Received 22 June 2014
Revised 14 November 2014
28 January 2015
Accepted 30 January 2015

Development of a financial literacy model for university students

Ani Caroline Grigion Potrich and Kelmara Mendes Vieira
Federal University of Santa Maria, Santa Maria, Brazil, and
Wesley Mendes-Da-Silva
Department of Finance Accounting and Controllership, Fundação Getulio Vargas at São Paulo, São Paulo, Brazil

Abstract

Purpose – The purpose of this paper is to build and compare models that assess university students' financial literacy. Financial literacy, understood as the mastery of a set of knowledge, attitudes and behaviors, has assumed a fundamental role in allowing and enabling people to make responsible decisions as they strive to attain financial wellbeing. To this end, models that integrate financial knowledge, behavior and attitude are integrated. The models are subsequently estimated, and many comparative tests are performed.

Design/methodology/approach – The study investigated a random sample of 534 university students attending public and private universities in southern Brazil. The choice of scale was based on consideration of the best adjustment for the Brazilian context, appropriate translation and content validation. For an analysis of the collected data, structural equation modeling was employed using two strategies.

Findings – The findings indicate that, in the model estimation stage, the scales for behavior and attitude have been reduced. Among all of the models estimated, the best adjusted model indicates that financial knowledge and financial attitude have positive impacts on financial behavior.

Research limitations/implications – The results are not generalizable to the wider population; to enable such generalization, different profiles should be researched using a larger sample. In practical terms, the financial behavior of Brazilian university students expresses the ability to establish long-term aims and saving aimed at future acquisitions and unexpected spending. This behavior is directly influenced by basic and advanced questions of financial knowledge and also by the importance attributed to attitude by establishing aims, control of spending and financial reserves.

Originality/value – This paper describes a pioneer study with respect to modeling financial literacy in Brazil. This topic can be improved as the need for rigorous evaluation of financial literacy grows at the same speed as the creation of more complex financial products.

Keywords Structural equation modeling, Financial literacy, Competing models

Paper type Research paper

Introduction

Financial literacy has been recognized as essential for people who operate in an increasingly complex environment. Governments around the world are interested in

Management Research Review
Vol. 39 No. 3, 2016
pp. 356-376

2040-8269
DOI 10.1108/MRR-06-2014-0143

The authors are grateful to the National Council for Scientific and Technological Development (CNPq) for financial support.

finding effective approaches to improve their populations' levels of financial literacy through the creation or improvement of national strategies for financial education with the objective of offering learning opportunities at various levels of education (Atkinson and Messy, 2012).

Apart from the government, international entities and numerous studies have been dedicated to this theme. The Organisation for Economic Co-operation and Development (OECD, 2012) conceptualizes financial literacy as a combination of the consciousness, knowledge, ability, attitude and behavior that are necessary to make financial decisions and, accordingly, to achieve individual financial wealth. In this context, financial education is a process of ability development that facilitates people to make correct decisions and to manage their personal finances successfully, while financial literacy is the capacity to use the knowledge and abilities acquired. In other words, the focus of financial education is knowledge, while financial literacy involves, apart from the knowledge, the behaviors and the financial attitudes of individuals.

Apart from financial literacy, an additional related aspect is financial education. According to the OECD (2012), financial education is a process whereby individuals improve their comprehension regarding financial products and their associated concepts and risks in such a way that from the information and recommendations given, the individuals can develop the abilities and the confidence necessary to make secure and fundamental decisions to improve their financial wellbeing. Similarly, Anderloni and Vandone (2010) define financial education as a preventive measure, as it allows the individual to understand financial problems and manage his/her personal finances in a satisfactory way, thereby avoiding indebtedness.

Although there were numerous differences found when conceptualizing and evaluating all the dimensions related to financial literacy, there is a certain amount of agreement regarding its importance. According to Vitt (2004), financial literacy plays an essential role in the process of making financial decisions, as it represents a systematic effort aimed at the development of positive knowledge, behavior and attitude. Anderloni and Vandone (2010) argue that one of the most important roles of financial education is to act as a preventive measure for controlling indebtedness. As such, education helps to leverage the knowledge of individuals in relation to the financial transitions, thereby giving them the tools to make responsible and informed decisions.

However, to date, there is no consensus within academia regarding what instruments should be used to model financial literacy. In recent years, there have been many studies conducted in the USA, such us Chen and Volpe (1998), Murphy and Yetmar (2010) and Neidermeyer and Neidermeyer (2010). Studies examining families from the United Kingdom were conducted by Disney and Gathergood (2011), while similar studies, such as Sekita (2011) in Japan and Ansong (2011) with university students in Ghana, were also conducted. Additionally, Rooij *et al.* (2011) studied retired people in Holland. Among the emergent countries, it is still common to find works that discuss the themes explored in this article. In the Brazilian scenario, for example, Mendes-Da-Silva *et al.* (2012) and Norvilitis and Mendes-Da-Silva (2013) have conducted studies regarding the subject of financial literacy.

In this context, the objective of this study is to build and compare models that assess university student financial literacy. To this end, models that integrate financial knowledge, behavior and attitude are integrated. The models are subsequently estimated, and many comparative tests are performed. The literature contends that

financial literacy is an interdisciplinary concept and with many dimensions. In this way, the need to construct and validate models that consider the measures and their inter-relations simultaneously is critical and is, therefore, the theme of this study.

The principal contribution of this paper is the multidimensional measure of financial literacy. Some authors have suggested that financial literacy should be considered more broadly, but nobody has shown that yet. There is not an operationally valid instrument to measure financial literacy in its totality (Remund, 2010). According to Fernandes *et al.* (2014), there is a marked disconnect between the conceptual definition of financial literacy, and the authors suggest that future works should develop more promising measures more connected to the conceptual definition of financial literacy and how it has been operationalized.

This work is divided into five sections, beginning with the introduction as the first section. The second section presents the theoretical and empirical bases that underpin the research. In the third section, the methodological procedures are demonstrated, while the fourth section presents the analysis and a discussion of the results. The last section presents the most relevant considerations regarding the research, as well as its limitations and a number of suggestions for future studies.

Financial literacy

The term financial literacy has been frequently used as a synonym for financial education or financial knowledge. However, these constructs actually are conceptually different in that financial literacy is deeper than financial education; thus, using them synonymously can cause problems. Huston (2010) contends that financial literacy has two dimensions: understanding, which represents the personal financial knowledge of financial education, and use, which refers to the management of personal financial knowledge. In this context, the individual could have financial knowledge, but to be considered literate, he should have the ability and confidence to implement it when making decisions. Therefore, financial literacy is deeper than the basic concept of financial education (Mccormick, 2009; Huston, 2010). Financial knowledge alone is not sufficient for the effective management of finances, as the influence of financial knowledge on behavior is measured trough the student's financial attitudes (Norvilitis and Maclean, 2010; Xiao *et al.*, 2011). Having financial information is not only about establishing future savings or checking the bank account; it further includes the process of learning about choosing the appropriate financial objective from among several alternatives (Criddle, 2006).

Another dilemma is the lack of models that present the dimensions involved. Remund (2010) has determined that, although there is no uniformity among the definitions proposed, the majority of the definitions fit well into one of the following categories: knowledge of financial concept, the ability to communicate financial concepts attitude to manage personal financial, the ability to make appropriate financial decisions and the confidence to plan for future financial necessities. Hung *et al.* (2009) contend that financial literacy can be defined by four variables: financial knowledge, financial attitude, financial behavior and financial ability, all of which are correlated with one another and financial knowledge, which coordinates the attitudes that influence financial management behavior. OECD (2012), Atkinson and Messy (2012) and Agarwalla *et al.* (2013) state that financial literacy is focused on three dimensions: financial knowledge, financial attitudes and financial behavior.

Financial knowledge is a particular type of capital acquired in life through learning the ability to manage income, expenditure and savings in a safe way (Delavande *et al.*, 2008). For OECD, financial knowledge is essential to determine whether the individual is financially literate, involving questions related to concepts such as simple and compound interest, risk and return and inflation (Atkinson and Messy, 2012). Financial attitudes are defined as a combination of concepts, information and emotions about learning, which results in a readiness to react favorably (Shockey, 2002). Financial behavior is defined as an essential financial literacy element, as well as the most important (OECD, 2013). In addition to recent study findings, the financial behavior dimension has been found to be a determinant of financial literacy (Lusardi and Mitchell, 2013).

The financial literacy measure poses an additional complex question. Lusardi and Mitchell (2011) posit that, although it is important to evaluate the way in which people are literate, in a practical sense, it is difficult to explore the way in which people proceed with financial information and make decisions based on this knowledge. For Hudson, it would be important to determine not only whether the person has the information but also whether the individual uses it in the correct way. Kempson (2011), conducting an investigation of financial literacy research, found great diversity in the way the subject was addressed and in the questions that were answered. Owing to the difficulty in directly measuring financial literacy, Moore (2003) suggests the use of proxies.

In this context, a group of three commonly used questions are found in the literature. The questions relate to three basic concepts about financial composition: tax rates, inflation and risk diversification. The first question addresses tax rate notions. Suppose you had $100 in a savings account and the interest rate was 2 per cent per year. Disregarding any bank fees, how much do you think you would have in the account after five years if you left the money to grow? 1) More than $102; 2) $102 exactly; 3) less than $102; 4) I do not know. It is important to mention that unfamiliarity with tax rates seems to be a critical aspect of risk behavior, according to evidence found by Mendes-Da-Silva *et al.* (2012) in Brazil, where university students who affirmed knowing the tax rates charged for the use of credit cards are less prone to adopt risk behavior. The second question addresses the understanding of inflation. Imagine that the tax rate on your bank account was 1 per cent per year and inflation was 2 per cent per year. After a year, you would be able to buy with this money 1) more than today; 2) the same as today; 3) less than today; 4) I do not know. The third question relates to the understanding of risk diversification. Do you think that this information is true or false? "Buying a single company stock usually provides a safer return than a stock mutual fund". 1) True; 2) False; 3) I do not know.

The utility of these questions is that they have been a part of many studies, thereby forming a useful basis to compare financial literacy among countries (Fornero and Monticone, 2011; Brown and Graf, 2013; Beckmann, 2013; Agnew *et al.*, 2013). These studies have detected low financial literacy in these countries and even lower financial literacy in countries with less income. Lusardi and Mitchell (2011) found that in the USA, only approximately 65 per cent of the people interviewed answered the first or the second question correctly, whereas only half of the people answered the third question correctly. Sekita (2011) determined that people in Japan performed even worse on the

financial literacy test, as only 50 per cent answered the first and second questions correctly, and only 40 per cent responded correctly to the third question.

OECD (2011) created the International Network for Financial Education (INFE) to facilitate the sharing of experiences and knowledge among specialists and among the public around the world. Additionally, the INFE promoted the development of both analysis work and political recommendations with respect to improving financial literacy on a global level. Thus, the lack of measurements and international data combined with certain countries' requests for a robust measurement of financial education at the national level has led the OECD and INFE to develop a research instrument for research that can be used to assess the level of financial literacy in many countries. The OECD questionnaires focused on aspects related to knowledge, attitudes and behaviors regarding global concepts of financial literacy.

Apart from these instruments, many authors have evaluated financial literacy dimensions separately. Rooij *et al.* (2011), for example, developed an instrument to link financial literacy and retirement planning in Holland. However, this instrument is only focused on financial knowledge dimension, which is formed by five questions, classified as basic knowledge items to measure number skills and the understanding of concepts, such as inflation, simple and compound interest, the value of money in time and 11 additional questions for advanced knowledge, which address the knowledge related to complex financial instruments, such as shares, stocks and mutual funds and the understanding of concepts such as risk diversification and the trade-off between risk and return. Chen and Volpe (1998) evaluate financial literacy with 36 multiple choice questions about the behavior of personal finance in such aspects as savings, loans, insurance and investment, and the Johnson (2001) study developed instruments for measuring human behavior. An additional instrument used in some studies is the financial literacy – attitude, behavior and knowledge questionnaire, which uses a Likert scale to analyze respondent attitudes and behaviors. This particular instrument was elaborated by Shockey (2002) and is composed of 40 questions, 8 to analyze the financial attitude and 17 to measure financial behavior, and the scale for financial knowledge has 15 multiple choice questions.

In this context, a study developed by Fernandes *et al.* (2014) reported a systematic meta-analysis with 168 papers covering 201 non-redundant studies. Based on these papers, the authors developed the working hypothesis that they would find weak effects of financial literacy in studies of financial education interventions intended to improve downstream financial behaviors. The results revealed that interventions to improve financial literacy explain only 0.1 per cent of the variance in financial behaviors studied, with weaker effects in low-income samples. In their research, financial literacy is used as a synonym for financial knowledge.

Furthermore, financial literacy was found to produce many benefits, indicating that it is positive for both individuals and families (Danes and Hira, 1987; Grable and Joo, 1998; Kerkmann *et al.*, 2000; Blalock *et al.*, 2004). The increase of financial literacy promotes improved self-confidence, control and independence (Conger *et al.*, 1999; Allen *et al.*, 2007), as well as an improvement in conjugal satisfaction (Cleek and Pearson, 1985; Kerkmann *et al.*, 2000; Oggins, 2003). Moreover, according to Schmeiser and Seligman (2013), an increase in the level of financial literacy provokes changes in wealth over time. According to Fonseca *et al.* (2012), the educational level of people impacts the financial decisions that they make.

Method

Participants

This study investigated a random sample of 534 university students attending public and private universities in southern Brazil. The data were collected in an internal environment based on teacher availability and the contact with those students who were disposed to participate. The instrument, which consists of four groups of questions, was administered between April and May 2013. Initially, we attempted to identify student profiles related to eight socioeconomic and demographic variables: gender, age, civil status, dependent living, race, descent, occupation and income.

There are many reasons that justify the decision to use university students in southern Brazil for this study:

- Financial literary is not widely explored in the academic environment as on the society level in general, especially when considering emergent markets such as Brazil.
- Among the students, we chose university students because of evidence reported by Lusardi and Mitchell (2010), in which individuals with lower educational levels are less prone to answer the questions correctly and more prone to say that they do not know the answer.
- University students currently have more responsibilities and are obliged to make decisions that will define their financial independence, and wealth wellbeing and security are the consequences (Mendes-Da-Silva *et al.*, 2012).
- Among Brazilian regions, the South is listed first in The Indices of Human Development, and it exhibits superior indicators when compared to other regions of Brazil, where most cities (64.70 per cent) are in high development groups, according to the Atlas of Human Being Development in Brazil (2013).

Instrument

Given that there is not an operationally valid instrument to measure financial literacy in its totality (Remund, 2010), a proxy was selected according to the procedures adopted by many prior studies (Knoll and Houts, 2012; Shim *et al.*, 2009, 2010; Atkinson and Messy, 2012) that have evaluated literacy with various factors. In this study, financial literacy is defined by financial behavior, financial knowledge and financial attitude, as recommended by OECD (2012), Atkinson and Messy (2012) and Agarwalla *et al.* (2013).

First, to model financial behavior, several questions developed by Chen and Volpe (1998), Johnson (2001) and Shockey (2002) have been used and adapted to fit the Brazilian context. Composed of 20 questions, a five-point Likert scale (1 = never and 5 = always) was used to evaluate university student behavior regarding financial management, as it pertains to the use of personal credit, planned consumption, investments and savings. High scores on the scale indicate good financial behaviors.

To evaluate the academic level of financial knowledge, a factor from the average punctuation of two groups of multiple choice questions adapted from Rooij *et al.* (2011) was constructed. The first group (basic knowledge) is composed of three questions and aims to measure basic financial abilities with questions related to inflation, tax rates and the value of money in time. The second group (advanced knowledge) is composed of five questions that explore the level of knowledge in relation to complex financial instruments, such as shares, public bonds and risk diversification. The question

classifications between basic and advanced knowledge have been inspired by a study by Rooij *et al.* (2011), who took into consideration the difficulty level of the questions. Furthermore, in the stage of instrument validation, they have been confirmed by the analysis of specialists. Each correct answer from the basic knowledge group was awarded a score of 1.0, while each correct answer from the advanced knowledge group received a score of 2.0. Thus, a student who answered three questions correctly from the basic knowledge group received 1 point for each question (3 points), while the student who correctly answered three questions in the advanced knowledge group received 2 points for each questions (6 points). According to this scale, the higher the score, the better is the level of financial knowledge.

To model financial attitude, the scale developed by Shockey (2002) was used. This scale is formed using nine questions and is organized around a five-point Likert scale (1 = absolutely disagree and 5 = absolutely agree). The aim of this scale is to identify how individuals evaluate their financial management. Accordingly, the higher the score, the better is the financial attitude of the individual.

The scale choice has taken into consideration the best adjustment for the Brazilian context, which is translated and the content validation of which is analyzed. These scales have been chosen for this study because they adapt to the Brazilian reality best. Based on the model of Churchill (1979), scales were validated by two specialists and applied to 112 students to improve and refine measures through exploratory factorial analysis. The final questions are displayed in Appendix 1.

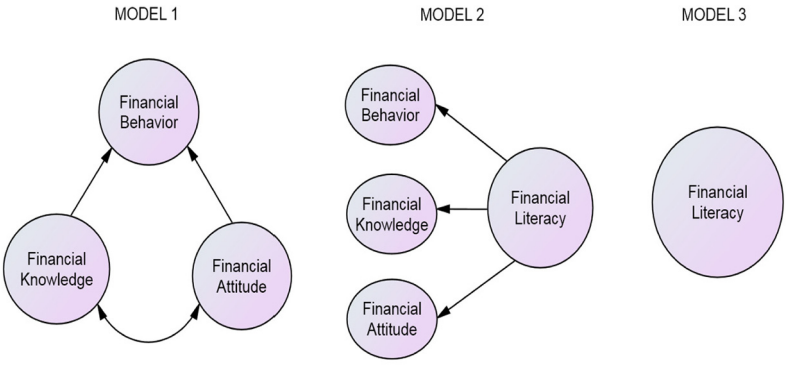
For an analysis of the collected data, descriptive statistics and the multivariate analysis technique were used, both of which were applied using Statistical Package for the Social Sciences 17.0® and Analysis of Moment Structures (AMOS) 18® software.

Models

Because there is no consolidated model to evaluate financial literacy in the literature, we have chosen to construct the three models displayed in Figure 1.

Model 1 was constructed based on the argument that financial knowledge and attitude precede financial behavior, as Hayhoe *et al.* (2005) and Miller and C' de Baca (2001) determined that a meaningful change in financial behavior is preceded by modifications in financial knowledge and attitude, apart from the fact that financial knowledge is correlated with financial attitude, as found by Hayhoe *et al.* (2005). Thus, in this model, it was assumed that knowledge has a more positive influence on financial behavior and attitude and that attitude and behavior are correlated.

Model 2 is a factorial in the second order, for which original constructs were maintained, and financial literacy was a second-order construct. This model presents the idea of OECD (2013), Atkinson and Messy (2012) and Agarwalla *et al.* (2013) by measuring financial literacy as a combination of financial behavior, financial knowledge and financial attitude, and this is the main reason to study these three components in combination. Model 3 assumed the existence of a unique financial literacy construct formed by all variables in the three constructs (financial behavior, financial knowledge and financial attitude) built in a way that considers the arguments of Shockey (2002), whereby financial literacy would be measured from the variables of constructs financial behavior, financial knowledge and financial attitude.



Note: For simplicity, observed variables and errors have not been represented in the figure

Figure 1.
Proposed models

Data analysis

To analyze the models, structural equation modeling was employed using two strategies. In the first strategy, competitor models have been applied using original scales and constructing a model in only one step. In the second strategy, confirmatory factor analysis was used to validate financial behavior and financial attitude constructs, whereas in the second part, a structural model was used. In both strategies, correlations between errors from observed variables were introduced, as suggested by the AMOS 18 report, which makes logical theoretical sense (Models b). Kline (2011) states, "Correlations between residuals can be inserted when necessary". Furthermore, six models are initially presented, three of which are structured differently and two of which have different ways of measuring constructs.

The measurement modeling validity was evaluated through convergent validity, unidimensionality and construct reliability. The convergent validity of each construct was analyzed according to the magnitude and meaningful statistics of its standardized coefficients, as well as the absolute fit indices: chi-square statistics (χ^2), root mean square residual (RMSR), root mean square error of approximation (RMSEA), goodness-of-fit index (GFI) and the comparatives fit indices: the comparative fit index (CFI), normed fit index (NFI), Tucker-Lewis index (TLI). There is no consensus in the extant literature regarding acceptable values for these indices. For example, for the chi-square/degrees of freedom, recommendations vary from less than five to less than two (Hooper *et al.*, 2008). For CFI, GFI, NFI and TLI, it is suggested their values be less than 0.95, and for RMSR and RMSA, the recommendations suggest they be less than 0.05 and 0.08, respectively (Hooper *et al.*, 2008).

To measure the construct reliability, extracted variance, score reliability and Cronbach's alpha were used. The construct is considered reliable if the score reliability and extracted variance values are equal to or exceed 0.7 and 0.5, respectively (Garver and Mentzer, 1999; Hair *et al.*, 2009). Alphas of approximately 0.7 are considered adequate (Kline, 2011). The construct unidimensionality is verified through the evaluation of adjusted residuals. Absolute values below 2.5 suggest that there are no problems (Garver and Mentzer, 1999; Hair *et al.*, 2009).

The comparison of the two models was conducted in two moments. For nested models, models measuring financial behavior and attitude were evaluated under the hypothesis of equal factorial loads. In this case, the difference in chi-square was used. To compare the concurrent models, the Bayesian information criterion (BIC) (Schwarz, 1978; Raftery, 1993), Akaike's informational criteria (AIC) (Akaike, 1973) and the expected cross-validation index (ECVI) were used. All of the models were estimated using a maximum likelihood bootstrap. All bootstraps were estimated with a sample size of 100 according to Cheung and Lau (2008).

Results

The sample was composed of 534 students, and of these, 49.25 per cent completed subjects related to finance during their professional training. Therefore, it was concluded that these students have financial training. The remaining 50.75 per cent did not have this training. It was verified that 56.93 per cent of the respondent population were female, 86.89 per cent were single and the average age was approximately 24 years. The majority of the respondents (90.82 per cent) did not have dependents and considered themselves of the white race (86.52 per cent) and were of Brazilian descent (49.81 per cent). With regard to occupation, 63.67 per cent did not have a formal job, and the majority were students or scholarship students. More than half declared their earnings below R$1,300.00.

According to the first strategy, the three conceptual models based on previous empirical evidence were estimated using the maximum likelihood bootstrap. The results of this index fit are displayed in Table I.

In the initial estimation, the models presented very low indices when compared to the desired indices. Following AMOS suggestions, correlations between observed variable errors were included, thereby making sense from a theoretical perspective. Despite some improvement, all the models continued to exhibit inadequate fit indices. Therefore, the three models, as well as the versions with insert correlations between errors, were adjusted.

Given these results, we chose to adopt the second strategy, whereby modeling is applied in two steps. Initially, the measurement models were adjusted, and the baseline model (measurement model and structural model) was later evaluated. In this stage, the

Table I.
Fit indices of models with all variables

Fit indices	Model 1.1a	Model 1.1b	Model 2.1a	Model 2.1b	Model 3.1a	Model 3.1b
Chi-square (value)	1871.488	915.398	1871.488	915.398	2489.871	1146.460
Chi-square (probability)	$p - 0.000$	$p - 0.000$	$p - 0.000$	$p - 0.000$	$p - 0.000$	$p - 0.000$
Freedom degree	431	410	431	410	434	410
GFI	0.781	0.893	0.781	0.893	0.717	0.863
CFI	0.668	0.884	0.668	0.884	0.526	0.830
NFI	0.610	0.809	0.610	0.809	0.482	0.761
TLI	0.642	0.868	0.642	0.868	0.492	0.807
RMSR	0.087	0.057	0.087	0.057	0.092	0.063
RMSEA	0.081	0.049	0.081	0.049	0.097	0.060
AIC	2,001.488	1,087.398	2,001.488	1,087.398	2,613.871	1,318.460
BIC	2,276.469	1,451.220	2,276.469	1,451.220	2,876.161	1,682.281
ECVI	3.948	2.145	3.948	2.145	5.156	2.601

improvement strategy model is adopted, although several changes were necessary in the measurement of the model (Table II).

For both constructs, the proposed models refer to the model with all variables in the original scale. The results indicate that both models are inadequate because the chi-square/degrees of freedom is greater than three; the fit for the GFI, CFI, NFI and TLI do not achieve the minimum of 0.95; the RMSEA and RMSR are greater than 0.08 and 0.05, respectively; and the extracted variance is less than 0.5.

To find more adequate measuring models, two additional measuring models were adopted after removing all of the variables that have presented standardized factor loadings with values below 0.3 and did not contribute significantly to the model (Hair *et al.*, 2009) and include correlations between the variable errors. After these changes, both models presented adequate adjustment. That is, the models exhibited convergent validity, whereby the indices CFI, GFI, NFI and TLI exceeded 0.95, and the RMSR and RMSEA were greater than 0.05; reliability, as all are greater than 0.7, although the medium variance is slightly below 0.50, the Cronbach's alphas exceed 0.7, thereby indicating reliability; and unidimensionality, as evidenced by all standardized residuals falling below 2.5 ($p < 0.05$). Chi-square values were no longer significant at the 5 per cent level.

For each model, the hypothesis of equal factor loading is tested. Both the financial behavior model (CMIN 35.837; $p = 0.000$) and the financial attitude model (CMIN 102.309; $p = 0.000$) exhibit worsening results, indicating that factorial loans may differ for the various measures of the models. Figure 2 displays the original measuring models with all variables and the models after financial behavior and attitude constructs.

Financial knowledge was not adjusted because it is not possible to adjust constructs formed by fewer than three variables. Therefore, based on the measurement models for financial behavior and financial attitude, the estimation of tree baseline models is conducted. The first model (Model 1.2) was constructed based on the argument that financial knowledge and attitude precede financial behavior, and financial knowledge is correlated with financial attitude, based on the arguments of Hayhoe *et al.* (2005) and Miller and C' de Baca (2001). The second (Model 2.2) is a factorial in the second order, whereby the measurement models for financial behavior, financial attitude and financial

	Financial behavior		Financial attitude	
Fit indices	Proposed	Final	Proposed	Final
Chi-square (value)	1,112.359	9.310	237.724	5.185
Chi-square (probability)	p – 0.000	p – 0.054	p – 0.000	p – 0.075
Freedom degree	170	4	27	2
GFI	0.792	0.993	0.888	0.995
CFI	0.646	0.993	0.818	0.995
NFI	0.610	0.988	0.801	0.991
TLI	0.604	0.982	0.758	0.984
RMSR	0.123	0.028	0.034	0.008
RMSEA	0.105	0.051	0.124	0.056
Extracted variance	0.227	0.441	0.317	0.483
Construct reliability	0.838	0.795	0.798	0.778
Cronbach's alpha	0.828	0.795	0.789	0.763

Table II. Fit model for financial behavior and financial attitude constructs

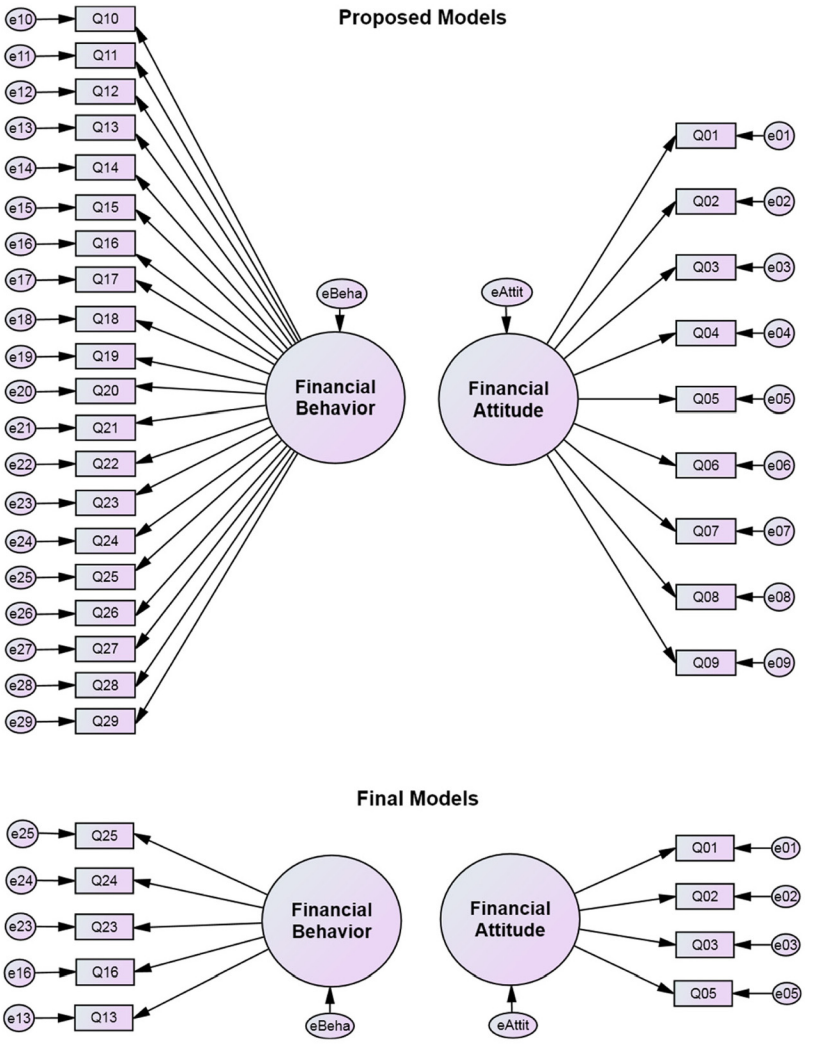


Figure 2.
Proposed and final models for financial behavior and attitude constructs

Note: For simplicity, the correlations between errors have not been shown, but they are in shown in table IV

knowledge were maintained, and financial literacy was a second-order construct, according to OECD (2013), Atkinson and Messy (2012) and Agarwalla *et al.* (2013). The last model (Model 3.2) determined a unique financial literacy construct formed by all variables in the three constructs (financial behavior, financial knowledge and financial attitude), as Shockey (2002) affirmed. Table III reveals the results.

Table III highlights that Models 1.2 and 2.2 are not equals because the relations between the tree constructs are different, where Model 1.2 is a factorial in the first order and the other is a factorial in the second order. However, the models are equivalent

because they have the same variables and constructs, which is why they present with equal values. In Table III, the last two columns represent Model 3.2. The first column displays the initial estimation results, while the second displays the estimation results after including correlations among the errors. All three models (1.2, 2.2 and 3.2b) present adequate fit indices. Although the chi-square exhibits significant results, the results of the chi-square/degrees of freedom are less than two. Figure 3 presents the final Models 1.2, 2.2 and 3.2b.

All models present differences when compared to the proposed models. In Model 1.2, the correlation between financial knowledge and financial attitude is not significant. In Model 2.2, financial literacy, as a second-order construct, is not practical because all categories related to knowledge and attitude constructs are not significant, and only the construct of financial behavior impacts on the level of financial literacy of university students. This result supports the findings of Lusardi and Mitchell (2013), OECD (2013), Klapper *et al.* (2013) and Fernandes *et al.* (2014) when stating that financial behavior is an essential and determining element of financial literacy. Model 3.2b differs from the proposed model because it includes correlations between errors. Furthermore, because financial literacy is a first-order construct, it is necessary to verify its reliability. The extracted variance indices are 0.227, indicating that the model does not have sufficient reliability.

For all models for which correlations among errors were included (Models 1.1b, 2.1b, 3.1b, 1.2, 2.2e and 3.2b), it is observed that the criteria may well have made theoretical sense, as suggested by many authors (Hooper *et al.*, 2008; Kline, 2011). Table IV presents all correlations inserted.

It is observed that all correlations are significant and positive. Correlations in Models 1.2 and 2.2 are exactly the same because they address equivalent models, and all of them are classified as low correlations at approximately 0.200. However, correlations in Model 3.2b varied from very low to moderate.

In an attempt to improve Model 3.2b, we applied the same techniques used when assessing the validity of the models, with the subsequent removal of variables with low loads and insertion correlations, which made theoretical sense. The application of these techniques resulted in the withdrawal of all variables related to financial knowledge (both variables with the smallest information in Model 3.2b) and all variables related to

Fit indices	Model 1.2	Model 2.2	Model 3.2a	Model 3.2b
Chi-square (value)	68.885	68.885	655.283	42.301
Chi-square (probability)	$p - 0.001$	$p - 0.001$	$p - 0.000$	$p - 0.105$
Freedom Degree	37	37	43	32
GFI	0.976	0.976	0.786	0.985
CFI	0.980	0.980	0.607	0.993
NFI	0.957	0.957	0.594	0.974
TLI	0.970	0.970	0.497	0.989
RMSR	0.033	0.033	0.072	0.022
RMSEA	0.041	0.041	0.168	0.025
AIC	126.885	126.885	701.283	110.301
BIC	249.569	249.569	798.584	254.137
ECVI	0.250	0.250	1.383	0.218

Table III. Fit indices for financial behavior and financial attitude measuring adjusted construct models

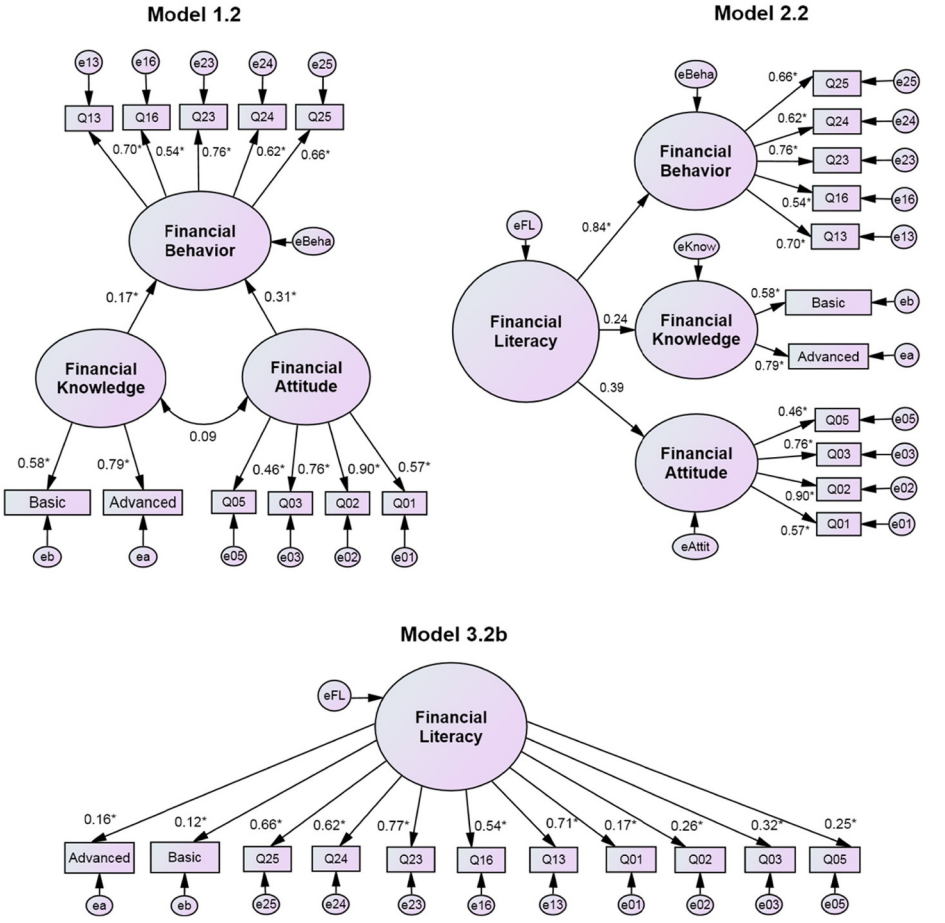


Figure 3.
Standardized coefficients for models 1.2, 2.2 and 3.2b

Notes: * $p < 0.001$; for simplicity, the correlations among the errors have not been shown, but they are shown in Table IV

financial attitude. Thus, as the model has the same structure as the measurement model for financial behavior, it is determined to be not viable as a measure for financial literacy.

Among all models estimated, the model with the lowest AIC (Model 3.2b) is considered inadequate because of a lack of reliability. It can be concluded that Model 1.2, which reported the second lowest AIC, is the most adequate for evaluating financial literacy. This model presupposes that financial knowledge and financial attitude positively influence financial behavior, based on the argument that financial knowledge and attitude precede financial behavior (Miller and C' de Baca, 2001; Hayhoe *et al.*, 2005).

Our result supports the findings of Fernandes *et al.* (2014), which indicated that financial literacy, measured by the percentage of correct answers on tests of financial knowledge, significantly predicted financial behavior, but this effect had a weak relationship. For this, according to Fernandes *et al.* (2014), the interventions studied so

Correlations	Model 1.2	Model 2.2	Model 3.2b
e13 ↔ e05	0.249*	0.249*	0.181*
e23 ↔ e03	0.228*	0.228*	0.134*
e23 ↔ e24	0.220*	0.220*	0.233*
e23 ↔ e05	0.201*	0.201*	0.149*
e03 ↔ e05			0.331*
e02 ↔ e03			0.658*
e01 ↔ e02			0.515*
e02 ↔ e05			0.360*
ea ↔ eb			0.443*
e01 ↔ e05			0.216*
e01 ↔ e03			0.368*

Note: *$p < 0.001$

Table IV. Correlations among errors from observed variables in Models 1.2, 2.2e and 3.2b

far make clear that different approaches to financial education are required if one expects to produce larger effects on behavior larger. A possibility, based on Hader *et al.* (2013), is that future education should teach soft skills, such as the propensity to plan, confidence to be proactive and willingness to take investment risks, more than content knowledge about compound interest and bonds, for example.

Aiming to provide robustness for Model 1.2, the research specialization tool from AMOS is used to test alternative structured models in different relations among the three constructs. Accordingly, the software generated and compared eight alternative models. Again, the results indicate that Model 1.2 provides the best fit for the intended purpose.

Conclusions

The environment in which the society is inserted requires self-sufficiency and responsibility in a more accurate way, and financial literacy is an essential component to have a more successful adulthood. In this context, the mastery of personal-finance skills plays a central role in attitudes and responsible knowledge formation when considering personal finance. Considering the importance of financial literacy, the objective of this study was to construct and compare financial literacy models. To model literacy, three scales were used – financial knowledge, financial behavior and financial attitude. From these scales, three conceptual models were built that differed in relation to theses scales.

This study used two different strategies in its evaluations. In the first, the original scales are applied under the assumption that they would be adequate, as they are already developed and have been used for evaluations in other studies. However, the results indicate the estimation made in only one step has been inadequate, and the estimation in two steps has presented the best indices; however, the problem consisted of reducing the measures proposed. From the 20 initial items on the financial behavior scale, only five were included, while on the attitude scale, the items have been reduced from nine to four, indicating instability in the scales chosen. These variables were excluded because it presented standardized factor loadings with values below 0.3, and therefore, it did not contribute significantly to the model (Hair *et al.*, 2009). The results from these two scales indicate the need for the increased application of techniques, the

use of more stringent criteria and a refinement of scale items to the point that the instruments to measure financial behavior and financial attitude are valid.

In the second stage, two out of the three models are considered inadequate, and both have explored the possibility of treating financial literacy as a first- or second-order model (Model 3 or Model 2, respectively). These results suggest that the creation of only one measure of financial literacy would be inadequate, at least based on the proposed variables. Thus, the construction of a multidisciplinary measure for financial literacy is still considered a challenge. However, there are possible alternative methods, such as the creation of a new scale or the creation of other models from existing scales.

After all of the estimations and research, Model 1.2 is determined to be the most adequate of the measurement tools analyzed. This model finds that financial knowledge and attitude impact positively the financial behavior and these results are consistent with the conceptual models, with the exception of the expectation regarding the correlation between knowledge and attitude.

The results are similar to those of Hilgert *et al.* (2003), Lyons *et al.* (2006) and Servon and Kaestner (2008), indicating that higher financial knowledge scores impact in higher standard of financial behavior; in addition to this, people with positive attitudes are more prone to behave in a more consistent way. However, the evidence found by Hayhoe *et al.* (2005) has not been proved, whereby a correlation between financial knowledge and financial attitude has been found. It is concluded that the level of financial literacy of university students has as a precedent the financial behavior, financial knowledge and financial attitude, with a higher impact from attitude.

In practical terms, the financial behavior of Brazilian university students expresses the ability to establish long-term aims and savings for future acquisitions or unexpected spending. This behavior is directly influenced by basic questions (interest and inflation) and advanced questions (risk and return from different assets) of financial knowledge and also by the importance attributed to attitude in the form of establishing aims, controlling spending and financial reserves.

The implications of such findings are the urgent need to ratify and develop effective actions to minimize the problem of financial illiteracy. One of the possible measures to be taken is the inclusion of matters of personal financial management and financial literacy of the market in all courses, regardless of the area of education. An additional possible measure relates to the development and adoption of educational programs, which should promote personal financial literacy in all sectors of society. Some efforts in this direction are being promoted in Brazil, especially by the Central Bank and the Federal Government, through the National Strategy for Financial Education. According to Lynch and Wood (2006), the public policy tools that can be drawn from the economics indicate three broad classes of interventions to help consumers make better decisions: offering more choices, providing better information to consumers about options they might consider and providing incentives for consumers or sellers to change their behavior.

It is important to note that the data are collected only in southern Brazil, which presents explicit peculiarities, such as an economic structure for services that is augmented by state and federal services – a system that differs from other regions in Brazil. Therefore, different profiles should be researched using a larger sample. Furthermore, while three constructs were used for financial literacy, other scales may also be relevant. The results revealed in Model 1.2 indicate that attitude and knowledge

influence behavior, which is an example that should be incorporated in the parental financial education scale developed by Norvilitis and MacLean (2010) for this model. This conclusion confirms the proposed hypothesis of a multidimensional measure of financial literacy, which is the measure for financial behavior, financial knowledge and financial attitude. This model is broadly and more connected to the conceptual definition of financial literacy, which fills in the gap identified by Fernandes *et al.* (2014).

While there are limitations to these findings, this study is a pioneering study with respect to modeling financial literacy in Brazil. This topic can be improved, as the need for rigorous evaluation of financial literacy grows at the same speed as the creation of more complex financial products.

References

Agarwalla, S.K., Barua, S.K., Jacob, J. and Varma, J.R. (2013), "Financial literacy among working young in urban India", Working Paper No. 2013-10-02, Indian Institute of Management Ahmedabad.

Agnew, J.R., Bateman, H. and Thorp, S. (2013), "Financial literacy and retirement planning in Australia", *Numeracy*, Vol. 6 No. 2.

Akaike, H. (1973), "Information theory and an extension of the maximum likelihood principle", in Petrov, B.N. and Csaki, F. (Eds), *Proceedings of the 2nd International Symposium on Information Theory*, *Akademiai Kiado, Budapest*, pp. 267-281.

Allen, M.W., Edwards, R., Hayhoe, C.R. and Leach, L. (2007), "Imagined interaction, attitudes towards money and credit, and family coalitions", *Journal of Family and Economic Issues*, Vol. 28 No. 1, pp. 3-22.

Anderloni, L. and Vandone, D. (2010), "Risk of overindebtedness and behavioral factors", Working Paper No 25, Social Science Research Network, Santa Monica, CA.

Ansong, A. (2011), "Level of knowledge in personal finance by university freshmen business students", *African Journal of Business Management*, Vol. 5 No. 22, pp. 8933-8940.

Atkinson, A. and Messy, F. (2012), "Measuring financial literacy: results of the OECD/International Network on Financial Education (INFE) Pilot study", Working Paper No. 15, OECD Working Papers on Finance, Insurance and Private Pensions, OECD Publishing, Paris.

Beckmann, E. (2013), "Financial literacy and household savings in Romania", *Numeracy*, Vol. 6 No. 2.

Blalock, L.L., Tiller, V.R. and Monroe, P.A. (2004), "They get you out of courage: persistent deep poverty among former welfare-reliant women", *Family Relations*, Vol. 53 No. 2, pp. 127-137.

Brown, M. and Graf, R. (2013), "Financial literacy and retirement planning in Switzerland", *Numeracy*, Vol. 6 No. 2.

Chen, H. and Volpe, R.P. (1998), "An analysis of personal financial literacy among college students", *Financial Services Review*, Vol. 7 No. 2, pp. 107-128.

Cheung, G.W. and Lau, R.S. (2008), "Testing mediation and suppression effects of latent variables: bootstrapping with structural equation models", *Organizational Research Methods*, Vol. 11 No. 2, pp. 296-325.

Churchill, G.A., Jr. (1979), "A paradigm for developing better measures of marketing constructs", *Journal of Marketing Research*, Vol. 16 No. 1, pp. 64-73.

Cleek, M.G. and Pearson, T.A. (1985), "Perceived causes of divorce: an analysis of interrelationships", *Journal of Marriage and the Family*, Vol. 47 No. 1, pp. 179-183.

Conger, R.D., Conger, K.J., Matthews, L.S. and Elder, G.H. (1999), "Pathways of economic influence on adolescent adjustment", *American Journal of Community Psychology*, Vol. 27 No. 4, pp. 519-541.

Criddle, E. (2006), "Financial literacy: goals and values, not just numbers", *Alliance*, Vol. 34 No. 4.

Danes, S.M. and Hira, T.K. (1987), "Money management knowledge of college students", *Journal of Student Financial Aid*, Vol. 17 No. 1, pp. 4-16.

Delavande, A., Rohwedder, S. and Willis, R.J. (2008), "Retirement planning and the role of financial literacy and cognition", Working Paper 2008-190, MI Retirement Research Center.

Disney, R.F. and Gathergood, J. (2011), "Financial literacy and indebtedness: new evidence for UK consumers", EconPapers, Discussion Papers, University of Nottingham, Centre for Finance, Credit and Macroeconomics (CFCM).

Fernandes, D., Lynch, J.G. and Netemeyer, R.G. (2014), "Financial literacy, financial education, and downstream financial behaviors", *Management Science*, Vol. 60 No. 8, pp. 1861-1883.

Fonseca, R., Mullen, K.J., Zamarro, G. and Zissimopoulos, J. (2012), "What explains the gender gap in financial literacy? The role of household decision making", *The Journal of Consumer Affairs*, Vol. 46 No. 1, pp. 90-106.

Fornero, E. and Monticone, C. (2011), "Financial literacy and pension plan participation in Italy", *Journal of Pension Economics and Finance*, Vol. 10 No. 4, pp. 547-564.

Garver, N.S. and Mentzer, J.T. (1999), "Logistics research methods: employing structural equation modeling to test for construct validity", *Journal of Business Logistics*, Vol. 20 No. 1, pp. 33-57.

Grable, J.E. and Joo, S. (1998), "'Does financial education affect knowledge, attitudes, and behavior? An empirical analysis'", *Personal Finances and Worker Productivity*, Vol. 2 No. 2, pp. 213-220.

Hader, L., Sood, S. and Fox, C.R. (2013), "Subjective knowledge in consumer financial decision making", *Journal of Marketing Research*, Vol. 50 No. 3, pp. 303-316.

Hair, J.F., Black, W.C., Babin, B.J. and Anderson, R.E. (2009), *Multivariate Data Analysis*, 7 ed., Pearson, Upper Saddle River, NJ.

Hayhoe, C.R., Leach, L., Allen, M.W. and Edwards, R. (2005), "Credit cards held by college students", *Financial Counseling and Planning*, Vol. 16 No. 1, pp. 1-10.

Hilgert, M.A., Hogart, J.M. and Beverly, S.G. (2003), "Household financial management: the connection between knowledge and behavior", *Federal Reserve Bulletin*, Vol. 89 No. 7, pp. 309-322.

Hooper, D., Coughlan, J. and Mullen, M.R. (2008), "Structural equation modelling: guidelines for determining model fit", *The Electronic Journal of Business Research Methods*, Vol. 6 No. 1, pp. 53-60.

Hung, A.A., Parker, A.M. and Yoong, J. (2009), "Defining and measuring financial literacy", Working Paper No 708, Social Science Research Network, RAND Corporation, Santa Monica, CA.

Huston, S.J. (2010), "Measuring financial literacy", *The Journal of Consumer Affairs*, Vol. 44 No. 2, pp. 296-316.

Johnson, A.C. (2001), "Evaluating a financial assessment tool: the financial checkup", *Dissertation of Utah University*, United States.

Kempson, E. (2011), "A framework for developing international financial literacy surveys", *OECD, Improving Financial Education Efficiency: OECD-Bank of Italy Symposium on Financial Literacy*, OECD Publishing. doi: 10.1787/5kmddpz7m9zq-em.

Kerkmann, B.C., Lee, T.R., Lown, J.M. and Allgood, S.M. (2000), "Financial management, financial problems and marital satisfaction among recently married university students", *Association for Financial Counseling and Planning Education*, Vol. 11 No. 2, pp. 55-64.

Klapper, L., Lusardi, A. and Panos, G.A. (2013), "Financial literacy and its consequences: evidence from Russia during the financial crisis", *Journal of Banking & Finance*, Vol. 37 No. 10, pp. 3904-3923.

Kline, R.B. (2011), *Principles and Practice of Structural Equation Modeling*, 3rd ed., The Guilford Press, New York, NY.

Knoll, M.A.Z. and Houts, C.R. (2012), "The financial knowledge scale: an application of item response theory to the assessment of financial literacy", *The Journal of Consumer Affairs*, Vol. 46 No. 3, pp. 381-410.

Lusardi, A. and Mitchell, O.S. (2010), "Financial literacy and planning: implications for retirement wellbeing", Working Paper No 17078, National Bureau of Economic Research, Cambridge, MA.

Lusardi, A. and Mitchell, O.S. (2011), "Financial literacy and retirement planning in the United States", *Journal of Pension Economics and Finance*, Vol. 10 No. 4, pp. 509-525.

Lusardi, A. and Mitchell, O.S. (2013), "The economic importance of financial literacy: theory and evidence", Working Paper No 18952, National Bureau of Economic Research, Cambridge, MA.

Lynch, J.G. Jr and Wood, W. (2006), "Special issue editors' statement: helping consumers help themselves", *Journal of Public Policy & Marketing*, Vol. 25 No. 1, pp. 1-7.

Lyons, A.C., White, T. and Howard, S. (2008), *The Effect of Bankruptcy Counseling and Education on Debtors' Financial Well-Being: Evidence from the Front Lines*, Money Management International, Houston, TX.

Mccormick, M.H. (2009), "The effectiveness of youth financial education: a review of the literature", *Journal of Financial Counseling and Planning*, Vol. 20 No. 1, pp. 70-83.

Mendes-Da-Silva, W., Nakamura, W.T. and Moraes, D.C. (2012), "Credit card risk behavior on college campuses: evidence from Brazil", *BAR: Brazilian Administration Review*, Vol. 9 No. 3, pp. 351-373.

Miller, W.R. and C' de Baca, J. (2001), *Quantum Change: When Epiphanies and Sudden Insights Transform Ordinary Lives*, Guilford Press, New York, NY.

Moore, D. (2003), "Survey of financial literacy in Washington state: knowledge, behavior, attitudes, and experiences", Technical Report No 03-39, Social and Economic Sciences Research Center, WA State University.

Murphy, D.S. and Yetmar, S. (2010), "Personal financial planning attitudes: a preliminary study of graduate students", *Management Research Review*, Vol. 33 No. 8, pp. 811-817.

Neidermeyer, A.A. and Neidermeyer, P.E. (2010), "The missing curriculum link: personal financial planning", *American Journal of Business Education*, Vol. 3 No. 4, pp. 79-82.

Norvilitis, J.M. and Maclean, M.G. (2010), "The role of parents in college students' financial behaviors and attitudes", *Journal of Economic Psychology*, Vol. 31 No. 1, pp. 55-63.

Norvilitis, J.M. and Mendes-Da-Silva, W. (2013), "Attitudes toward credit and finances among college students in Brazil and the United States", *Journal of Business Theory and Practice*, Vol. 1 No. 1, pp. 132-151.

Oggins, J. (2003), "Topics of marital disagreement among African-American and Euro-American newlyweds", *Psychological Reports*, Vol. 92 No. 2, pp. 419-425.

Organisation for Economic Co-operation and Development (OECD) (2011), *Measuring Financial Literacy: Core Questionnaire in Measuring Financial Literacy: Questionnaire and Guidance*

Notes for conducting an Internationally Comparable Survey of Financial Literacy, OECD Publishing, Paris.

Organisation for Economic Co-operation and Development (OECD) (2012), *OECD/INFE High-Level Principles on National Strategies for Financial Education*, OECD Publishing, Paris.

Organisation for Economic Co-Operation and Development (OECD) (2013), *PISA 2012 Assessment and Analytical Framework: Mathematics, Reading, Science, Problem Solving and Financial Literacy*, OECD Publishing, Paris.

Raftery, A.E. (1993), "Bayesian model selection in structural equation models", in Bollen, K.A. and Long, J.S. (Eds), *Testing Structural Equation Models*, Sage Publications, Newbury Park, CA, pp. 163-180.

Remund, D.L. (2010), "Financial literacy explicated: the case for a clearer definition in an increasingly complex economy", *The Journal of Consumer Affairs*, Vol. 44 No. 2, pp. 276-295.

Rooij, M.C.J., Lusardi, A. and Alessie, R.J.M. (2011), "Financial literacy and retirement planning in the Netherlands", *Journal of Economic Psychology*, Vol. 32 No. 4, pp. 593-608.

Schmeiser, M.D. and Seligman, J.S. (2013), "Using the right yardstick: assessing financial literacy measures by way of financial well-being", *The Journal of Consumer Affairs*, Vol. 47 No. 2, pp. 243-262.

Schwarz, G. (1978), "Estimating the dimension of a model", *The Annals of Statistics*, Vol. 6 No. 2, pp. 461-464.

Sekita, S. (2011), "Financial literacy and retirement planning in Japan", *Journal of Pension Economics and Finance*, Vol. 10 No. 4, pp. 637-656.

Servon, L.J. and Kaestner, R. (2008), "Consumer financial literacy and the impact of online banking on the financial behavior of lower-income bank customers", *Journal of Consumer Affairs*, Vol. 42 No. 2, pp. 271-305.

Shim, S., Barber, B.L., Card, N.A., Xiao, J.J. and Serido, J. (2010), "Financial socialization of first-year college students: the roles of parents, work, and education", *Journal of Youth and Adolescence*, Vol. 39 No. 12, pp. 1457-1470.

Shim, S., Xiao, J.J., Barber, B.L. and Lyons, A.C. (2009), "Pathways to life success: a conceptual model of financial well-being for young adults", *Journal of Applied Developmental Psychology*, Vol. 30 No. 6, pp. 708-723.

Shockey, S.S. (2002), "Low-wealth adult's financial literacy: money management behavior and associates factors, including critical thinking", Unpublished doctoral dissertation, The Ohio State University (AAT 3039524).

Vitt, L.A. (2004), "Consumers financial decisions and the psychology of values", *Journal of Financial Service Professionals*, Vol. 58 No. 6, pp. 68-78.

Xiao, J.J., Tang, C., Serido, J. and Shim, S. (2011), "Antecedents and consequences of risky credit behavior among college students: application and extension of the theory of planned behavior", *Journal of Public Policy & Marketing*, Vol. 30 No. 2, pp. 239-258.

Further reading

Atlas of Human Being Development in Brazil (2013), "Evolution of human development in the brazilian municipalities", available at: www.atlasbrasil.org.br/2013/en/destaques/faixas_idhm (accessed 15 November 2013).

Lyons, A.C. (2004), "A profile of financially at-risk college students", *Journal of Consumer Affairs*, Vol. 38 No. 1, pp. 56-80.

Appendix 1

Questions related to financial attitude, financial behavior and financial knowledge.

Financial Attitude	**01.** It is important to control monthly expenses.
	02. It is important to establish financial targets for the future
	03. It is important to save money on a monthly basis.
	04. The way I manage my money today will affect my future.
	05. It is important to have and follow a monthly expense plan.
	06. It is important to pay the full value on credit cards.
	07. When buying in installments, it is important to compare available credit offers.
	08. It is important to stay within a budget.
	09. It is important to invest regularly to achieve targets in the long term.
Financial Behavior	**10**. I always pay my credit cards on time to avoid extra charges.
	11. I worry about how best to manage my money.
	12. I take notes and control my personal expenses(e.g., expense and revenue spreadsheet).
	13. Iestablish financial targets for the longterm that influence the managing of my expenses.
	14. I follow a weekly or monthly plan for expenses.
	15. I go more than one month without balancing my expenses.
	16. I am satisfied with the way I control my finances.
	17. I pay my bills without delay.
	18. I can identify how much I pay when using credit.
	19. I use credit cards and overdrafts when I do not have money for expenses.
	20. When buying in installments, I compare the available credit options.
	21. I use more than 10% of my monthly earnings to make payments on my credit cards (except car financing).
	22. I check my credit card invoices to avoid possible mistakes and debts.
	23. I save monthly.
	24. I save so I can buy something expensive (e.g., car).
	25. I have a financial reserve at least three times my monthly earnings, which can be used in unexpected moments (e.g., unemployment).
	26. I compare prices when buying something.
	27. I analyze my financial situation before a major purchase.
	28. I buy on impulse.
	29. I prefer to buy a financial product to save money to buy in cash.
Basic Financial Knowledge	**30.Imagine you have R$ 100.00 in the savings account and the tax rate is 10% a year. After 5 years, how much money will you have in this account?** More than R$ 150.00 Exactly R$ 150.00 Less than R$ 150.00 Do not know
	31. Imagine the tax rate applied to your savings account is 6% a year and the inflation tax is 10% a year. After one year, how much will you be able to buy with the money from this account? More than today Exactly the same Less than today Do not know
	32. Imagine Joseph inherits R$ 10000.00 today and Peter inherits R$ 10000.00 in three years. According to the time value of money, who is going to be wealthier? Joseph Peter They are equally as wealthy Do not know
Advanced Financial Knowledge	**33. Which of the options below best describes the stock market's functions?** Allow for the meeting of people who want to buy and sell shares. Predict gains of shares Increase the prices of shares Do not know
	34. Considering a long time period, (e.g., 10 years), which asset described below normally gives the highest rate of return? Account Bond Stocks Do not know
	35.Which statement is correct? Once investing in investment refunds, it is not possible to take the money out in the first year Investment refunds can be invested in many assets, such as shares and securities Investment refunds pay assured return rates that depend on past behavior None of them Do not know
	36. Normally, which asset exhibits higher oscillations over time? Savings account Shares Public securities Do not know
	37. When an investor diversifies, his investments are divided among different assets. The risk of losing money: Increases Decreases Remains the same Do not know

Table AI.
Questions related to financial attitude, financial behavior and financial knowledge

About the authors

Ani Caroline Grigion Potrich (MS, Federal University of Santa Maria) is Doctoral Student in the Post-Graduation Program in Business Administration at Federal University of Santa Maria, Brazil. Her research interests are directed to behavioral finances, with emphasis on financial literacy. Ani Caroline Grigion Potrich is the corresponding author and can be contacted at: anipotrich@gmail.com

Kelmara Mendes Vieira (PhD, Federal University of Rio Grande do Sul) is Assistant Professor of Management in the Post-Graduation Program in Business Administration at Federal University of Santa Maria, Brazil. She is Scholarship in Research Productivity ate CNPq, and her research interests are directed to behavioral finances, capital markets and financial management.

Wesley Mendes-Da-Silva (PhD, University of São Paulo) is Assistant Professor of Management in the Department of Finance Accounting and Controllership at Fundação Getúlio Vargas Business School, Brazil. He is one of the founders of Sociedade Brasileira de Finanças (Brazilian Society of Finance) and a member of Associação Nacional de Pós Graduação e Pesquisa em Administração (National Association of Post-Graduation Studies and Research in Administration), Finance Division. His research interests are directed to the capital markets, corporate finances, behavioral finances and entrepreneurial performance. In the productive sector, he has been acting in Technical Editorial Councils in the Financial Area and also as a Consultant for topics related to the evaluation and design of corporate governance structures for public and non-public traded companies and also structured operations, in the context of fund capturing by companies participating in the Brazilian capital markets.