Predictors of credit card use and perceived financial well-being in female college students: a Brazil-United States comparative study

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Abstract

This article examines predictors of the financial well-being of female college students living in São Paulo or New York, focusing upon the relationship with their credit card use behaviour. The results of structural equation models, based on 784 participants, suggest that financial self-confidence and social comparison have an impact on the use of credit cards and exercise an influence on financial well-being. Despite the fact that social comparison is more strongly predictive of credit card use among Brazilian women, credit card use behaviour has a greater impact on the well-being of American women.

Introduction

Consumers are inevitably confronted with many complex financial decisions to handle while still young adults. The negative consequences of wrong financial decisions taken at the beginning of adulthood can extend for a considerable period of one's life (Lusardi *et al*., 2010). This realization has led researchers to examine predictors of debt and financial well-being in order to help students develop positive financial habits. One of the first tests that college students must face is when to use credit cards.

Most students manage credit cards wisely. Research in the United States indicates that most students maintain relatively low balances, with 67% reporting a balance of less than $3 000 and 22% paying off their credit cards monthly (Sallie Mae, 2009). However, a significant minority find themselves in substantial debt, which is associated with a variety of negative consequences, including decreased confidence in one's money management skills, lower self-esteem, decreased financial well-being and higher stress (Lange and Byrd, 1998; Norvilitis *et al*., 2003). Of concern for colleges, students with high levels of debt are at risk of dropping out of college due to their decreased financial well-being (Dwyer *et al*., 2013). Clearly, it is important to understand the factors predicting credit card use and financial well-being and to examine the universality of these predictors, given that most of the research to date has been conducted in North America, Western Europe, and Australia. Thus, the present study sought to explore college students' credit card use in both the United States and in Brazil.

Credit card debt is viewed as arising from multiple factors, including demographics, personality, and social and educational variables. In studies of American students, important demographic factors include year in college, with students reporting increasingly worse financial well-being with advancing year in school (Gutter and Copur, 2011), and age, with older students self-reporting more problematic financial behaviour (Lokken Worthy *et al*., 2010). Personality factors most frequently identified include more liberal attitudes towards credit use (Norvilitis *et al*. 2006), poor delay of gratification, more impulsiveness, and more compulsive spending (Strayhorn, 2002; Watson, 2003; Norvilitis *et al*., 2006; Pirog and Roberts, 2007; Joireman *et al*, 2010; Palan *et al*., 2011). Social and educational factors are also predictive of financial well-being, although the role of financial knowledge is unclear, with some studies showing a protective effect (Norvilitis *et al*., 2006; Robb, 2011) and others showing increased risk (Hirt and Nick, 1999; Norvilitis and MacLean, 2010).

However, it is not known if many of these same predictors apply to other cultures, including emerging markets (Norvilitis and Mendes-Da-Silva, 2013). The credit market among university students has been growing rapidly in Brazil, while new legal restrictions have been imposed in the United States, such as provisions of the 2009 Credit CARD Act that have served to limit college student access to credit cards (Credit Card Accountability Responsibility and Disclosure Act, 2009). Given the differences across the two countries, similar predictors of financial well-being would demonstrate the universality of these factors.

Theoretical background

This study combines two theories, social comparison theory and the theory of planned behaviour, in understanding college student financial behaviour. According to social comparison theory (Festinger, 1954), people evaluate themselves through comparisons with others. Such comparisons can influence self-confidence, self-esteem, and positive and negative feelings about oneself. In Lee's (2014) study of social media usage, individuals who are less certain about themselves were more likely to engage in social comparison.

One area in which one is likely to find social comparison is that of spending and consumption. People may compare their possessions and their income with others. Indeed, even with similar levels of income, households who consider themselves to be better off than others report higher levels of consumption (Karlsson *et al.*, 2004). Further, research has established that social comparison is linked with satisfaction with income and success (McBride, 2010) and debt among adults (Lea *et al.*, 1995), as well as to financial well-being among American college students (Norvilitis and Mao, 2012).

Social comparison may also be the basis for subjective norms about financial behaviour. Chudry *et al.* (2011) examined attitudes towards borrowing as an application of the theory of planned behaviour. The theory of planned behaviour (Ajzen, 1991) conceptualizes behaviour as the result of a combination of attitudes, subjective norms, and perceived behavioural control. Chudry *et al.* (2011) reported support for this model in a study involving student loans, for all three of these factors were found to affect intention to borrow. And, students' beliefs about social norms are related to overspending on credit cards (Sotiropoulous and d'Astous 2013).

In this study, we conceptualized student financial behaviour and perceived financial well being as resulting from a combination of these influences. Thus, financial behaviour, in this case credit card use, was expected to be predicted by subjective norms, as measured by social comparison. In addition, credit card use was also expected to be predicted by students' attitudes concerning financial self-confidence, and by perceived behavioural control, which is assumed to be related to parental modelling of financial behaviour.

Financial self-confidence

In a study of 2098 first year college students, Shim *et al.* (2010) examined a financial socialization model through the use of structural equations to explain how young people acquire financial attitudes, behaviours and knowledge. In this study the authors reported that greater parental participation, especially when a new task is being carried out that involves financial management, can help develop the self-confidence that encourages young people to adopt healthier financial attitudes and behaviours. Similarly, Norvilitis and Mao (2012) reported that parental education was related to increased financial self-confidence. Further, financial self-confidence was also related to increased delay of gratification, suggesting that self-confidence is related to more positive outcomes. Conversely, anxiety is related to compulsive buying, indicating that a lack

of self-confidence is related to negative outcomes (Roberts and Jones, 2001).

### Parental education and modelling

Positive parental modelling and instruction about money appear to decrease the risk of debt (Pinto *et al.*, 2001; Norvilitis and MacLean 2010; Norvilitis and Mao 2012). In a study that examined the influence of parental interactions on credit card use behaviour among students in seven universities, Hancock *et al.* (2013) identified the importance of the participation of parents as positive models. Limbu *et al.* (2012) further highlighted the importance of the parents in terms of confidence and balanced management when it comes to the use of credit cards, adding that those female students who are less influenced by their parents are subject to greater risk of debt. In a study of 7,417 Americans between 12 and 17 years of age, Lusardi *et al.* (2010) emphasized how important the influence of the parents is when it comes to young people acquiring financial knowledge before they get involved with contracts and begin taking financial decisions. Thus, parental modelling is critical for college students to acquire perceived control over their finances.

Gender and financial behaviour

Although the model described above should apply to both male and female college students, it is important to examine men and women separately because research on gender differences has been inconclusive, with some studies showing no differences (Davies and Lea, 1995, Norvilitis *et al.*, 2003; Norvilitis *et al.*, 2006) and others reporting increased risk among men or women. For example, Wang *et al.* (2011) state that men tend to get into debt more frequently. Conversely, Lyons (2004) found that women are more likely not to pay the whole of their credit card bill for a period equal to or greater than 2 months.

Male college students are reported to be more risk-tolerant and make more financially risky decisions (Lemaster and Strough, 2014). There may also be differences by gender in response to debt. Dwyer *et al.* (2013) report that, although student debt causes both male and female college students to slow down their progress towards graduation, males are more likely to drop out of school at lower levels of debt. In a study of 26 896 students from 10 North American universities, Yilmazer and Lyons (2010) found that women are more likely to have credit card debts in excess of $1 000, not to pay the whole bill for a period equal to or greater than 2 months and to exceed their credit card limit. Similarly, O'Guinn and Faber (1989), D'Astous (1990) and Norum (2008) argue that women report more compulsive buying behaviour, which may lead women to greater debt.

Given these conflicting results, it is evident that further research into women's use of credit is necessary, particularly in emerging markets such as Brazil. The credit industry has been growing rapidly in Brazil. Between January 2004 and January 2011, the volume of credit increased from about US$232.11 billion to about US$0.95trillion, largely due to personal credit (Depec, 2011). This growth in the use of credit has been so rapid that growth in the credit market has outpaced research. Among the few studies, Veludo-de-Oliveira *et al.* (2004) replicated findings from elsewhere around the world, reporting that
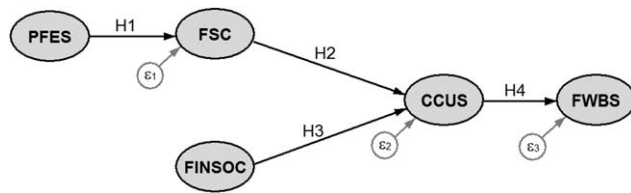
Figure 1 Proposed structural model. PFES, Parent Financial Education Scale; FSC, Financial Self-Confidence; FINSOC, Financial Social Comparison; CCUS, Credit Card Use Scale; FWBS, Financial Well-Being Scale.

compulsive spending is a predictor of risk for debt in young adults with credit cards. More recently, Mendes-Da-Silva *et al.* (2012) examined credit card risk behaviour among 769 college students, finding that those with more credit cards were at increased likelihood of risky credit behaviour and that those students who reported knowing their interest rates were at decreased risk, suggesting that knowledge may be protective. However, little work to date has examined men and women separately.

Brazilian authors have argued that the financial behaviour of women in their country should be better and more fully investigated in view of the fact that they do not have the financial autonomy that men have. This is reflected in recently published information about the determinants of well-being in the city of São Paulo. When compared with men, women reported that they were less satisfied with their financial life and with their savings for retirement (Well Being Brazil Index, 2014). In addition, among the few studies that have been conducted, women's behaviour has been examined without using control groups or data from other institutional contexts, thereby reducing the opportunity for more detailed explanations as to why certain behaviours are found in females (Trindade *et al.*, 2012).

Model for present study

Although components of this study have previously been examined in isolation, we are not aware of any studies that have simultaneously examined the influence of the three predictors on credit card use and financial well-being in female college students in a cross-cultural setting.[1] More specifically, the research, which utilized Brazilian and American students, was carried out by constructing a structural equation model. This model was capable of capturing the dynamic between these three predictors through the use of a comparative approach to these two different institutional environments.

According to Tenenhaus *et al.* (2004) structural equation modelling (SEM) allows for a simultaneous statistical regression of a group of different equations between themselves. This makes it possible to check the relationship of the two types of variable: latent and observable. Figure 1 shows the path diagram between the latent variables of the structural model.

Overall, it was expected that parental financial education and modelling would influence financial self-confidence and this combined with financial social comparison would predict credit

card use. In turn, credit card use would predict financial well-being. Specifically, based on the prior research on predictors of debt and the social comparison and planned behaviour theories, we identified four hypotheses:

H₁: The better the financial education transmitted by the parents (PFES), the greater the subsequent self-confidence in financial management of the student (FSC).

H₂: The greater the self-confidence in financial management (FSC), the more responsible the students' credit card use behaviour (CCUS).

H₃: The greater the focus upon social comparisons (FINSOC), the less responsible with credit card use (CCUS).

H₄: The less responsible the credit card use (CCUS), the worse the financial well-being (FWBS).

Method

Participants

Data were collected in medium-large public universities located in São Paulo (Brazil) and New York (United States). A total of 784 female students took part; 436 Brazilians and 348 Americans.

Of the North American female students, 71% consider themselves to be white, 8% said they were African American, 17% were of Hispanic origin, 3% were of Asian origin and 1% was Native American. With regard to the Brazilian respondents, 75% said they were white, 10% were black, 7% were of Hispanic descent, 7% were of Asian origin and 1% came from Brazilian indigenous tribes. With regard to the student profile of the respondents, in the sample of Brazilians 12% were enrolled in the first undergraduate year, 31% in the second year, 23% in the third year, 19% in the fourth year and 15% in the fifth year. Of the North Americans, 14% said they were first year college students, 25% in the second year, 34% in the third year, 18% in the fourth year and 8% in the fifth year.

With regard to the frequency with which credit cards are used by these students, 26% of the Brazilians indicated they only use this payment method in emergency situations, 20% said that they use them less than once a week, 13% said they use them at least once a week and the remaining 40% of the respondents said they use their cards more than once a week. Approximately 38% of the North Americans, in their turn, reported that they only use their credit card in emergency situations, while 26% said they use them less than once per week and 13% reported they make purchases with their cards at least once weekly. The remaining 23% disclosed a use frequency greater than once per week (Percentages may not add up to 100% due to rounding). Ten students from Brazil and 50 students from the United States left this item blank because they do not use credit cards.

Data collection and variables

Participants were recruited from a variety of departments and courses across each campus to assure that the samples are representative of each of the colleges. Both credit card users and noncredit card users participated. Instructors awarded extra credit for participation. Following a description of the study, students were given the opportunity to take a survey packet to complete. Surveys were completed outside of class and

[1]This study is a secondary analysis of a data set. For information on the original work, please see Please change to Norvilitis and Mendes-Da-Silva (2012).

Table 1 Constructs of the proposed structural model

Constructs	Definition	# of indicators
FWBS	Higher scores indicate high financial well-being	10
FSC	Higher scores indicate greater self-confidence in the management of their financial resources	10
Modified CCUS	Higher scores indicate greater responsibility in credit card use	30
FINSOC	Higher scores indicate less desire to own the goods that others have	9
PFES	Higher scores indicate better financial education passed on by the parents	34

returned to the class in which they were distributed. Because students were not required to take a packet, it is impossible to determine the response rate. The information collected was hand-written on three printed documents: a consent form, a questionnaire and a sheet for completing the replies. Upon return, consent forms were immediately separated from the answer sheet so that all responses were anonymous.

The constructs in the questionnaire formed five large question groups: Financial Well-Being Scale (FWBS; Norvilitis, *et al.*, 2003), Financial Self-Confidence (FSC; Norvilitis and Mao, 2012), Modified Credit Card Use Scale (CCUS; Raghubir and Srivastava, 2008), Financial Social Comparison (FINSOC; Norvilitis and Mao, 2012) and Parental Financial Education Scale (PFES; Norvilitis and MacLean, 2010). Table 1 gives a brief definition of the constructs and the number of questions used to measure them.

A 5-point Likert scale was used for all questions, with 1 meaning 'strongly agree' and 5 meaning 'strongly disagree'. The scale was inverted for some variables so that high scores had the interpretation suggested in Table 1. The variables used in the reverse scale can be identified by the suffix *r* in Fig. 2 and the original questions in Table 2, with the observable variables remaining in the model.

Results

Data analysis plan

All estimations were carried out using Stata version 12 software. Whenever possible and to enhance the robustness of the results, we used three different estimation techniques: the asymptotic distribution-free (ADF) method, the maximum verisimilitude method (ML) and the maximum verisimilitude method, with *missing values treatment* (MLMV). In the order in which they were listed, these methods give gradually more restrictive hypotheses. The ADF method is a generalized method of moments (GMM) estimator and makes no supposition of joint normality or even of symmetry in the data.

But ADF is less efficient than ML when the suppositions for ML are valid. Maximum verisimilitude is the estimation method most widely used in SEM analyses because it requires a smaller number of data for convergence and conditional normality is sufficient for obtaining consistent estimates. MLMV, conversely, requires all variables to be jointly normal, which is a very strong premise in most cases, particularly if the measurement scale is categorical, as is the case with this study.

According Mueller and Hancock (2007), the process of composition of the latent variable components of the structural
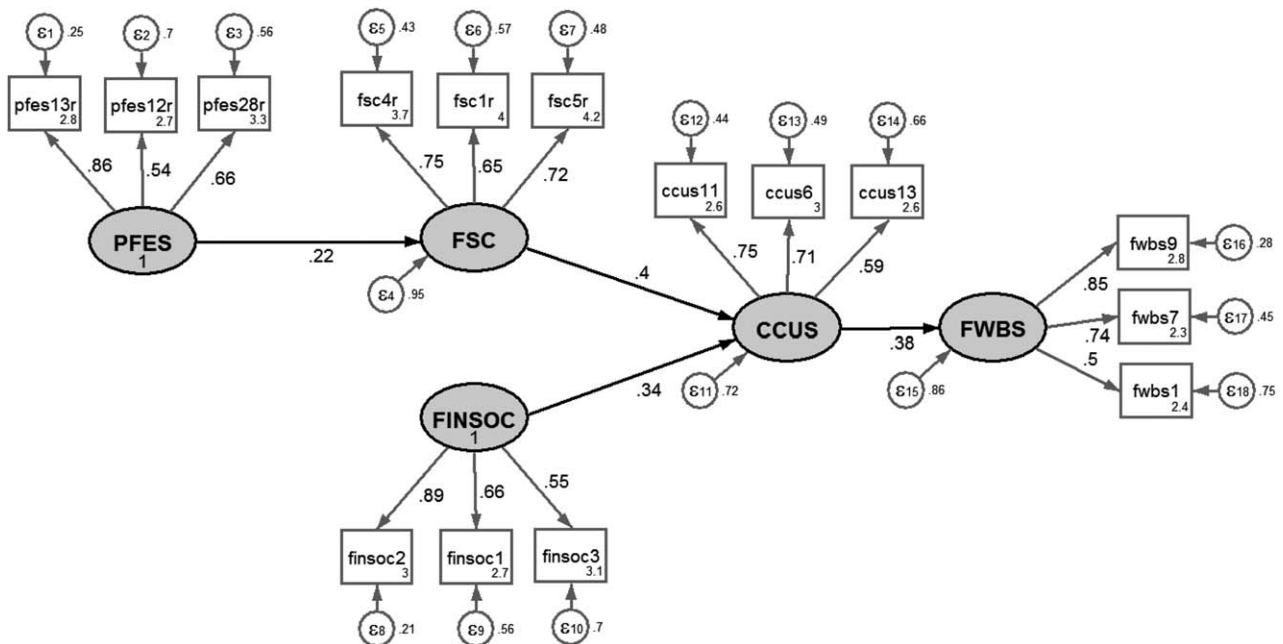
Figure 2 Structural model estimated for maximum verisimilitude. The diagram shows the standardized estimates. The values in arrows represent the betas and the values within the rectangles, the constant. The values alongside the errors represent their variance.

Table 2 Observable variables remaining in the model

Label	Questions (latent variable indicators)
FSC	Financial Self-Confidence
fsc1	I am confident that I know how to handle my money
fsc4	I trust my capacity for handling credit cards
fsc5	I trust my capacity for handling bank accounts
FINSOC	Financial Social Comparison
finsoc1	When I see things that others have, like clothes or an automobile, I would often like to have that too
finsoc2	I usually compare what I have with what my friends have
finsoc3	I am happy when I see I have nicer things than other people
CCUS	Credit Card Use Scale
ccus6	Every month I am afraid when I receive my credit card bill
ccus11	I regret the amount of my credit card bills when I finally have to pay them
ccus13	I buy unnecessary items when I use a credit card
PFES	Parental Financial Education Scale
pfes12	My parents helped teach me how to save money
pfes13	My parents talked to me about their priorities in terms of domestic expenditure
pfes28	My parents helped me understand their financial priorities
FWBS	Subjective Financial Well-being
fwbs1	I am bothered about the debts I currently have
fwbs7	I think a lot about my current debts
fwbs9	I frequently catch myself thinking about my debts

Scale used 1-Strongly agree; 2-Agree; 3-Neither agree, nor disagree; 4-Disagree; 5-Strongly disagree.

model is based on the choice of indicators, by the researcher. And this process of choice must rest on two main pillars, i) the arguments underlying the model, in the literature on the subject studied, and the model fit measures. This line of procedure has already been used in recent studies about young adults' attitude to credit and Money (Potrich *et al*., 2016).

Despite the fact that each construct initially contains a large number of observable variables (see Table 1), to achieve convergence in the estimation methods and satisfactory adjustments in the measurement, validity and reliability models, it was necessary to reduce the number of indicators drastically. The question of the convergence of the estimation methods is linked to the identification hypothesis of the models and to sample size. Models with a large number of indicators need larger samples and estimation methods with fewer restrictive hypotheses (Thompson, 2006).

In this study, e.g. if an indicator was created to measure PFES is explaining better the CCU, we have a divergent validity problem. And, if the set of indicators that measure PFES, example.g. are not correlated enough can have convergent validity and reliability problems. A convergent validity problem occurs when the indicators of a latent variable does not correlate sufficiently. And the lack of discriminant validity is when an indicator can better explain another factor that not father factor.

To address both problems, the indicators were excluded one by one, from the most critical. With each step we calculate the measures of: Composite Reliability (CR), Average Variance Extracted (AVE), Maximum Shared Variance (MSV), and Shared Average Variance (ASV), until the adjustment is considered satisfactory. Therefore, our final model could only handle three indicators in each construct. The remaining observable variables are listed in Table 2.

Table 3 contains the adjustments of the measurement model for the validity and reliability of the constructs, as estimated by the ADF and ML methods. The CR, AVE, MSV and ASV variables gave the values recommended in literature. The only exception was the AVE value for the CCUS construct, which despite not exceeding the value recommended gives a result that is very close to it.

The adjustment measures of the confirmatory factor analysis (CFA) model and the structural model (SEM) are shown in Table 4. We estimated both using the three methods previously mentioned: ADF, ML and MLMV. With regard to the adjustments to the full sample, we saw that both CFA and SEM gave values within the recommended parameters. The exception was for the Standardized Root Mean Square Residual (SRMR) value for the ADF method, which does not satisfy the criterion of remaining below 0.08 (Hu and Bentler, 1999).

With regard to the structural model (SEM), a correlation was initially allowed between the exogenous latent variables, PFES and FINSOC. However we obtained a nonsignificant correlation coefficient and we chose, therefore, to restrict this correlation to zero. This led to obtaining a slight improvement in the adjustments of the model. It is worth noting that for the ML method the SRMR was less than 0.08 and the Root Mean Square Error of Approximation (RMSEA) was less than 0.06, and thus Hu and Bentler's Two-Index strategy was satisfied.

Generally speaking, the statistics calculated using the ML method gave better adjustments than the ADF and the MLMV

Table 3 Results of the validities and reliabilities of the constructs

	ADF Method				ML Method			
	CR[a]	AVE[b]	MSV[c]	ASV[d]	CR[a]	AVE[b]	MSV[c]	ASV[d]
FINSOC	0.787	0.561	0.097	0.038	0.747	0.507	0.114	0.031
FSC	0.803	0.579	0.081	0.031	0.749	0.500	0.148	0.066
FWBS	0.765	0.534	0.258	0.078	0.747	0.507	0.135	0.052
PFES	0.758	0.519	0.018	0.010	0.737	0.493	0.052	0.014
CCUS	0.729	0.477	0.258	0.114	0.721	0.465	0.148	0.099

Recommended values: [a]CR > 0.7. [b]AVE > 0.5. [c]MSV < AVE. [d]ASV < AVE.
ADF, asymptotic distribution-free method; ML, maximum verisimilitude method.

Table 4 Adjustment metrics of the models

Model	N	χ^2	df	χ^2/df [a]	RMSEA [b]	pclose [c]	CFI [d]	SRMR [e]
CFA (ADF)	612	230.71*	80	2.88	0.055	0.135	0.856	0.108
CFA (ML)	612	216.04*	80	2.70	0.053	0.287	0.943	0.044
CFA (MLMV)	784	246.14*	80	3.07	0.051	0.359	0.943	
MG-CFA (ML)	612	497.38*	180	2.76	0.076		0.875	0.074
Brazil	374							0.070
Unites States	238							0.078
MG-CFA (MLMV)	784	596.50*	180	3.31	0.077		0.866	
SEM (ADF)	612	243.78*	86	2.83	0.055	0.160	0.849	0.114
SEM (ML)	612	225.38*	86	2.62	0.051	0.372	0.941	0.049
SEM (MLMV)	784	255.15*	86	2.97	0.050	0.479	0.942	
MG-SEM (ML)	612	555.87*	195	2.85	0.078		0.858	0.094
Brazil	374							0.076
Unites States	238							0.108
MG-SEM (MLMV)	784	655.66*	195	3.36	0.078		0.851	

*for the *p*-vlue(χ^2) < 0.05.
Recommended values: [a]χ^2/df<5 moderate <3 good. [b]RMSEA <0.10 moderate <0.05 good. [c]pclose >0.05. [d]CFI >0.80 moderate >0.90 good; and: SRMR < 0.08.
CFA, Confirmatory Factorial Analysis; SEM, structural model; MG, Multigroup Analysis. ADF, asymptotic distribution-free estimation method; ML, maximum verisimilitude method; MLMV, maximum verisimilitude method with missing values treatment. SRMR is not calculated by the MLMV method and pclose is not calculated in multi-group analysis.

methods. This is no reason, however, for one method to be selected in detriment to another since, as we have already discussed, the assumptions of each of them differ substantially. We preferred, therefore, to present the parameters as estimated by the three methods because we believe that the convergence or not of the results is important which leads us to a picture that is closer to reality.

Structural model

Figure 2 presents the results of the estimation by the maximum verisimilitude method of the proposed structural model and Table 4 shows the adjustments to the model. The standardized estimates of the parameters for the three estimation methods can be seen in Table 5 in '*default model*'.

Before analysing the results obtained for these parameters (Table 5) and checking the hypotheses of the models, a discussion on the construction of this model is in order. The hypotheses raised were based on studies in which the dynamic between the constructs was examined in isolation. In other words, when we formulated Hypothesis 1, which is that parental education has an impact in terms of greater financial self-confidence, we used studies that checked this implication without considering the effect of other variables. Testing this hypothesis in the structural model consists in analysing up to what point this relationship is maintained in a broader context, where other dynamics are observed.

However, when we create a path from PFES to FSC and from the latter to CCUS, we are discarding a possible direct effect from PFES to CCUS. In other words, we might be basing this on research that is prior to the impact of financial self-confidence on credit card use behaviour and to the impact of parental education on self-confidence; but this ignores that there might be a direct and relevant impact of parental education on credit card use. To examine this type of concern we

tested the mediating effects of the constructs. These results are also presented in Table 5.

To measure the mediation relationship exercised by FSC of PFES on CCUS, we included a new path between PFES and CCUS. Despite being statistically significant at 10% we notice that the beta was very small, being estimated in the three methods at −0.09. Analogously, to test the mediation exercised by CCUS on FINSOC and FSC on FWBS, we included direct

Table 5 Estimates of the parameters in the path model

	ADF	ML	MLMV
Panel A: Default model			
PFES → FSC	0.05	0.22***	0.16***
FSC → CCUS	0.34***	0.40***	0.41***
FINSOC → CCUS	0.33***	0.34***	0.33***
CCUS → FWBS	0.53***	0.38***	0.39***
Panel B: FSC mediation			
PFES → FSC	0.04	0.23***	0.17***
PFES → CCUS	−0.09*	−0.09*	−0.09**
FSC → CCUS	0.33***	0.43***	0.43***
FINSOC → CCUS	0.34***	0.34***	0.33***
CCUS → FWBS	0.51***	0.38***	0.39***
Panel C: CCUS mediation			
PFES → FSC	0.05	0.22***	0.16***
FSC → CCUS	0.34***	0.39***	0.40***
FINSOC → CCUS	0.33***	0.35***	0.33***
FSC → FWBS	0.01	0.12**	0.09
FINSOC → FWBS	0.00	−0.02	−0.02
CCUS → FWBS	0.53***	0.33***	0.36***

Standardized estimates of the coefficients in the structural model.
p-value: *<0.10, **<0.05, ***<0.01.
ADF, asymptotic distribution-free estimation method; ML, maximum verisimilitude method; MLMV, maximum verisimilitude method, with missing values treatment.

paths between them. We note that with the exception of the impact of FSC on FWBS by the ML method, all the estimates were statistically nonsignificant for all the estimation methods. These tests, therefore, corroborate the validity of the proposed model.

Returning to deal with the original model, we must first try to show that in the way we oriented the measurement scale (see Table 6) confirmation of the hypotheses is linked to finding positively significant coefficients between constructs. We can check that the conclusions about the effects of PFES on FSC are doubtful. While the ML and MLMV methods estimated this effect at 0.22 and 0.16 respectively, significant at 1%, the ADF method did not reject the possibility of this effect being null. Therefore, Hypothesis (H_1), that parental education positively affects self-confidence in financial management, cannot be satisfactorily demonstrated. What the results do allow us to state is that if the effect exists it will be positive.

On the other hand, Hypotheses (H_2), that confidence in financial management leads to better credit card use, (H_3), that less inclination to social comparison implies a more rational credit card use, and (H_4), that less responsibility in credit card use results in a state of worse financial well-being were all supported by the model. Regardless of the estimation method used, all the coefficients are significant at 1% and positive. As for the magnitudes of the estimated values we note a convergence of the results with the maximum verisimilitude methods.

The ADF method estimated the FINSOC on CCUS (H_3) coefficient with a result similar to the ML methods, but the FSC on CCUS (H_2) and CCUS on FWBS (H_4) coefficients with results that were different from those in the ML methods, at below (0.34 vs. 0.40) and above (0.53 vs. 0.38) respectively. Table 6 shows the direct, indirect and total effects between all the constructs of the model. We note that the total effect of PFES both on CCUS and on FWBS is null or practically null, while FINSOC and FSC are significantly important for determining the financial well-being of women.

Comparison between Brazil and the United States

To compare Brazilian and American women, it was first necessary to check the invariance in the measurement model, known in literature as factorial invariance (FI). FI procedures are well established and made increasingly easier by powerful statistical packages, but there is controversy regarding the acceptable levels of invariance and the preferred manner of testing them. Meredith and Horn (2001) propose that factorial invariance should be tested by forcing equality both of the coefficients and the intercepts of the indicators. This type of invariance is called strong factorial invariance, or metric and scalar factorial invariance.

Following this procedure we carried out a score test on the difference in chi-squares between the restricted and unrestricted model (Baseline) using the ML method and we obtained a X_{diff} (10) = 34, 617 for the CFA Multigroup model and a X_{diff} (10) = 34, 884 for the SEM Multigroup model. Both gave statistically significant differences which invalidates strong factorial invariance. The adjustment metrics for these models are shown in Table 4, along with the models with the whole sample. The ADF method did not converge in the group analysis and so there is nothing to report.

If strong factorial invariance should be required, analysis between the groups must be aborted. Some researchers, however, argue that in the absence of invariance, finding some factorial invariance is better than abandoning the analyses altogether (Byrne *et al.*, 1989). In their work on partial measurement invariance (PMI), Byrne *et al.* (1989) argue that if two or more loadings are invariant, then the metric of the common factor can be considered equivalent between the groups, so that comparisons can still be made. If this methodology is adopted, a score test of the difference in the coefficients in our SEM comparison between groups rejected the restriction at 10% for items (*p-value* in parentheses): fwbs1 (0.0698), ccus6 (0.0003), finsoc3 (0.0083), fsc5r (0.0054) and pfes28r (0.0659). Considering that two of the three loadings of each construct were considered invariant, the PMI could be a defence for the validity of the comparison between groups.

However, we are not interested in pursuing this investigation into the factorial invariance of the model in any more depth and neither, based on the results we found, do we want to argue that this partial invariance is satisfactory, as we understand that this is still a problem under development that is both theoretical, as researchers have not reached any consensus, and empirical, as only a repeat of this study with new data can clarify this issue. According to Bontempo *et al.* (2007), what is needed is knowledge of the limit at which the lack of invariance presents a significant practical bias for a private study, but what is tested is only the difference in the coefficients.

Table 7 shows the estimates of the coefficients in the SEM Multigroup analysis. The estimates were generated using the ML and MLMV methods; ADF did not converge, which is

Table 6 Direct, indirect and total effects

	ADF	ML
Panel A: Direct effects		
PFES → FSC	0.04	0.16***
FSC → CCUS	0.38***	0.46***
FINSOC → CCUS	0.28***	0.32***
CCUS → FWBS	0.66***	0.43***
Panel B: Indirect effects		
PFES → CCUS	0.01	0.07***
PFES → FWBS	0.01	0.03***
FSC → FWBS	0.25***	0.19***
FINSOC → FWBS	0.19***	0.14***
Panel C: Total effects		
PFES → FSC	0.04	0.16***
PFES → CCUS	0.01	0.07***
FSC → CCUS	0.38***	0.46***
FINSOC → CCUS	0.28***	0.32***
PFES → FWBS	0.01	0.03***
FSC → FWBS	0.25***	0.20***
FINSOC → FWBS	0.19***	0.14***
CCUS → FWBS	0.66***	0.43***

Standardized estimates of the coefficients in the structural model.
p-value: ***<0.01.
ADF, asymptotic distribution-free estimation method; ML, maximum verisimilitude method.

Table 7 Results of the multigroup analysis

	ML			MLMV	
	BR	US	χ^2 (1)	BR	US
PFES → FSC	0.23***	0.20**	0.65	0.18***	0.14**
FSC → CCUS	0.35***	0.46***	1.82	0.38***	0.44***
FINSOC → CCUS	0.43***	0.23***	5.66**	0.39***	0.22***
CCUS → FWBS	0.30***	0.48***	4.55**	0.34***	0.47***

Standardized estimates of the coefficients in the structural model.
p-value: **<0.05, ***<0.01.
ML, maximum verisimilitude method, with treatment of missing values.

why there is nothing to show. For the ML method we carried out a Wald test to test for equality of coefficients. The effects of PFES on FSC and FSC on CCUS were determined to be equal between the groups, implying that the value of parental education for confidence in financial management is the same among Americans and Brazilians, as is the effect of financial self-confidence on credit card use behaviour. The FINSOC on CCUS and CCUS on FWBS coefficients, on the other hand, were determined to be different between the two countries.

The effect of social comparison practices on card use is stronger among Brazilian women. This result is in line with the larger rate of frequent and nonurgent use of credit cards by Brazilian women, while the impact of credit card use on financial well-being is greater for American females than for Brazilian women.

Discussion

This study analysed the effect of credit card use behaviour on the financial well-being of college women living in São Paulo or in New York. To do so, structural equation models were used, based on a survey of 784 participants. We investigated the relationships that exist between Financial Social Comparison, Parental Financial Education, Financial Self-Confidence, Modified Credit Card Use Scale and Perceived Financial Well-Being Scale constructs. These effects have already been checked in isolation by other researchers. In this work we expanded the analysis by considering the joint dynamics of these factors. To do so we built a structural equation model in which the proposed relationships between the constructs are analysed through four hypotheses.

To test the hypotheses the same model was estimated in three different ways: (i) the ADF method; (ii) the maximum verisimilitude method and (iii) the maximum verisimilitude method, considering *missing values*. The four hypotheses that were formulated were confirmed; that is, the arguments used in proposing the empirical model found support in the data collected. However, doubts remained as to the magnitude of the effect of parental education on self-confidence in financial management.

The comparison between Brazilian and American female students identified similar effects for parental education and self-confidence in financial management. Credit card use behaviour among Brazilian females seems to be more affected by social comparison than among American females. However, American women who reported more negative credit card behaviour report lower levels of financial well-being than Brazilians. These results indicate that American and Brazilian college students use credit cards differently, that they are affected by their use in different ways, or a combination of these two factors. Clearly, this question warrants further research. However, results from the combined samples suggest more similarities across cultures than differences.

Overall, the results support the theoretical model in that social comparison appears to influence credit card behaviour. Specifically, women who engage in more social comparison are more likely to report problematic credit card use. This suggests that students who more frequently compare their possessions and spending habits with others may use their credit cards to maintain the lifestyle that they aspire to have. The other portion of the model, the theory of planned behaviour, was generally supported as well. The theory of planned behaviour posits that intended behaviour is predicted by social norms, attitudes, and perceived behavioural control. In this case, social comparison (representing social norms) and financial self-confidence (attitudes) both predicted credit card behaviour. The third factor, parental modelling and education (leading to perceived behavioural control) was related in some models, but not all. It is noteworthy that these results were consistent across two countries, Brazil and the United States, indicating that these processes are not simply products of one culture.

Despite these results, the present study had limitations. Most notably, it was assumed that parental modelling and education would lead to perceived behavioural control. Although this assumption is based upon prior research (e.g. Limbu *et al.*, 2012), in the future, it would be helpful to include measures of both constructs in a future model to explicitly test this assumption. Further, the data were collected on just two campuses, one in each country. The two colleges are similar in that both are medium-large, public institutions, located in urban areas and thus they are broadly comparable to one another. However, it is possible that different results might be found on campuses with different characteristics. Future research should examine this possibility.

Conclusion

Overall, the results highlight the need for interventions with college students that extend beyond simple financial education. Although financial literacy is important, the role of financial knowledge in predicting student debt is unclear, with some studies showing a protective effect (Norvilitis *et al.*, 2006; Robb, 2011) and others showing increased risk (Hirt and Nick, 1999; Norvilitis and MacLean, 2010). Given this, it may be that interventions to help students avoid debt and to promote perceived financial well-being should also address the social factors, such as social comparison, and attitudes, including financial self-confidence, that clearly play a role in student financial behaviour.

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