Reading Nutrition Labels: A Predictor of Health and Wealth?

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This study explored relationships between the practice of reading Nutrition Facts labels on food products and the frequency of performance of 19 positive health and financial practices. Data were collected using an online survey with 3,361 observations that provided a simultaneous assessment of the participating individuals' health and financial practices. Few publicly-available instruments of this type exist. The reliability of the overall scale used in this study was .845. Support was found for three hypotheses: there are differences in demographic characteristics between those who read Nutrition Facts labels and others and respondents who reported reading nutrition labels had both higher health practice scores and higher financial practice scores than others. Those who were more likely to read nutrition labels were females, older respondents, and those with higher education and incomes. Findings of this study, which provide evidence of positive associations between two different aspects of people's lives, imply that it might be useful for both health and financial practitioners to know if their clients/students read nutrition labels on a regular basis. Having this information can inform the content and duration of interventions to change health- and financial-related behaviors.

Keywords: health, wealth, nutrition facts labels, personal finance

Introduction

The body of knowledge for the family and consumer sciences (FCS) profession encompasses a variety of subject matter specializations including health/nutrition and economics/management (Baugher et al., 2000). In addition, many family and consumer sciences (FCS) professionals, especially those employed by K-12 schools and the Cooperative Extension System, are generalists and are expected to teach content in multiple FCS subject matter areas such as health/nutrition, human development/family relationships, and personal finance (AAFCS, n.d.).

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Thus, they are in a position to have a positive impact on several dimensions of people's lives and present information holistically in an interdisciplinary manner versus solely by subject matter category.

This study explored the relationship between the practice of nutrition label reading and a wide variety of health and financial practices, nine related to health and ten related to personal finance. Specifically, it explored three research hypotheses relating to characteristics of nutrition label readers and associations between nutrition label reading and health and financial practices. This research extends the results of previous studies linking nutrition label reading and other personal behaviors, especially those related to personal finance.

Nutrition label reading was selected as the key variable for this study because there was some previous evidence of its link to financial practices (Carr, Sages, Fernatt, Nabeshima, & Grable, 2015). However, the wide variety of health and financial management practices that were included in this study makes it unique. Data were derived from an online survey that is believed to be one of few publicly-available simultaneous assessments of both the health and personal finance domains of people's lives. Study results can be used to inform the content of programs delivered by FCS professionals, especially those that are interdisciplinary and integrate both health and personal finance topics.

Since implementation of the Nutrition Education and Labeling Act (NLEA) in 1994, packaged foods must come with a Nutrition Facts label that provides key information about their nutritional characteristics, such as serving size, calories per serving, total and saturated fat, dietary fiber, cholesterol, sodium, protein, and key vitamins and minerals, in a standardized format. Nutrient information is stated as a percentage of recommended daily values based on a 2,000-calorie diet (U.S. Food and Drug Administration, 2016). Nutrition labels can help consumers make healthy food (and beverage) choices consistent with a healthier diet, and avoid unhealthy ones, by increasing understanding of complex information such as the caloric/nutrient content of available options. Nutrition labels are also useful for those with food intolerances or those who are following special diets and must carefully scrutinize the content of foods (Renee, 2017; Suter & Burton, 1996). Nutrition labels enable consumers to compare food items and choose those with the most favorable attributes (e.g., low calories and high nutritional value).

This study uses data from an online survey about respondents' frequency of performance of positive health and financial management practices that has been previously used, with a different data set, to study health and personal finance practice relationships (O'Neill, Xiao, & Ensle, 2016a, 2016b, 2017).

Review of Literature

Nutritional labeling research literature is robust, and researchers have explored this topic from many different angles, including the use of Nutrition Facts label information by consumers and its effectiveness in informing healthy food purchase and consumption decisions. Previous studies of nutrition label use have addressed four key topical areas:

(1) Frequency of nutrition label reading practice by consumers,
(2) Demographic characteristics and traits of individuals who read nutrition labels,
(3) Comprehension of nutrition label information by consumers, and
(4) Impact of nutrition label information use in helping consumers make healthy choices to improve dietary outcomes.

Recent research in each area of inquiry is cited below, along with a summary of some key findings from representative studies.

Frequency of Nutritional Label Reading Practice by Consumers

Representative studies: Brown, 2013; Borra, 2006; Coulson, 2000; Graham & Jeffery, 2011; Lin, Zhang, Carlton, & Lo, 2016; Satia, Galanko, & Neuhouser, 2005

Brown (2013) used data from Gallup's annual Consumption Habits Survey and found that Americans were much more likely to take note of food labels on food packages than restaurant menus. About two-thirds of 2,027 respondents said they paid at least a "fair amount" of attention to this information. Women were more likely than men to pay a great deal or fair amount of attention to nutrition information on food packages and restaurant menus. Young adults aged 18 to 29 were the age group least likely to say they paid attention to nutrition information.

Graham and Jeffery (2011) studied nutrition label use with eye-tracking technology and found that people said they look at nutrition labels more than they actually did. In addition, they were more likely to view information at the top of the label (e.g., calories and fat) than at the bottom (e.g., vitamins and minerals). Lin et al. (2016) used data from the 2014 FDA Health and Diet Survey and found that over three-quarters (77%) of U.S. adults reported using the Nutrition Facts Label always, most of the time, or sometimes in general and 79% often or sometimes when buying a product for the first time. Similarly, Satia et al. (2005) found that 78% of a sample of 658 African-Americans said they read food labels, with significantly higher use among women and respondents who were older, had education beyond high school, and were obese. Coulson (2000) studied a sample of students and found that a majority (65.5%) reported they were currently reading labels. Their staging according to the stages of change model was 30% pre-contemplation stage (not acknowledging that there is a problem), 4.5% contemplation stage

(acknowledging a problem but not yet ready to change), 16.4% action stage (changing behavior), and 49.1% maintenance stage (maintaining a behavior change).

Demographic Characteristics and Traits of Individuals Who Read Nutrition Labels

Representative studies: Chen, Jahns, Gittelsohn, & Wang, 2012; Drichoutis, Lazaridis, & Nayga, 2006; Elbon, Johnson, Fischer, & Searcy, 2000; Guthrie, Fox, Cleveland, & Welsh, 1995; Nayga, Lipinski, & Savur, 1998; Neuhouser, Kristal, & Patterson, 1999; Rasberry, Chaney, Housman, Misra, & Miller, 2007; Scott-Dixon, n.d.

Studies have found that not everyone uses Nutrition Facts labels equally. Nayga et al. (1998) found that unemployed individuals and those who place greater importance on nutrition while shopping and following dietary guidelines were more likely to use nutrition labels. Rasberry et al. (2007) studied 1,294 college students and found that label users had greater nutrition label knowledge and more accurate perceptions of diet-disease relationships than nonusers. Females exhibited greater knowledge and more frequent label use than males, and health reasons, looking for specific information, weight control, and nutrition label knowledge predicted frequent label use. Similarly, Elbon et al. (2000), using a sample of older Americans, found that being female, having high nutrition knowledge, and positive nutrition-related health-seeking behaviors were most strongly and consistently associated with the use of food labels. Neuhouser et al. (1999) found that nutrition label use was significantly higher among women, persons younger than age 35, and those with more than a high school education. When controlled for demographic characteristics, the strongest predictors of label use were: believing in the importance of eating a low-fat diet, believing in an association between diet and cancer, and being in the maintenance stage of change for adopting a low-fat diet. Chen et al. (2012) found that 80% of Americans reported using food labels, but only 26% used all label information. Those who were unaware of diet-disease relationships were less likely to use food labels, as were those who perceived their weight to be "about right."

Comprehension of Nutrition Label Information by Consumers

Representative studies: Byrd-Bredbenner, Alfieri, & Kiefer, 2000; Cowburn & Stockley, 2005; Grunert, Fernandez-Celemin, Wills, Bonsmann, & Nureeva, 2010; Grunert & Wills, 2007; Grunert, Wills, & Fernandez-Celemin, 2010; Hennessy, 2014; Levy & Fein, 1998; Miller & Cassady, 2015; Rothman et al., 2006

Rothman et al. (2006) studied patient comprehension of food labels and found that food label comprehension was highly correlated with literacy and numeracy skills. However, they found that even those individuals with higher levels of education could have difficulties interpreting nutrition labels. Of particular concern were situations involving the interpretation and

application of serving size and percent daily value information. Similarly, Cowburn and Stockley (2005) reported that most people appear able to retrieve simple information and make simple calculations and comparisons between products using label information, but their ability to interpret a nutrition label accurately decreases as the complexity of the task increases (e.g., analyses requiring math calculations). Grunert et al. (2010) found that understanding of nutrition information seems to be more widespread than use, suggesting that lack of use is a question of motivation, as well as understanding. Levy and Fein (1998) studied consumers' ability to perform common nutrition label use tasks and found subjects who performed significantly poorer were age 55+, nonwhite, and less educated than those who performed best. Miller and Cassady (2015) found evidence in a literature review that, the more consumers know about nutrition, the more likely they are to consult and understand food nutrition labels.

Nutrition labels are not always used correctly. A common error is misinterpreting the information on food labels when identifying appropriate food portions (Ledikwe, Ello-Martin, & Rolls, 2005). Not properly cross-referencing calorie information with serving size results in incorrect calculations. For example, if a nutrition label states 50 calories per serving and there are three servings in a package, a person would consume 150 calories if they consumed the entire package, triple the amount shown on the label. Calorie content is the most sought out source of nutritional information on food labels (Scott-Dixon, n.d). Another area of confusion about food label information is the "% Daily Value" section that indicates the percentage of a key nutrient that a serving of a food contributes to the amount recommended to be eaten daily (e.g., 25% for calcium means that one serving provides 25% of the daily calcium requirement) (Borra, 2006).

Impact of Nutrition Label Information Use in Helping Consumers Make Healthy Choices to Improve Dietary Outcomes

Representative studies: Balasubramanian & Cole, 2002; Campos, Doxey, & Hammond, 2011; Drichoutis, Lazaridis, & Nayga, 2005; Kim, Nayga, & Capps, 2000; Kreuter, Brennan, Scharff, & Lukwago, 1997; Lin, Lee, & Yen, 2004; Loureiro, Yen, & Nayga, 2012; Neuhouser et al., 1999; Shine, O'Reilly, & O'Sullivan, 1997; Variyam, 2008; Variyam & Cawley, 2006

Results found by Drichoutis et al. (2005) suggested that nutrition knowledge has a strong effect on general nutrition label use, the degree of use, and use of nutrient content information. Kim et al. (2000) found that food label use decreases individuals' average daily intakes of calories from total fat, saturated fat, cholesterol, and sodium and increases average daily fiber intake. Shine et al. (1997) found that a majority of respondents who read nutrition labels indicated that they search out information on nutrients they wish to avoid. Similarly, Balasubramanian and Cole (2002) found that Nutrition Labeling and Education Act food labeling requirements changed attention to negative nutrition attributes (e.g., fat and sodium) more than it changed attention to positive attributes (e.g., calcium and vitamins). Loureiro et al. (2012) found that nutrition labels

play a role in reducing obesity among label users, notably among women. Campos et al. (2011) reviewed existing literature and concluded that evidence shows a consistent link between the use of nutrition labels and healthier diets. However, the use of labels varies considerably across subgroups, with lower use among children, adolescents, and older adults who are obese.

The overall consensus of previous research is that nutrition label use is uneven. Food label readers tend to be female, more educated, older adults, knowledgeable about nutrition and diet-disease relationships, concerned about nutrition and health, and have higher incomes, high nutrition knowledge, and more available time than others for grocery shopping (Brown, 2013; Drichoutis et al., 2005; Drichoutis et al., 2006; Elbon et al., 2000; Nayga, Lipinski, & Savur, 1998; Rasberry et al., 2007; Satia et. al., 2005; Scott-Dixon, n.d.). Research findings also suggest that people may say they read nutrition labels more than they actually do, perhaps because this is a frequently recommended practice that they don't want to admit that they are not performing (Melnick, 2011; Scott-Dixon, n.d.).

Studies have also found deficits in consumer understanding of nutrition label information, particularly among those with low-level literacy and numeracy skills (Levy & Fein, 1998; Rothman et al., 2006), and positive relationships between label reading and both positive dietary practices (Kreuter et al., 1997) and a reduction of obesity (Loureiro et al., 2012; Variyam & Cawley, 2006). In addition, studies have shown that consumers search more for negative nutrition information (e.g., fat and sodium) than positive (e.g., calcium and vitamins) and for information related to personal health conditions (e.g., sodium content for those with high blood pressure) more than for other label information (Balasubramanian & Cole, 2002; Shine et al., 1997).

Health and Personal Finance Associations

Studies have been increasingly conducted in recent years linking personal health and financial behaviors (Finke & Huston, 2013; Gubler & Pierce, 2014; O'Neill, 2005). For example, in one study, preventive health behaviors were found to be a stronger predictor of the importance of saving for retirement than all other explanatory variables (Finke & Houston, 2013). In another study, contributions to a 401(k) retirement savings plan and future health improvements (e.g., reduced smoking) were highly correlated (Gubler & Pierce, 2014). Several studies have focused specifically on associations between consumers' use of nutrition labels and financial planning practices, such as retirement planning (Carr et al., 2015; Chatterjee & Nielsen, 2010; Martin, Guillemete, & Browning, 2016).

In financial planning literature, the practice of reading nutrition labels is often used as a proxy for taking care of one's health (i.e., health conscientiousness). In one study, time preference was operationalized using six variables, four of which were health-related: smoking, obesity,

exercise, and reading nutrition labels (Martin et al., 2016). The researchers found that people with a strong preference for current consumption may choose to save less and face the risk of decreased retirement preparedness. In another study, consumers who were more conscientious about taking care of their health, as proxied by reading nutrition labels before purchasing groceries, were more likely than others to have purchased health insurance (Chatterjee & Nielsen, 2010).

A third study (Carr et al., 2015) found that individuals who engage in health information search behaviors, such as reading the contents and nutrition labels, are more likely than others to engage in financial planning activities. However, Carr et al. (2015) found that regular physical activity and healthy eating were not found to be associated with retirement planning. Another study (O'Neill et al., 2016b), using a different data set derived from the same online survey used for the current study, found that respondents who reported frequent planning behavior had higher health and financial practice scores than others and those who had higher health behavior scores also had higher financial behavior scores.

Theoretical Framework

This study extends current knowledge about relationships between health and financial practices by exploring relationships between the practice of reading nutrition labels and a total of 19 health and financial management practices. It also examined demographic subsamples to determine their likelihood of performing recommended health and financial practices. The conceptual base of this study is Self-Regulation Theory (SRT) (Bandura, 1991). This theory posits that what people do depends upon a self-regulatory system of conscious personal management that helps control their thoughts and actions. Self-regulation includes impulse control and stops people from taking ill-advised actions, such as over-eating and over-spending. It can also be a force to promote the adoption of recommended positive behaviors such as eating healthy foods and saving money. SRT can be applied to many aspects of people's lives including personal health and financial management practices, which are the focus of this study.

According to SRT theorists, self-regulation is a complex process with many "moving parts." Four components of self-regulation described by Baumeister and Vohs (2007) are *standards*, *motivation*, *monitoring*, and *willpower*. Standards are specific ideals of desirable behavior. Nutrition Facts labels are a type of standard because they present information to compare how much of a nutrient is in a serving of food to how much of that nutrient should be consumed in a day. The second SRT component, motivation, refers to a person's motivation to meet certain standards. Third, monitoring refers to paying attention to situations and thoughts that precede breaking standards. If monitoring is not performed, attentiveness to behaviors can wane. Nutrition labels are a tool for monitoring food components, serving sizes, and calories. Lastly, willpower refers to internal strength to control urges (Changingminds.org, 2017).

If the practice of reading nutrition labels is related to personal traits such as discipline, focus, and conscientiousness, people who are inclined to read labels before making food selection decisions may also be conscientious in other aspects of their lives, such as the management of their personal finances. They might also tend to weight future rewards more heavily than present ones. For example, if people think they will live a long time, they may be more inclined to engage in healthy behaviors and plan financially. Nutrition labels are a planning and decision-making tool to help people make informed food choices that contribute to a healthy diet (U.S. Food and Drug Administration, 2016). Planning behavior has been found to be more predictive of financial health than household income. Households that plan ahead for large irregular expenses are ten times more likely to be financially healthy than those that do not (Tescher & Schneider, 2015).

Hypotheses

The purpose of this study was to test the following three research hypotheses:

(1) There are differences in the demographic characteristics of online survey respondents who read nutrition labels and those who do not.
(2) Survey respondents who report more frequent reading of nutrition labels have higher health practice scores than those who read nutrition labels less frequently.
(3) Survey respondents who report more frequent reading of nutrition labels have higher financial practice scores than those who read nutrition labels less frequently.

Methodology

Data Source

Data for this study came from the *Personal Health and Finance Quiz*, believed to be one of few publicly-available (versus proprietary tools developed by employee assistance programs and workplace wellness firms), simultaneous online assessment tools of individuals' health and financial practices (see http://njaes.rutgers.edu/money/health-finance-quiz/). Respondents to the quiz indicate one of four frequencies for their self-assessed performance of ten health practices and ten financial practices. The responses are 1 = *Never*, 2 = *Sometimes*, 3 = *Usually*, and 4 = *Always*. Participants are required to answer all questions, including demographic questions, to obtain a score. Upon completion of the survey, respondents receive a health score, finance score, total score, and links to online resources. A high score means that they frequently perform activities that health and financial experts recommend to improve health and build wealth.

The online quiz (survey) was developed as a tool for consumers to self-assess their health and personal finance practices. It is promoted in college classes and Cooperative Extension adult

education programs and publications that discuss health and personal finance subject matter. The quiz has also been presented at professional conferences and made available to health and personal finance educators and is promoted frequently in social media messages. In addition, if someone types "health and finances" into the Google search engine, the quiz will be among the top entries. Before its launch, an exemption from full IRB review was approved by the lead author's academic institution.

Experts in health/nutrition, personal finance, and evaluation methods provided input during the development of the *Personal Health and Finance Quiz* regarding both the format of the survey and the selection of practices used to measure health and financial management, thus providing evidence of the face validity and content validity of the quiz survey instrument. The reliability (i.e., internal consistency of measurement) of this survey was found to be acceptable with Cronbach's alpha coefficient scores of .757, .787, and .845 for the health scale, financial scale, and total scale, respectively (Cronbach's Alpha, 2018). These Cronbach's alpha values were calculated using the data from this study. Question 10 was not included in the health scale.

It should be noted that quiz behaviors are intentionally a "step in the right direction," even if they are not at the highest recommended level of action. For example, there is no mention of walking 10,000 steps per day. Rather, respondents are asked if they "get at least 30 minutes of aerobic and/or muscle-strengthening physical activity at least 5 days per week," which is below government physical activity guidelines (Centers for Disease Control and Prevention, 2015), but above the time that Americans, on average, spend exercising (Penn State University, 2012).

Likewise, investing $3,650 annually is probably not sufficient for most workers to achieve maximum financial security in later life. Many financial advisors recommend saving 10-15% of gross income. However, investing the equivalent of at least $10 per day is far better than doing nothing, which, unfortunately, is the case for many Americans. According to the 2017 Retirement Confidence Survey (Greenwald, Copeland, & VanDerhei, 2017), 24% of American workers have less than $1,000 saved for retirement, excluding a primary home and any defined benefit pensions, and 47% have total savings and investments of less than $25,000.

Variables

Nutrition label reading. Nutrition label reading was measured by responses to survey Question 10: "I read the Nutrition Facts Label on food products before making a purchase." Like the other questions, responses were Never, Sometimes, Usually, and Always. Ordinarily, when scoring the Personal Health and Finance Quiz, Question 10 about reading food labels would be included as part of the health practice score total, but, for this study, that item was pulled out separately to serve as a separate variable in the study.

Health practice. Health practice was measured by the total score for the nine remaining health practice questions, with a range of 9 for all "Never" responses to 36 for all "Always" responses.

Financial practice. Financial practice was measured by the total score for the ten financial practice questions, with a range of 10 for all "Never" responses to 40 for all "Always."

The nine health practices on the *Personal Health and Finance Quiz,* excluding the tenth nutrition label reading practice item, and the ten financial practices that were used in this study are summarized below:

Health Practices

- Eating breakfast
- Avoiding sugar-sweetened beverages
- Eating 3 ½ to 4 ½ cups of fruits and vegetables daily
- Getting at least 7 hours of sleep per night
- Eating at least 1-2 high fiber foods each day
- Eating and drinking fat-free and/or low-fat dairy products each day
- Avoiding high-calorie salad dressings, gravies, spreads, and/or sauces
- Eating foods low in fat and/or saturated fat
- Getting at least 30 minutes of aerobic and/or muscle-strengthening physical activity at least five days per week

Financial Practices

- Following a hand-written or computer-generated spending plan (budget)
- Maintaining an emergency fund equal to at least three months of basic essential household expenses
- Saving the equivalent of $1 daily ($365 annually)
- Investing the equivalent of $10 daily ($3,650 annually)
- Avoiding payday loans, car title loans, cash advances, and other high-cost debt
- Owing less than 20% of monthly net income on monthly consumer debt payments
- Eating at least two meals a day prepared at home
- Using advertisements, coupons, and other discounts to save money on purchases
- Living below one's means
- Making written to-do lists or specific plans to organize financial goals, spending, and/or daily activities

Sample

Data for this study were pulled for analysis in July of 2016 on the two-year anniversary of the *Personal Health and Finance Quiz* and included responses from July 1, 2015, to June 30, 2016. The online convenience sample initially had 3,414 observations. After removing 53 respondents who reported "Not a U.S. resident," the sample used for analyses included 3,361 observations. Responses were recorded only if respondents completed the entire survey instrument. Thus, there is no way to know how many people attempted to complete the survey, nor are there any missing values. The sample characteristics are shown in Table 1 below.

Table 1. Descriptive Statistics of the Sample (N = 3,361)

Characteristic	Percentage
Gender	
Male	47.8
Female	52.2
Age	
24 or younger	43.5
25-34	7.3
35-44	9.7
45-54	13.4
55-64	16.2
65-74	8.5
75 and over	1.4
Education	
Some high school or less	27.7
High school graduate	16.1
Some college or trade or vocational training	10.9
Associate degree	5.9
Bachelor degree	22.3
Graduate or professional degree	17.0
Income	
Less than $25,000	17.1
$25,000-$49,999	15.2
$50,000-$74,999	20.9
$75,000-$99,999	15.9
$100,000 or greater	30.9
Race/Ethnicity	
White	78.0
Hispanic	6.8
African	6.2
Asian	3.7
Native American	1.1
Other (e.g., a combination of Black and Hispanic)	4.2

The sample was almost evenly divided by gender with 52% female and 48% male respondents. The age of respondents skewed young with 43.5% of respondents age 24 or younger versus 26% age 55 or older. Almost two in five (39.3%) respondents had four-year college degrees or higher, 30.9% had a household income of $100,000 or higher, and 78% were White. According to the U.S. Census Bureau (n.d.), 29.3% of Americans age 25+ had a bachelor's degree or higher and 77.1% were White.

Results

Statistical analysis methods used in this study include mean scores and standard deviations for individual survey items, analysis of variance (ANOVA), and ordinary least squares (OLS) linear regression analyses. The alpha level of statistical significance for these analyses was set a priori at $p < .05$.

Means and standard deviations were calculated for responses to each of the 20 questions on the *Personal Health and Finance Quiz.* Table 2 presents descriptive statistics about these health and financial practices. Q1 to Q10 are health practices, and Q11 to Q20 are financial practices. A brief description of each health and financial practice is provided in parentheses after each question number.

Table 2. Descriptive Statistics of Health and Financial Practices

Survey Question	Minimum	Maximum	Mean	SD
Q1 (Eating breakfast before starting day)	1	4	3.01	1.03
Q2 (Avoiding sugar-sweetened beverages)	1	4	2.70	.99
Q3 (Eating 3½ to 4½ cups of fruits and vegetables daily)	1	4	2.38	.83
Q4 (Getting at least 7 hours of sleep per night)	1	4	2.82	.87
Q5 (Eating at least 1-2 high fiber foods daily)	1	4	2.90	.81
Q6 (Eating and drinking low-fat dairy products)	1	4	2.68	1.04
Q7 (Avoiding high-calorie dressings, spreads, sauces, etc.)	1	4	2.52	.96
Q8 (Eating foods low in fat and/or saturated fat)	1	4	2.48	.75
Q9 (Getting 30 minutes of physical activity at least 5 days per week)	1	4	2.71	1.07
Q10 (Reading the Nutrition Facts Label)	1	4	2.36	1.02
Q11 (Following a spending plan/budget)	1	4	1.95	1.09
Q12 (Having emergency fund of at least 3 months expenses)	1	4	2.58	1.26

Survey Question	Minimum	Maximum	Mean	SD
Q13 (Saving at least $1 daily in loose change)	1	4	2.68	1.20
Q14 (Investing at least $10 daily/ $3,650/year)	1	4	2.51	1.31
Q15 (Avoiding high- cost debt; e.g., payday loans)	1	4	3.51	.97
Q16 (Owing < 20% of monthly net income on consumer debt payment)	1	4	3.04	1.19
Q17 (Eating 2+ meals a day prepared at home)	1	4	3.26	.81
Q18 (Using, ads, sales coupons to save money)	1	4	2.71	.93
Q19 (Living below means/spend < earnings)	1	4	3.08	.90
Q20 (Making written to-do lists or specific plans)	1	4	2.49	1.04
Subtotals				
health9 (Q1-Q9)	9	36	24.21	4.90
financial10 (Q11-Q20)	10	40	27.82	6.33

Table 3 presents results of a one-way ANOVA to test group differences in nutrition label reading practice. Gender, age, education, income, and race/ethnicity showed group differences. Females reported higher scores than males, which is consistent with previous studies. Older respondents and those with higher education and incomes also reported higher quiz item scores.

As shown in Table 3, post hoc tests found some significantly different subgroup patterns. Age had two different subgroups. Those aged 24 or younger had significantly lower scores than older age groups. Education had three distinct subgroups, those with lower than high school or high school graduate, some college to college degree, and college degree and graduate or professional degree. Income had three distinct subgroups, those with household income under $25,000, income of $25,000-$99,999, and income of $100,000 or higher. Post hoc tests did not show differences among different racial/ethnic groups. These findings lend partial support for research hypothesis 1: There are differences in the demographic characteristics of online survey respondents who read nutrition labels and those who do not.

Table 3. Group Differences in Nutrition Label Reading Practice: ANOVA Results

Demographic Characteristic	Q10 Mean Score	F	p
Gender			
Male	2.24[a]	42.9	.013*
Female	2.47[b]		
Age			
24 or younger	1.99[a]	63.7	<.001**
25-34	2.65[b]		
35-44	2.55[b]		
45-54	2.56[b]		
55-64	2.70[b]		
65-74	2.81[b]		
75 and over	2.70[b]		
Education			
Some high school or less	1.95[a]	92.0	<.001**
High school graduate	2.01[a]		
Some college or trade or vocational training	2.55[b]		
Associate degree	2.54[b]		
Bachelor degree	2.65[bc]		
Graduate or professional degree	2.80[c]		
Income			
Less than $25,000	1.93[a]	37.2	<.001**
$25,000-$49,999	2.34[b]		
$50,000-$74,999	2.38[b]		
$75,000-$99,999	2.46[bc]		
$100,000 or greater	2.54[c]		
Race/Ethnicity			
White	2.39[a]	2.70	.019*
Hispanic	2.20[a]		
African	2.26[a]		
Asian	2.46[a]		
Native American	2.27[a]		
Other (e.g., a combination of Black and Hispanic)	2.23[a]		

*Note: * $p < .05$, ** $p < .001$. Post hoc tests show that a, b, and c are significant different subgroups.

Table 4 presents results of an OLS linear regression analysis when the total score of the nine health practices was used as the dependent variable. Model 1 included only nutrition label reading as the independent variable, and it was positively associated with the health practice score. Model 2 added several demographic variables as control variables, and the nutrition label reading behavior was still positively associated with health practice. The coefficient estimate of the nutrition label reading variable decreased a little from 2.566 to 2.255, which suggests that, after controlling for demographic characteristics, nutrition label reading still showed a significant ($p < .001$) correlation with health practice scores. Model 2 explained an additional 6.2% of the

variance, which is smaller than 28.4% of variance explained by the nutrition label reading variable. These findings support research hypothesis 2: Survey respondents who report frequent reading of nutrition labels have higher health practice scores than those who read nutrition labels less frequently.

Table 4. OLS Regression Results on Health Practice Scores

	Model 1			Model 2		
	B	**Beta**	***p***	**B**	**Beta**	***p***
(Constant)	18.144		<.001	17.716		<.001
Q10 Nutrition label reading practice	2.566	.533	<.001	2.255	.468	<.001
Male				.310	.032	.030
Age: 25-34				-1.416	-.075	<.001
Age: 35-44				-.532	-.032	.114
Age: 45-54				-.841	-.058	.007
Age: 55-64				.443	.033	.137
Age: 65-74				.519	.030	.133
Age: 75 and over				1.224	.029	.051
Education: high school graduate				-.080	-.006	.719
Education: some college or trade or vocational training				.299	.019	.375
Education: associate degree				.856	.041	.031
Education: bachelor degree				1.274	.108	<.001
Education: graduate or professional degree				1.829	.140	<.001
Income: $25,000-$49,999				.374	.027	.137
Income: $50,000-$74,999				.470	.039	.048
Income: $75,000-$99,999				.890	.067	.001
Income: $100,000 or greater				1.257	.119	<.001
Hispanic				-1.047	-.054	<.001
African American				-1.696	-.083	<.001
Asian				.006	.000	.987
Native American				.475	.010	.473
Other (e.g., a combination of Black and Hispanic)				-.754	-.031	.031
R^2 change	.284			.062		
p	<.001			<.001		

Note: Reference categories: female, age under 25, some high school or less, household income less than $25,000, and white.

Table 5 presents results of an OLS linear regression analysis when the score of financial practices was used as the dependent variable. Model 1 included only nutrition label reading as the independent variable, and it was positively associated with the financial practice score. Model 2 added several demographic variables as control variables, and the nutrition label reading

practice was still positively associated with financial practice. The coefficient estimate of nutrition label reading variable decreased from 2.626 to 1.712, which suggests that after controlling for demographic characteristics, nutrition label reading showed a smaller but still significant ($p < .001$) correlation with financial practice. Comparing the results between Table 4 and 5 suggests that nutrition labeling health behavior may be more closely related to health practice than financial practice. Model 2 explained an additional 18.1% of the variance, which is similar to the 17.8% of variance explained by the nutrition label reading variable. These findings support research hypothesis 3: Survey respondents who report frequent reading of nutrition labels have higher financial practice scores than those who read nutrition labels less frequently.

Table 5. OLS Regression Results on Financial Practice Scores

	Model 1			Model 2		
	B	**Beta**	***p***	**B**	**Beta**	***p***
(Constant)	21.614		<.001	19.980		<.001
Q10 Nutrition label reading practice	2.626	.422	<.001	1.712	.275	<.001
Male				.431	.034	.018
Age: 25-34				.130	.005	.776
Age: 35-44				1.135	.053	.008
Age: 45-54				.557	.030	.161
Age: 55-64				2.240	.130	<.001
Age: 65-74				2.123	.094	<.001
Age: 75 and over				3.167	.058	<.001
Education: high school graduate				.806	.047	.005
Education: some college or trade or vocational training				2.040	.100	<.001
Education: associate degree				2.779	.104	<.001
Education: bachelor degree				3.381	.222	<.001
Education: graduate or professional degree				3.727	.221	<.001
Income: $25,000-$49,999				.175	.010	.585
Income: $50,000-$74,999				.976	.063	.001
Income: $75,000-$99,999				1.328	.077	<.001
Income: $100,000 or greater				2.279	.166	<.001
Hispanic				-1.481	-.059	<.001
African American				-1.846	-.070	<.001
Asian				.404	.012	.389
Native American				-.859	-.014	.311
Other (e.g., a combination of Black and Hispanic)				-.899	-.028	.044
R^2 change	.178			.181		
p	<.001			<.001		

Note: Reference categories: female, age under 25, some high school or less, household income less than $25,000, and White.

Discussion

Support was found for the three hypotheses in this study, confirming results of previous research and adding new findings to the existing body of knowledge about relationships between personal health and financial practices. Specifically, differences were found in the demographic characteristics of respondents who read nutrition labels and those who do not. This study identified demographic characteristics of those who are more likely to read nutrition labels: females, older respondents, and those with higher education and incomes. These results support previous studies (Brown, 2013; Neuhouser et al., 1999; Satia et al., 2005).

Further, survey respondents who reported frequent reading of nutrition labels had higher health and financial practice scores than others using reliable scales representing a much wider variety of personal practices than other researchers (e.g., Carr et al., 2015) have previously studied. These results are consistent with previous associations of health and financial practices that were found using previous data sets derived from the same online survey instrument (O'Neill et al., 2016a, 2016b, 2017).

There were positive, statistically significant relationships between the practice of reading nutrition labels (or whatever personal characteristics, such as discipline and focus, this behavior represents) and both positive health practices and positive financial practices. Thus, there appears to be a "virtuous circle," where positive action in one area of a person's life may be related to success in another, perhaps as a result of personality traits such as conscientiousness and future-mindedness. One survey item about making written to-do lists or specific plans describes an action that many conscientious individuals perform. The survey findings support the previous association between nutrition label reading and financial planning practices found by Carr et al. (2015).

Limitations

This study had several limitations. As noted above, respondents were not representative of the U.S. population. Rather, the sample was primarily young and White with higher education and income levels than typical Americans. Perhaps this is not surprising, given research findings in the literature review about characteristics of nutrition label readers. However, this also suggests a possible sample bias represented by a higher level of conscientiousness about personal health and/or finance behaviors among the survey respondents than in the U.S. population at large.

Conversely, due to the way that respondents access the survey, people who do not search for health- and finance-related topic information are not included, resulting in self-selection bias. In addition, survey responses relied on respondents' self-assessment of the frequency of their

performance of 20 health and financial management practices, which could differ from objective assessments made by a neutral third party (e.g., a dietitian or financial planner).

Despite these methodological issues, the findings, nevertheless, offer unique insights into relationships between two key aspects of people's lives and extend previous research about links between nutrition label reading and personal finances. To the authors' knowledge, this study is one of the few to investigate relationships between nutrition label reading and a wide array of personal health and financial practices (19 in total). The data set is unique as there are very few publicly-available online tools that simultaneously assess consumers' health and finances.

Implications for Research and Practice

Results of this study suggest that the practice of reading nutrition labels provides useful insights into human behavior and may be a good proxy in future research for "taking care of my health," which has increasingly been found to be associated with "taking care of my personal finances" (Carr et al., 2015; Martin et al., 2016). The findings were not entirely unexpected because the practice of reading labels requires an expenditure of time and a degree of conscientiousness about the impact of present actions (e.g., food and beverage choices) on future outcomes (e.g., improved health status). In addition, product information labels in general, such as those used on food and beverages, have been shown to help users understand complex information to make better decisions (Kim et al., 2000; Neuhouser et al., 1999; Variyam, 2008). One study in personal finance literature explored the use of an interactive information label related to retirement saving and found significantly better ability of users to reach their savings goals with the information label (Gunaratne & Nov, 2017). Findings of that study and this one lend support to the development of product information labels, including those with interactive features, that aid and inform consumer decision-making.

This study found a positive and statistically significant relationship between nutrition label reading and nine positive health practices, as well as ten positive financial practices. These findings provide evidence of a positive association between different aspects of people's lives. The findings imply that it may be useful for both health and financial education practitioners to know if their clients/students read nutrition labels on a regular basis because a significant factor in both areas of life is lifestyle habits. A good way for professionals to start conversations with clients about personal health habits in a nonthreatening way is to turn questions into statements such as "Tell me what you do to take care of your health." The answer could hold clues to clients' or students' levels of conscientiousness that can inform the content and duration of interventions to change behavior. For example, non-label readers may need targeted personalized learning activities to foster their conscientiousness.

Not everyone reads nutrition labels, so a second implication of this study is to encourage people to do so and to provide information about what to look for on a Nutrition Facts label. Many FCS professionals already do this. Some health educators have found supermarket tours to be a fun and interactive way to engage learners around this topic. Available educational resources make it easy to teach people how to understand and use nutrition labeling. The U.S. Food and Drug Administration (FDA) (2018a) has issued final changes to update the Nutrition Facts label. Manufacturers are required to use the new label by January 1, 2020, or January 1, 2021 (depending upon annual food sales), making the next few years an ideal "teachable moment" (U.S. Food and Drug Administration, 2018b).

Health and financial educators can incorporate the findings of this study into their educational programming and publications. For example, financial educators could explain that a positive association was found between nutrition label reading and a wide array of positive financial practices. Health educators, who already encourage nutrition label reading, can describe the positive association with personal finances. In other words, subject matter specialists within the FCS profession can create interdisciplinary programs to improve the lives of those they serve.

Future studies of the connection between reading Nutrition Facts labels and health and financial practices could examine specific population groups (e.g., Native Americans, young adults) individually and/or use more diverse samples that are more representative of average Americans. The *Personal Health and Finance Quiz* could also be used as a pre- and post-test assessment of the effectiveness of interdisciplinary programs (e.g., Cooperative Extension's *Small Steps to Health and Wealth*™ program) that promote positive health and financial practices.

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