.00008)
University degree	0.162 *** (0.0466)	0.145 *** (0.0471)	0.137 *** (0.0472)	0.128 *** (0.0474)
Marriage	−0.0228 (0.0599)	−0.0299 (0.0601)	−0.0292 (0.0603)	−0.0523 (0.0605)
Divorce	−0.0257 (0.0963)	−0.0246 (0.0964)	−0.0232 (0.0965)	0.0241 (0.0971)
Household size	−0.0160 (0.0174)	−0.0177 (0.0175)	−0.0164 (0.0176)	−0.0123 (0.0177)
Children	−0.0703 (0.0627)	−0.0650 (0.0628)	−0.0612 (0.0629)	−0.101 (0.0635)
Unemployed	−0.275 * (0.141)	−0.257 * (0.141)	−0.255 * (0.140)	−0.199 (0.140)
Log of household income	0.0219 (0.0277)	0.0204 (0.0279)	0.0229 (0.0280)	0.00757 (0.0282)
Log of household assets	0.114 *** (0.0172)	0.112 *** (0.0173)	0.112 *** (0.0173)	0.102 *** (0.0174)
Current smoker		−0.146 ** (0.0628)	−0.145 ** (0.0630)	−0.123 * (0.0633)
Current drinker		0.00221 (0.0447)	0.000719 (0.0447)	−0.00984 (0.0450)
Frequent gambler		−0.0700 (0.0813)	−0.0713 (0.0814)	−0.0418 (0.0819)
Myopic view of the future			−0.160 ** (0.0687)	−0.122 * (0.0693)
Level of risk preference			−0.199 *** (0.0758)	−0.212 *** (0.0760)
Current level of happiness				0.626 *** (0.0994)
Anxiety about health				−0.162 *** (0.0466)
Constant	−0.802 ** (0.314)	−0.770 ** (0.316)	−0.621 * (0.319)	−0.846 *** (0.327)
Observations	3831	3831	3831	3831
Log likelihood	−2388	−2385	−2379	−2348
Chi ² statistics	146.2	154.2	166.1	224.4
p-value	0	0	0	0

Note: Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 8. Probit model regression results: Financial literacy and financial education as the main explanatory variable.

Variables	Dependent Variable: Regular Exerciser			
	Model 1	Model 2	Model 3	Model 4
Financial literacy	0.153 ** (0.0733)	0.144 ** (0.0734)	0.145 ** (0.0735)	0.131 * (0.0742)
Financial education	0.359 *** (0.0695)	0.359 *** (0.0695)	0.364 *** (0.0696)	0.344 *** (0.0700)
Male	−0.00121 (0.0438)	0.00950 (0.0443)	0.0230 (0.0445)	0.0283 (0.0448)
Age	−0.0130 (0.00800)	−0.0110 (0.00807)	−0.0125 (0.00810)	−0.00664 (0.00816)
Age squared	0.000124 (0.00008)	0.000103 (0.00008)	0.000115 (0.00008)	0.000063 (0.00008)
University degree	0.143 *** (0.0475)	0.128 *** (0.0479)	0.120 ** (0.0481)	0.112 ** (0.0483)
Marriage	−0.0254 (0.0600)	−0.0322 (0.0602)	−0.0314 (0.0604)	−0.0543 (0.0606)
Divorce	−0.0291 (0.0965)	−0.0276 (0.0965)	−0.0261 (0.0966)	0.0213 (0.0972)
Household size	−0.0152 (0.0174)	−0.0170 (0.0175)	−0.0157 (0.0176)	−0.0117 (0.0177)
Children	−0.0644 (0.0628)	−0.0595 (0.0629)	−0.0557 (0.0630)	−0.0957 (0.0635)
Unemployed	−0.271 * (0.141)	−0.254 * (0.141)	−0.253 * (0.140)	−0.197 (0.140)
Log of household income	0.0176 (0.0278)	0.0166 (0.0280)	0.0191 (0.0281)	0.00428 (0.0283)
Log of household assets	0.107 *** (0.0175)	0.105 *** (0.0176)	0.105 *** (0.0176)	0.0963 *** (0.0177)
Current smoker		−0.140 ** (0.0629)	−0.139 ** (0.0631)	−0.119 * (0.0634)
Current drinker		−0.000593 (0.0447)	−0.00196 (0.0448)	−0.0121 (0.0450)
Frequent gambler		−0.0667 (0.0815)	−0.0681 (0.0815)	−0.0393 (0.0820)
Myopic view of the future			−0.156 ** (0.0687)	−0.118 * (0.0693)
Level of risk preference			−0.203 *** (0.0758)	−0.215 *** (0.0760)
Current level of happiness				0.623 *** (0.0995)
Anxiety about health				−0.161 *** (0.0466)
Constant	−0.753 ** (0.315)	−0.725 ** (0.317)	−0.574 * (0.320)	−0.804 ** (0.329)
Observations	3831	3831	3831	3831
Log likelihood	−2386	−2383	−2377	−2347
Chi ² statistics	150.8	158.4	170.3	228.1
p-value	0	0	0	0

Note: Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6 shows that the association between financial literacy and exercise behavior is significantly positive at the 5% significance level and the result is robust and consistent. For the association of financial education, Table 7 shows that financial education has a significantly positive association with exercise behavior at a 1% significance level, which is robust and consistent. Table 8 confirms our findings on the association of financial literacy and financial education: the association of financial literacy is positive and statistically significant at a 5% significance level. The association of financial education is also positive

and statistically significant at a 1% significance level. These findings imply that people with better financial literacy or people with financial education are more likely to exercise regularly. Thus, the results support our hypothesis.

Due to the robustness and consistency in the association of the main explanatory variables in Tables 6–8, we focus on the results in Table 8. In Table 8, we find that the associations of most control variables are robust and consistent across the model specifications. Education status, household assets and happiness level are positively associated with exercise behavior, while the level of risk preference and anxiety about health are negatively associated with exercise behavior, all at a 1% significance level. Smoking behavior and myopic view of the future are negatively associated with exercise behavior at a 10% significance level. Lastly, variables like age, gender, marital status, children, household size, household income, unemployment status, drinking behavior and gambling behavior are not significantly associated with exercise behavior.

4. Discussion

We find that people with higher financial literacy are more likely to exercise regularly or at least once a week, similar to Ono et al. [1] and that those who received financial education in high school are also more likely to exercise regularly. These results are consistent with Grossman's [24,25] health capital model. They also support our argument that financial literacy and financial education help people to value information accurately and understand financial problems comprehensively. Hence, people with better financial literacy may feel more inclined to make rational decision such as to exercise regularly. Furthermore, these results support the existing literature [27–29] on how financial literacy helps improve people's rational decision-making skills. As three-quarters of Americans do not exercise enough, policy makers may consider implementing measures to improve financial literacy to increase the proportion of regular exercisers.

Among the positive associations, the relations of education status, household assets and happiness level are consistent with previous studies. Our finding on education, for example, is consistent with Huang and Humphreys [58], Hoekman et al. [59], Ono et al. [1] and Saint Onge and Krueger [60], who find a positive association of education with exercise behavior. This finding is also consistent with the human capital perspective, which suggests that people with higher education levels are more likely to have better self-control and allocate more time for exercise [60–62]. Our result for household assets is also consistent with Chung et al. [63] and Ono et al. [1]. The static labor supply model, where people with high non-labor income or greater assets have more time for leisure, can explain this phenomenon. Thus, people with greater assets will exercise more than those with lower assets. Our finding on happiness level is consistent with prior studies [1,64–67]. People with higher happiness levels are more likely to exercise than people with lower happiness levels because they are less likely to feel exhausted and are more likely to be energetic.

Among the negative associations, our results for the level of risk preference and anxiety about health are inconsistent with other studies. On the former, we find that risk-takers are less likely to exercise and vice versa. Intrinsically, risk-averse people would try to avoid bearing the potential risk of insufficient exercise and will thus be more inclined to exercise more in the present. Regardless, this result is inconsistent with Ono et al. [1], who find that risk preference does not have an association with exercise behavior. Our finding on the anxiety about health indicates that people with health anxiety are less likely to exercise. One possible explanation is that people with health anxiety may believe that they are physically unable to exercise [67,68]. Hence, exercise may exacerbate their illness. This finding is inconsistent with Ono et al. [1], who find an insignificant relationship between health anxiety and exercise. On the other hand, the finding on smoking behavior is consistent with previous studies [69,70] reporting a negative correlation between smoking and physical activity. This finding is also consistent with Ono et al. [1], who find that Japanese smokers are less likely to exercise. The adverse health effect of smoking could cause this relationship. Regular smokers are more likely to have low oxygen levels in their

organs [71–73], making them prone to exhaustion and discouraging them from exercise. Lastly, our finding on the myopic view of the future is consistent with Adam and Nettle [74] and Milfont et al. [75], who find that forward-thinking people are more likely to exercise. Intrinsically, such people are more likely to be concerned about future consequences. In the case of exercise, once forward-thinking people know the benefits of exercise and the consequences of not exercising, they may be more likely to exercise regularly.

Among the insignificant variables, some of our findings are consistent with other studies, such as marital status [63,76] and household size [76]. Our results for the unemployment variable are not robust. The result is significant in model specifications 1 to 3 in Table 8, but become insignificant in model specification 4. Our insignificant finding on unemployment is consistent with Ono et al. [1] and Gough [77]. On the other hand, our results for age, gender, income, drinking and gambling are inconsistent with other studies [1]. Regarding income, prior studies [78–80] report differing effects on physical activity. For the gambling variable, Håkansson et al. [81] find an association between gambling and exercise. Lastly, Ono et al. [1] report the association between age, gender and drinking behavior and exercise behavior in Japan. This difference between our findings and other findings may be due to the differing measurements of exercise, socioeconomic settings and cultures. Hence, future research may consider exploring these associations in detail.

5. Conclusions

Despite several intervention programs, three-quarters of Americans still exercise insufficiently [23]. Recently, Ono et al. [1] report that financial literacy helps improve rational decision-making and encourages people to exercise in Japan. Because of this unresolved issue and Ono et al.'s findings [1], we hypothesize that American people with better financial literacy exercise more. We perform a probit regression analysis of Osaka University's 2010 PPS dataset to test our hypothesis. Similar to Ono et al. [1], we find that American people with better financial literacy are more like to exercise at least once a week. In addition, we find that American people with financial education are more likely to exercise. Our results confirm that explaining exercise behavior by financial literacy and financial education as proxies for rationality also hold in a country that differs culturally and socio-economically from Japan. These findings also support previous studies' arguments (e.g., Khan et al. [42], Lusardi and Mitchell [34], Meier and Sprenger [36], Watanapongvanich et al. [29,53], Yoshino et al. [38]) that financial literacy enhances people's decision-making ability.

Although we provide evidence on the association between exercise behavior and financial literacy and financial education as proxies for rational decision-making ability, the channel through which they are associated needs more investigation. For example, Xiao and Porto [82] found that financial literacy, behavior and capability mediated the association between financial education and financial satisfaction while Zhu and Xiao [83] found that financial literacy, financial and economic information search and risk tolerance mediated the association between financial education and risky financial asset holding. Similarly, there could be some mediating variables in the association between exercise behavior and financial literacy and financial education. Future studies should be directed to conduct these mediating analyses.

This study does have limitations. First, there could be a possible measurement error arising from the measurement of "exercise regularly". As the PPS dataset includes only respondent's exercise frequency and excludes other measurements of exercise, such as exercise time and exercise intensity. We therefore define regular exercise based on O'Donovan et al.'s [47] findings that people who perform high-intensity exercise once or twice a week have lower mortality risk. Second, we are aware that there are alternative approaches to measure financial literacy and that our approach might not measure financial literacy perfectly. The reason for using this approach is to ensure comparability with previous studies on financial literacy and health risk behavior [1,27–29,53]. Moreover, Nicolini and Haupt [56] compared various measurements of financial literacy and found

the three-question methodology, which we used in this study, as a viable one. Finally, since similar psychological functions could affect both financial literacy and health behavior, the potential causality could affect the results of our study. However, we could not control this causality due to limitation of data. Despite these limitations, our results have important policy implications. Given that lack of exercise is still an important public health issue, policy makers could consider introducing financial literacy as an alternative policy intervention to promote regular exercise. Encouraging regular exercise would eventually have a positive impact on reducing the obesity problem. However, further study is needed to clearly understand whether financially literate people are less likely to suffer from obesity.

Author Contributions: Conceptualization, Y.K., P.Y. and M.S.R.K.; methodology, P.Y. and Y.K.; software, P.Y. and Y.K.; validation, P.Y., M.S.R.K. and Y.K.; formal analysis, P.Y., M.S.R.K. and Y.K.; investigation, P.Y., M.S.R.K. and Y.K.; resources, Y.K.; data curation, P.Y.; writing—original draft preparation, P.Y., M.S.R.K. and Y.K.; writing—review and editing, P.Y., M.S.R.K. and Y.K.; visualization, P.Y., M.S.R.K. and Y.K.; supervision, Y.K., M.S.R.K.; project administration, Y.K.; funding acquisition, Y.K. and M.S.R.K. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by JSPS KAKENHI, grant numbers 19K13739 and 19K13684.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Data are available on request.

Acknowledgments: This research used micro data from the Preference Parameters Study of Osaka University's 21st Century COE Program, "Behavioral Macrodynamics Based on Surveys and Experiments" and its Global COE project, "Human Behavior and Socioeconomic Dynamics". The authors acknowledge the program/project's contributors: Yoshiro Tsutsui, Fumio Ohtake and Shinsuke Ikeda. We are also grateful for helpful comments from Somtip Watanapongvanich, Pongpat Putthinun, and Stella Lartey.

Conflicts of Interest: The authors declare no conflict of interest. The funders had no role in the study design, data collection and analysis, preparation of the manuscript, or decision to publish.

Appendix A

- a. Suppose you had 10,000 JPY in a savings account and the interest rate is 2% per year and you never withdraw money or interest payments. After 5 years, how much would you have in this account in total?
 - More than ¥10,200 (correct answer)
 - Exactly ¥10,200
 - Do not know
 - Refuse to answer
- b. Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?
 - More than today
 - Exactly the same
 - Less than today (correct answer)
 - Do not know
 - Refuse to answer
- c. Please indicate whether the following statement is true or false. "Buying a company stock usually provides a safer return than a stock mutual fund".
 - True
 - False (correct answer)
 - Do not know
 - Refuse to answer

References

1. Ono, S.; Yuktadatta, P.; Taniguchi, T.; Iitsuka, T.; Noguchi, M.; Tanaka, S.; Ito, H.; Nakamura, K.; Yasuhara, N.; Miyawaki, C.; et al. Financial literacy and exercise behavior: Evidence from Japan. *Sustainability* **2021**, *13*, 4189. [\[CrossRef\]](#)
2. Eisen, C.; Ishii, K.; Miyamoto, Y.; Ma, X.; Hitokoto, H. To accept One's fate or be its master: Culture, control, and workplace choice. *Front. Psychol.* **2016**, *7*, 936. [\[CrossRef\]](#)
3. Markus, H.R.; Kitayama, S. Culture and the self: Implications for cognition, emotion, and motivation. *Psychol. Rev.* **1991**, *98*, 224–253. [\[CrossRef\]](#)
4. Morling, B.; Kitayama, S.; Miyamoto, Y. Cultural practices emphasize influence in the United States and adjustment in Japan. *Pers. Soc. Psychol. Bull.* **2002**, *28*, 311–323. [\[CrossRef\]](#)
5. Mathew Joseph, N.; Ramaswamy, P.; Wang, J. Cultural factors associated with physical activity among U.S. adults: An integrative review. *Appl. Nurs. Res.* **2018**, *42*, 98–110. [\[CrossRef\]](#)
6. D'Alonzo, K.T. The influence of marianismo beliefs on physical activity of immigrant latinas. *J. Transcult. Nurs.* **2012**, *23*, 124–133. [\[CrossRef\]](#) [\[PubMed\]](#)
7. Im, E.O.; Ko, Y.; Hwang, H.; Chee, W.; Stuifbergen, A.; Lee, H.; Chee, E. Asian American midlife women's attitudes Toward physical activity. *J. Obstet. Gynecol. Neonatal Nurs.* **2012**, *41*, 650–658. [\[CrossRef\]](#) [\[PubMed\]](#)
8. Kim, J.; Heo, J.; Kim, J. The benefits of in-group contact through physical activity involvement for health and well-being among Korean immigrants. *Int. J. Qual. Stud. Health Well-Being* **2014**, *9*, 23517. [\[CrossRef\]](#)
9. Mohamed, A.A.; Hassan, A.M.; Weis, J.A.; Sia, I.G.; Wieland, M.L. Physical activity Among Somali men in Minnesota: Barriers, facilitators, and recommendations. *Am. J. Mens Health* **2014**, *8*, 35–44. [\[CrossRef\]](#)
10. Centers for Disease Control and Prevention. Obesity Is a Common, Serious, and Costly Disease, 7 June 2021. Available online: <https://www.cdc.gov/obesity/data/adult.html> (accessed on 10 June 2021).
11. Mitchell, N.S.; Catenacci, V.A.; Wyatt, H.R.; Hill, J.O. Obesity: Overview of an epidemic. *Psychiatr. Clin. N. Am.* **2011**, *34*, 717–732. [\[CrossRef\]](#) [\[PubMed\]](#)
12. Mokdad, A.H.; Serdula, M.K.; Dietz, W.H.; Bowman, B.A.; Marks, J.S.; Koplan, J.P. The spread of the obesity epidemic in the United States, 1991–1998. *JAMA* **1999**, *282*, 1519–1522. [\[CrossRef\]](#)
13. Morrill, A.C.; Chinn, C.D. The Obesity Epidemic in the United States. *J. Public Health Policy* **2004**, *25*, 353–366. Available online: <http://www.jstor.org/stable/3343494> (accessed on 9 June 2021). [\[CrossRef\]](#)
14. McAllister, E.J.; Dhurandhar, N.V.; Keith, S.W.; Aronne, L.J.; Barger, J.; Baskin, M.; Benca, R.M.; Biggio, J.; Boggiano, M.M.; Eisenmann, J.C.; et al. Ten putative contributors to the obesity epidemic. *Crit. Rev. Food Sci. Nutr.* **2009**, *49*, 868–913. [\[CrossRef\]](#) [\[PubMed\]](#)
15. National Center for Health Statistics. Health, United States; Volume 2021: Table 25, 2019. Hyattsville, MD. 2019. Available online: <https://www.cdc.gov/nchs/health/us/content/2019.htm> (accessed on 3 June 2021).
16. Healthy People 2020 [Internet]; U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion: Washington, DC. Available online: <https://www.healthypeople.gov/2020/data-search/Search-the-Data?objid=5072> (accessed on 3 June 2021).
17. Belluz, J. How Michelle Obama Quietly Changed What Americans Eat 3 October 2016 Vox. Available online: <https://www.vox.com/2016/10/3/12866484/michelle-obama-childhood-obesity-lets-move> (accessed on 2 June 2021).
18. Let's Move! Let's Move! Available online: <https://letsmove.obamawhitehouse.archives.gov> (accessed on 9 June 2021).
19. Chalhoub, T.; Twomey, M.; Rogombe, R. Public Policies Promoting Healthy Eating and Exercise Center for American Progress 27 November 2018. Available online: <https://www.americanprogress.org/issues/healthcare/reports/2018/11/27/461418/public-policies-promoting-healthy-eating-exercise/> (accessed on 1 June 2021).
20. Sallis, R.E. Exercise is medicine and physicians need to prescribe it! *Br. J. Sports Med.* **2009**, *43*, 3–4. [\[CrossRef\]](#) [\[PubMed\]](#)
21. Zimmerman, R. Doctor's Orders: Prescribe Exercise to Patients Make Physical Activity a Vital Sign | CommonHealth WBUR.Org. Available online: <https://www.wbur.org/commonhealth/2015/12/10/doctors-prescribe-exercise-to-all-patients> (accessed on 10 June 2021).
22. Mishori, R. To Push Patients to Be Healthier, Some Doctors Write Exercise Prescriptions Washington Post. Available online: https://www.washingtonpost.com/national/health-science/to-push-patients-to-be-healthier-some-doctors-write-exercise-prescriptions/2018/03/09/70a77fe0-0129-11e8-bb03-722769454f82_story.html (accessed on 9 June 2021).
23. Stobbe, M. Survey: Exercise and Obesity Are Both Rising in US; The Associated Press, 29 June 2018. Available online: <https://apnews.com/article/physical-fitness-health-us-news-ap-top-news-obesity-b0a275d97ac84dcf9ed7fa75114498fb> (accessed on 5 June 2021).
24. Grossman, M. On the concept of health capital and the demand for health. *J. Pol. Econ.* **1972**, *80*, 223–255. [\[CrossRef\]](#)
25. Grossman, M. The Human Capital Model. In *Handbook of Health Economics*; Culyer, A.J., Newhouse, J.P., Eds.; Elsevier: Amsterdam, The Netherlands, 2000; Volume 1. Available online: <https://econpapers.repec.org/bookchap/eeeheachp/1-07.htm> (accessed on 3 June 2021).
26. Jekauc, D.; Brand, R. Editorial: How do emotions and feelings regulate physical activity? *Front. Psychol.* **2017**, *8*, 1145. [\[CrossRef\]](#)
27. Khan, M.S.R.; Putthinun, P.; Watanapongvanich, S.; Yuktadatta, P.; Uddin, M.A.; Kadoya, Y. Do financial literacy and financial education influence smoking behavior in the United States? *Int. J. Environ. Res. Public Health* **2021**, *18*, 2579. [\[CrossRef\]](#)

28. Watanapongvanich, S.; Khan, M.S.R.; Putthinun, P.; Ono, S.; Kadoya, Y. Financial literacy, financial education, and smoking behavior: Evidence from Japan. *Front. Public Health* **2020**, *8*, 612976. [\[CrossRef\]](#)
29. Watanapongvanich, S.; Binnagan, P.; Putthinun, P.; Khan, M.S.R.; Kadoya, Y. Financial literacy and gambling behavior: Evidence from Japan. *J. Gambl. Stud.* **2021**, *37*, 445–465. [\[CrossRef\]](#) [\[PubMed\]](#)
30. Abreu, M.; Mendes, V. Financial literacy and portfolio diversification. *Quant. Fin.* **2010**, *10*, 515–528. [\[CrossRef\]](#)
31. Alessie, R.; van Rooij, M.; Lusardi, A. Financial literacy and retirement preparation in the Netherlands. *J. Pension Econ. Fin.* **2011**, *10*, 527–545. [\[CrossRef\]](#)
32. Braunstein, S.; Welch, C. Financial literacy: An overview of practice, research, and policy [Federal Reserve Bulletin]. *Fed. Reserve Bull.* **2002**, *88*. [\[CrossRef\]](#)
33. Hastings, J.; Mitchell, O.S. How financial literacy and impatience shape retirement wealth and investment behaviors. *J. Pension Econ. Financ.* **2020**, *19*, 1–20. [\[CrossRef\]](#) [\[PubMed\]](#)
34. Lusardi, A.; Mitchell, O.S. The economic importance of financial literacy: Theory and evidence. *J. Econ. Lit.* **2014**, *52*, 5–44. [\[CrossRef\]](#) [\[PubMed\]](#)
35. Mandell, L. Financial literacy of high school students. In *Handbook of Consumer Finance Research*; Xiao, J.J., Ed.; Springer: New York, NY, USA, 2008; pp. 163–183. Available online: https://link.springer.com/chapter/10.1007/978-0-387-75734-6_10 (accessed on 5 June 2021).
36. Meier, S.; Sprenger, C. Present-biased preferences and credit card borrowing. *Am. Econ. J. Appl. Econ.* **2010**, *2*, 193–210. [\[CrossRef\]](#)
37. Willis, L.E. The financial education fallacy. *Am. Econ. Rev.* **2011**, *101*, 429–434. [\[CrossRef\]](#)
38. Yoshino, N.; Morgan, P.J.; Trinh, L.Q. *Financial Literacy in Japan: Determinants and Impacts*; Asian Development Bank: Tokyo, Japan, 2017. Available online: <https://www.adb.org/publications/financial-literacy-japan-determinants-and-impacts> (accessed on 5 June 2021).
39. Almenberg, J.; Säve-Söderbergh, J. Financial literacy and retirement planning in Sweden. *J. Pension Econ. Fin.* **2011**, *10*, 585–598. [\[CrossRef\]](#)
40. Boisclair, D.; Lusardi, A.; Michaud, P. Financial literacy and retirement planning in Canada. *J. Pension Econ. Fin.* **2017**, *16*, 277–296. [\[CrossRef\]](#)
41. Lusardi, A.; Michaud, P.-C.; Mitchell, O.S. *Optimal Financial Knowledge and Saving for Retirement*; RAND Working Paper, No. WR-905-SSA; RAND Corporation: Santa Monica, CA, USA, 2011.
42. Khan, M.S.R.; Rabbani, N.; Kadoya, Y. Is financial literacy associated with investment in financial markets in the United States? *Sustainability* **2020**, *12*, 7370. [\[CrossRef\]](#)
43. James, B.D.; Boyle, P.A.; Bennett, J.S.; Bennett, D.A. The impact of health and financial literacy on decision making in community-based older adults. *Gerontology* **2012**, *58*, 531–539. [\[CrossRef\]](#)
44. Zheng, Q.; Peng, Z.; Ding, S. Financial literacy, health engagement, and residents' health: Evidence from China. *Int. J. Environ. Res. Public Health* **2021**, *18*, 4202. [\[CrossRef\]](#) [\[PubMed\]](#)
45. O'Neill, B.; Xiao, J.J.; Ensle, K.M. Propensity to plan: A key to health and wealth? *J. Financ. Plan.* **2016**, *29*, 42–50.
46. O'Neill, B.; Xiao, J.J.; Ensle, K.M. Positive financial practices: Do diet, sleep, and physical activity make a difference? *Fam. Consum. Sci. Res. J.* **2019**, *111*, 17–23. [\[CrossRef\]](#)
47. O'Donovan, G.; Lee, I.M.; Hamer, M.; Stamatakis, E. Association of “weekend warrior” and other leisure time physical activity patterns With risks for All-Cause, cardiovascular disease, and cancer mortality. *JAMA Intern. Med.* **2017**, *177*, 335–342. [\[CrossRef\]](#)
48. Lusardi, A.; Mitchell, O.S. Planning and financial literacy: How do women fare? *Am. Econ. Rev.* **2008**, *98*, 413–417. [\[CrossRef\]](#)
49. Fornero, E.; Monticone, C. Financial literacy and pension plan participation in Italy. *J. Pension Econ. Fin.* **2011**, *10*, 547–564. [\[CrossRef\]](#)
50. Lusardi, A.; Mitchell, O.S. Financial literacy around the world: An overview. *J. Pension Econ. Financ.* **2011**, *10*, 497–508. [\[CrossRef\]](#)
51. Klapper, L.; Panos, G.A. Financial literacy and retirement planning: The Russian case. *J. Pension Econ. Fin.* **2011**, *10*, 599–618. [\[CrossRef\]](#)
52. Sekita, S. Financial literacy and retirement planning in Japan. *J. Pension Econ. Fin.* **2011**, *10*, 637–656. [\[CrossRef\]](#)
53. Watanapongvanich, S.; Khan, M.S.R.; Putthinun, P.; Ono, S.; Kadoya, Y. Financial literacy and gambling behavior in the United States. Published. *J. Gambl. Stud.* **2021**. [\[CrossRef\]](#)
54. Rieger, M.O. How to measure financial literacy? *J. Risk Financ. Manag.* **2020**, *13*, 324. [\[CrossRef\]](#)
55. Huston, S.J. Measuring financial literacy. *J. Con. Aff.* **2010**, *44*, 296–316. [\[CrossRef\]](#)
56. Nicolini, G.; Haupt, M. The assessment of financial literacy: New evidence from Europe. *Int. J. Financ. Stud.* **2019**, *7*, 54. [\[CrossRef\]](#)
57. National Financial Capability Study. Financial Capability in the United States: Initial Report of Research Findings from the 2009 National Survey, December 2009. Available online: https://www.usfinancialcapability.org/downloads/NFCS_2009_Natl_Full_Report.pdf (accessed on 3 June 2021).
58. Huang, H.; Humphreys, B.R. Sports participation and happiness: Evidence from US microdata. *J. Econ. Psychol.* **2012**, *33*, 776–793. [\[CrossRef\]](#)
59. Hoekman, R.; Breedveld, K.; Kraaykamp, G. Sport participation and the social and physical environment: Explaining differences between urban and rural areas in the Netherlands. *Leis. Stud.* **2017**, *37*, 1–14. [\[CrossRef\]](#)
60. Saint Onge, J.M.; Krueger, P.M. Education and racial-ethnic differences in types of exercise in the United States. *J. Health Soc. Behav.* **2011**, *52*, 197–211. [\[CrossRef\]](#)

61. Mirowsky, J.; Ross, C.E. *Education, Social Status, And Health*, 1st ed.; Taylor & Francis: Abingdon, UK, 2017. [\[CrossRef\]](#)
62. Mullahy, J.; Robert, S.A. No time to lose: Time constraints and physical activity in the production of health. *Rev. Econ. Household* **2010**, *8*, 409–432. [\[CrossRef\]](#)
63. Chung, S.; Domino, M.E.; Stearns, S.C.; Popkin, B.M. Retirement and physical activity: Analyses by occupation and wealth. *Am. J. Prev. Med.* **2009**, *36*, 422–428. [\[CrossRef\]](#) [\[PubMed\]](#)
64. Cheon, H.U. The structural relationship between exercise frequency, social health, and happiness in adolescents. *Sustainability* **2021**, *13*, 1050. [\[CrossRef\]](#)
65. Kim, E.S.; Kubzansky, L.D.; Soo, J.; Boehm, J.K. Maintaining healthy behavior: A prospective study of psychological Well-Being and physical activity. *Ann. Behav. Med.* **2017**, *51*, 337–347. [\[CrossRef\]](#) [\[PubMed\]](#)
66. Kushlev, K.; Drummond, D.M.; Diener, E. Subjective well-being and health behaviors in 2.5 million Americans. *Appl. Psychol. Health Well-Being* **2020**, *12*, 166–187. [\[CrossRef\]](#) [\[PubMed\]](#)
67. You, S.; Shin, K.; Kim, M. Long-term effect of physical activity on internalizing and externalizing problems and life satisfaction. *Sustainability* **2021**, *13*, 2322. [\[CrossRef\]](#)
68. National Health Service. Health Anxiety; National Health Service (NHS). 14 October 2020. Available online: <https://www.nhs.uk/mental-health/conditions/health-anxiety/> (accessed on 9 June 2021).
69. Heydari, G.; Hosseini, M.; Yousefifard, M.; Asady, H.; Baikpour, M.; Barat, A. Smoking and Physical Activity in Healthy Adults: A Cross-Sectional Study in Tehran. *Tanaffos* **2015**, *14*, 238–245. Available online: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4841990/> (accessed on 5 June 2021). [\[PubMed\]](#)
70. Kujala, U.M.; Kaprio, J.; Rose, R.J. Physical activity in adolescence and smoking in young adulthood: A prospective twin cohort study. *Addiction* **2007**, *102*, 1151–1157. [\[CrossRef\]](#)
71. National Cancer Institute. How Smoking Affects Your Work Out | Smokefree Smokefree.Gov. Available online: <https://smokefree.gov/quit-smoking/why-you-should-quit/how-smoking-affects-your-workout> (accessed on 9 June 2021).
72. Conway, T.L.; Cronan, T.A. Smoking, exercise, and physical fitness. *Prev. Med.* **1992**, *21*, 723–734. [\[CrossRef\]](#)
73. National Health Service. Quit Smoking, 25 October 2018. Available online: <https://www.nhs.uk/live-well/quit-smoking/> (accessed on 8 June 2021).
74. Adams, J.; Nettle, D. Time perspective, personality and smoking, body mass, and physical activity: An empirical study. *Br. J. Health Psychol.* **2009**, *14*, 83–105. [\[CrossRef\]](#) [\[PubMed\]](#)
75. Milfont, T.L.; Vilar, R.; Araujo, R.C.R.; Stanley, R. Does promotion orientation help explain why future-orientated people exercise and eat healthy? *Front. Psychol.* **2017**, *8*, 1202. [\[CrossRef\]](#)
76. Ruseski, J.E.; Humphreys, B.R.; Hallmann, K.; Breuer, C. Family structure, time constraints, and sport participation. *Eur. Rev. Aging Phys. Act.* **2011**, *8*, 57–66. [\[CrossRef\]](#)
77. Gough, M. A couple-level analysis of participation in physical activity during unemployment. *SSM Popul. Health* **2017**, *3*, 294–304. [\[CrossRef\]](#)
78. Armstrong, S.; Wong, C.A.; Perrin, E.; Page, S.; Sibley, L.; Skinner, A. Association of physical activity with income, Race/Ethnicity, and sex among adolescents and young adults in the United States: Findings from the National Health and Nutrition Examination Survey, 2007–2016. *JAMA Pediatr.* **2018**, *172*, 732–740. [\[CrossRef\]](#)
79. Kari, J.T.; Pehkonen, J.; Hirvensalo, M.; Yang, X.; Hutri-Kähönen, N.; Raitakari, O.T.; Tammelin, T.H. Income and physical activity among adults: Evidence from self-reported and pedometer-based physical activity measurements. *PLoS ONE* **2015**, *10*, e0135651. [\[CrossRef\]](#)
80. Shuval, K.; Li, Q.; Gabriel, K.P.; Tchernis, R. Income, physical activity, sedentary behavior, and the ‘Weekend warrior’ among U.S. adults. *Prev. Med.* **2017**, *103*, 91–97. [\[CrossRef\]](#) [\[PubMed\]](#)
81. Håkansson, A.; Entezarjou, A.; Kenttä, G.; Fernández-Aranda, F.; Jiménez-Murcia, S.; Gunnarsson, B. Problem gambling in the fitness World—A general population web survey. *Int. J. Environ. Res. Public Health* **2020**, *17*, 1342. [\[CrossRef\]](#)
82. Xiao, J.J.; Porto, N. Financial education and financial satisfaction: Financial literacy, behavior, and capability as mediators. *Int. J. Bank Mark.* **2017**, *35*, 805–817. [\[CrossRef\]](#)
83. Zhu, T.; Xiao, J.J. Consumer financial education and risky financial asset holding in China. *Int. J. Consum Stud.* **2020**. [\[CrossRef\]](#)