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PREDICTORS AND IMPLICATIONS OF PERSONAL FINANCE MANAGEMENT

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ABSTRACT

The understanding of personal finance management becomes a pressing concern as individuals across most of the world live longer while simultaneously facing decreasing incomes and increasing income inequality. Study 1 examined time discounting as an individual differences predictor of income. The investigation of putative mechanisms revealed that the effect of time discounting on income is fully mediated by general education and financial literacy. Study 2 extended these findings by focusing on another metric of financial standing: creditworthiness as measured by FICO scores. Results indicated that education and financial literacy fully mediated the relationships between deliberative time discounting – thought to reflect controlled/reflective processing – and creditworthiness. In order to assess how individuals use assets, credits, loans, savings, and investments, we developed a measure of consumer banking competence (CBC) in which lower scores indicate undesirable banking practices and higher scores indicate desirable banking practices. Studies 3-5 demonstrate the newly-developed scale's internal consistency, validity, and reliability. Greater scores on the CBC were associated with greater individual and household income, specifically, with greater income from investments and capital gains. The data indicated that financial literacy and consumer banking competence represent two distinct yet viable indices of financial expertise. Whereas financial literacy seems to assess knowledge of finance, the CBC scale appears to assess behavioral practices in regard to money management. Study 6 demonstrated that the CBC fully mediated the relationships between financial literacy with income and creditworthiness. These results suggest that among the two indices of financial expertise – financial literacy vs. consumer banking competence – consumer banking competence may play a more proximal role to individual financial outcomes. Study 7 showed that conscientiousness, extraversion, and emotional stability carry implications for personal finance

management. Results from Study 8 show that consumer banking competence explained variability in physical health beyond known correlates. By contrast, variability in financial literacy accounted for unique variability in subjective well-being beyond that explained by known correlates of the construct. Taken together the current findings indicate that managing personal finance represents a broad-ranging set of skills with implications for not only financial outcomes but also physical health and psychological well-being.

GENERAL INTRODUCTION

Social status hierarchies are omnipresent in a wide range of organized behavior and exert profound influence on life across many species; from ants, fish, and birds (Grosenick, Clement, & Fernald, 2007; Tinbergen, 1936; Wilson, 2000), to non-human primates and humans alike (Cheney & Seyfarth; 2008; Fiske 2010; Hare & Tomasello, 2004; Magee & Galinsky, 2008; Stephens, Markus, & Townsend, 2007). Human hierarchies influence social behavior within professional, domestic, and recreational social settings (Cummins, 2000). These formal and informal hierarchies are believed to serve two broad sets of functions. First, they provide social roles guiding the behavior of group members, which in turn facilitate order, coordination, and interactions. Second, hierarchical structures incentivize those at the bottom of the hierarchy to progress and achieve higher relative standings (Anderson & Kilduff, 2009; Flynn, Reagans, Amanatullah, & Ames, 2006; Henrich & Gil-White, 2001; Hogg, 2001; Huberman, Loch, & Önccüler, 2004; Magee & Galinsky, 2008).

Achieving high status caries substantial implications, such as improved access to scarce resources, greater social support, better physical and mental health, longer life expectancy, and better reproductive success (Adler et al., 1994; Ellis, 1994). In addition, social status can shape one's daily life by affecting one's neighborhood of residence, as well as the occupations and social organizations one can enter (Domhoff, 1998; Leventhal & Brooks-Gunn, 2000). Social status shapes people's customs as well as their preferences for art, music, literature, etc. (Bordieu, 1984; Snibe & Markus, 2005).

Bearing in mind the proposition that hierarchical structures incentivize individuals to progress and achieve high status, as well as the far-reaching consequences of having achieved high status on the quality of human life, it is natural to ask whether people themselves realize

how class and status affect them. Relative to the rest of the world, Americans are not comfortable talking about social class, and many hold the belief that class and status do not exert strong influence on their life (Kingston, 2000; Mantsios, 2006). Some have suggested that this may be due to the particularly strong notion of the *American Dream* and its promise of equal opportunity (Kraus & Stephens, 2012). However, the reality is that the contemporary United States is confronted with unprecedented income inequality, as well as lower levels of social mobility compared to other industrialized nations (Burkhauser, Feng, Jenkins, & Larrimore, 2009; Fiske & Markus, 2012; Picketty & Saez, 2003). In his seminal book *Capital in the Twenty-First Century*, the economist Thomas Piketty provides an economic explanation for these trends by demonstrating that when the rate of return on capital is greater than the rate of economic growth we tend to observe concentration of wealth among few. This leads to not only economic but also social consequences. Such trends can be alarming, since they do not merely represent differences in disposable income; rather, high levels of income inequality denote the deepening of already existing social class divisions which can have far reaching negative consequences for those lower in social rank compared to their more affluent counterparts.

Socioeconomic Status

But what is status and how do we measure it? Even though researchers generally agree upon the omnipresence of status hierarchies, providing an exhaustive yet precise operational definition of the construct remains elusive as researchers actively debate what represents the single best measure of social status and class (Cloutier, Cardenas-Iniguez, Gyurovski, Barakzai, & Li, 2016; Kraus & Stephens, 2012). In examining the effects of status among humans, researchers from across disciplines have utilized a variety of generalizable definitions of the construct with the most common one being referred to as socioeconomic status (SES). SES represents a multi-

dimensional construct that is usually based on an objective assessment of one's education, occupation, and income (Lareau & Conley, 2008; McLoyd, 1998; Oakes & Rossi, 2003). The measurement of these SES factors can be done on the individual level as well as on the household level. Additionally, when studying children and adolescent populations it is common to use parental indices of the aforementioned factors.

Education

Researchers consider general educational attainment to be an integral part of the measurement of social status. In general, having more education is associated with improved competence and expertise. A common strategy for achieving high status is by demonstrating task-related competence and expertise as a way of enhancing one's apparent value and contributions to the group (Anderson & Kilduff, 2009a; Anderson & Kilduff, 2009b; Cheng, Tracy, Foulsham, Kingstone, & Henrich, 2013). In addition, educational attainment is linked to higher income and opportunities for more prestigious occupations (Snibe & Markus, 2005; Tamborini, Kim, & Sakamoto, 2015). For instance, a 4-year college graduate is likely to earn approximately twice as much over his or her life, relative to others whose highest obtained degree is a high-school diploma (Day & Newburger, 2002; Pascarella & Terenzini, 1991). Furthermore, attending college or advancing one's education more generally presents one with access to cultural capital (e.g., manners, customs) that facilitates functioning in higher social class circumstances (e.g., social connections) (Domhoff, 1998).

Income

Due to the recent increases in inequality around the world and within the United States specifically (Burkhauser, Feng, Jenkins, & Larrimore, 2009; Fiske & Markus, 2012; Kraus, Piff, & Keltner, 2009; Norton & Ariely, 2011; Picketty & Saez, 2003), researchers underscore the

importance of income as a robust indicator of social class and status. Individual and household income are important variables to consider in much of the research on social status because they represent the most proximal assessment of an individual's ability to benefit from material resources such as healthy food, reliable transportation, and accessible healthcare. Variability in income carries important implications for one's psychological well-being. For instance, lower-income individuals from across the United States demonstrate reductions in subjective-well-being, compared to their wealthier counterparts (Howell & Howell, 2008). Furthermore, recent research (Ruberton, Gladstone, & Lyubomirsky, 2016) indicates that a greater bank-balance is associated with positive perceptions of one's financial well-being. This in turn predicted greater life satisfaction when controlling for known correlates, such as demographics, investments, spending, and indebtedness. Simply put, having a safety net of cash on hand is associated with unique variability in life satisfaction above and beyond what income, investments, or indebtedness can predict (Ruberton, Gladstone, & Lyubomirsky, 2016).

Occupation

Aside from education and income, occupation carries important implications as an indicator of social class because one's vocational position comes with a formative context that shapes the psychological experiences of that individual. For instance, professions deemed more prestigious, such as lawyers and doctors, tend to be associated with a need for high educational attainment. Additionally, these professions expose those who perform them to a greater variety of tasks of substantive complexity, with less management and supervision, as well as a certain freedom of choice of action. In stark contrast, professions deemed less prestigious, such as construction workers or employees in the service industry are exposed to repetitive and routine

tasks, a high degree of supervision, and therefore limited, if any, freedom of choice of action (Kohn & Schoenbach, 1983; Kohn & Schooler, 1983).

Taken together, educational attainment, income, and occupation represent one of the most widely used indices of objective social class because they shape the social environment in which people function (Kraus & Stephens, 2012). For instance, individuals tend to live in neighborhoods, attend schools, date, and work with individuals of similar status (Argyle, 1994; Kusserow, 2004; Lareau, 2003; Nisbett, 2009; Sweeney & Cancian, 2004). Researchers have argued that the three factors indicating social class and status do not merely represent an individual trait, but also shape the environment where individuals spend prolonged amounts of time (Kraus & Stephens, 2012). In fact, one's SES has been linked to important life outcomes (for a review see Cloutier, Cardenas-Iniguez, Gyurovski, Barakzai, & Li, 2016) such as social functioning, structural brain development, as well as neurocognitive functioning across multiple domains including language, self-regulation, memory, and socio-emotional processing (Kim et al., 2013; Noble, Wolmetz, Ochs, Farah, & McCandliss, 2006; Raizada, Richards, Meltzoff, & Kuhl, 2008; Sheridan, Sarsour, Jutte, D'Esposito, & Boyce, 2012; Stevens, Lauinger, & Neville, 2009; Tomalski et al., 2013).

Although education, income, and occupation are often highly correlated, it is important to be mindful of their distinctiveness as they reflect discrete life experiences, development opportunities, and environment circumstances (Brito & Noble, 2014; Duncan & Magnuson, 2012; Noble et al., 2015). Therefore, it is critical to also examine SES factors individually as they likely represent the availability of distinct resources especially during one's childhood development. For instance, income may exert its influence through the availability of material resources whereas parental education may shape interactions with one's children (Duncan &

Magnuson, 2012). Distinct SES factors also exert distinct influence on structural brain development. Research (Noble et al., 2015) shows that parental education is linearly associated with children's total brain surface area implying that increases in parental education lead to proportional increases in surface area during childhood and adolescence. By contrast, family income and surface area were logarithmically related, suggesting that increases in family income lead to proportionally greater increases in children's brain surface area at the lower end of the family income spectrum (Noble at al., 2015). Furthermore, whereas parental education is not associated with cortical thickness, family income is borderline (p=.054) significantly associated with cortical thickness. In addition, family income was a positive predictor of cognitive performance including working memory, vocabulary, and reading (Noble at al., 2015). These relationships are important to note as they may have downstream consequences. It has been shown that relative to wealthier children, those from poorer households tend to enter school with less developed literacy and numeracy skills critical for early school success (Magnuson, Meyers, Ruhm, & Waldfogel, 2004), and have been demonstrated to be the strongest predictors of future academic trajectories (Duncan et al., 2007; Heckman, 2000).

It is also important to note, however, that the different SES factors (income, education, occupation) do not share the same predictive ability across countries. For example, using income as a marker of SES is less discriminatory in predicting individual outcomes in the United Kingdom, where indices based on occupation or education are more robust predictors. By contrast, income appears to be a more optimal index of SES within the United States, as income is a considerably more sensitive predictor of health, relative to education or occupation (Duncan et al. 2002; Marmot, 2004). Researchers have speculated that this may be due to the fact that once achieved, the level of educational attainment is unaffected by subsequent changes in SES

(Cherkas et al., 2006). Furthermore, income plays a more proximal role for the procurement of vital resources necessary for life – nutritious food, reliable transportation, and accessible healthcare – than do education, or occupation. This may be especially true in the case of the US, which lack the network of social services present in other industrialized nations where the deleterious effects of compromised raw earnings are buffered by the effect of national social services such as healthcare and transportation.

Summary and Current Research

To summarize, hierarchical structures are pervasive in daily life and SES represents one of the dominant forms of status among humans. The different factors composing SES (education, income, and occupation) exert influence across multiple aspects of human life, including brain structure and function, achievement, health, and social functioning. However, different SES factors (e.g. education vs. income) exert distinct influence on humans with income being one of the more robust predictors of health outcomes in the US.

Rather than furthering the investigation on the effects of SES, the main goal of the current set of studies is to take a step back and to identify individual predictors (e.g. time discounting) associated with not only better income, but also creditworthiness, as indebtedness represents a crucial component of one's overall financial status. In addition, the current set of studies proposes putative mechanisms (e.g. educational mediators) through which these individual predictors may influence one's overall financial standing, highlighting the different roles of finance-specific knowledge, such as financial literacy and consumer banking competence.

In order to accomplish these goals, Chapter 2 focuses on the effect of time discounting on income. Here we demonstrate that the relationship between these two variables is fully mediated

by general education and financial literacy. Chapter 3 extends these findings by showing that education and financial literacy also mediate the relationship between time discounting and creditworthiness which represents another important metric of financial performance. Results from Chapters 2 and 3 suggest that valuing later, larger rewards over sooner, smaller rewards may represent a building block for more complex behaviors by triggering cognitive and behavioral processes that can be domain specific to the behavior of interest. This may include behaviors and mental processes that allow fully developing one's earning potential, or remaining creditworthy in the eyes of financial institutions. Chapter 4 extends this line of research by developing and validating an alternative measure of financial expertise, *consumer banking competence* (CBC). We define CBC as behaviors which enable individuals to utilize assets, credits, financial markets, and, in particular, banking institutions and Alternative Financial Services (AFS) providers. Chapter 4 offers three distinct applications of the newly-developed consumer banking competence scale: first, identifying the character traits of the "financially-savvy" personality; second, predicting physical health and psychological well-being; and third, proposing consumer banking competence as a putative mechanism in the relationships between financial literacy with income and creditworthiness. These results suggest that among the two indices of financial expertise, financial literacy vs. consumer banking competence, the latter may play a more proximal role in individual financial outcomes. Chapter 4 also shows that consumer banking competence explained variability in physical health, BMI, sleep latency, healthcare, and perceived stress, beyond known correlates of these constructs. Financial literacy, on the other hand, accounted for unique variability in healthcare and subjective well-being, beyond that explained by known correlates of these constructs.

Taken together, the findings of the current set of studies suggest a conceptual model (see Figure 1) for improvements in personal finance that can carry implications for physical health and well-being. Being able to postpone rewards for the future may make one more likely to invest and to benefit from staying longer in school thereby improving one's financial expertise. This allows one to develop and adhere to prudent strategies of personal finance management which, in turn, is associated unique variability in health outcomes.

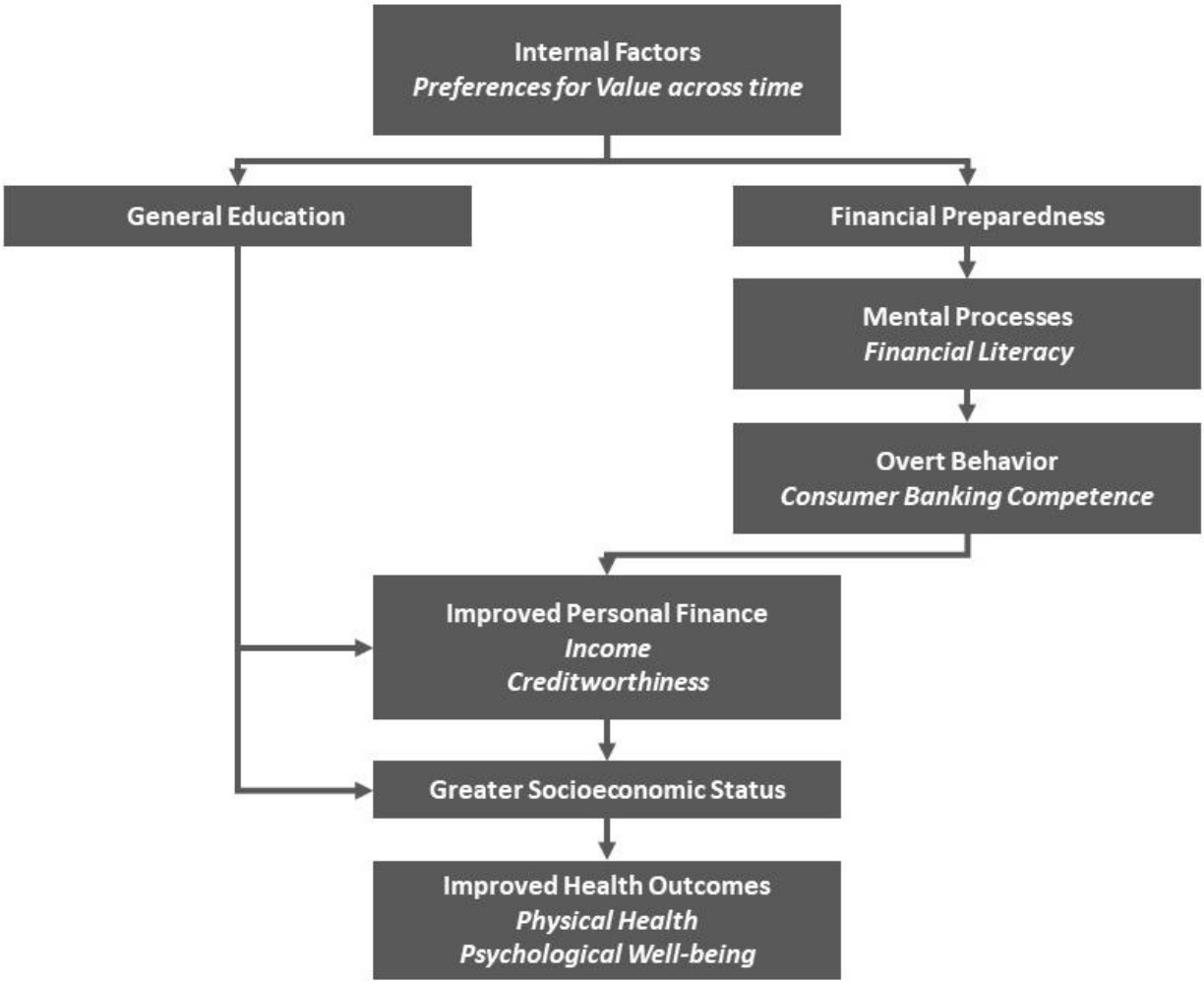

Figure 1. Conceptual model for the influence of time preferences, education, and financial expertise on personal finance and health.

CHAPTER 1

GENERAL AND FINANCIAL EDUCATION: UNDERSTANDING THE MEDIATING PROCESSES UNDERLYING THE RELATIONSHIP BETWEEN TIME DISCOUNTING AND INCOME

National indicators of financial performance strongly suggest that people are struggling with monetary choices. Individual bankruptcy rates have risen five-fold in the US from 0.13 per capita in 1980 to 0.52 per capita starting in 2001 (White, 2009). Financial liabilities, such as loans and mortgages, have grown to represent 129% from personal income in 2009 compared to their level of 20% in 1945 (American Bankruptcy Institute, 2010) whereas the individual savings rate hovers around 3% - one of the lowest in the world (Guidolin & La Jeunesse, 2007; Lusardi & Mitchell, 2014).

Prompted by the Great Recession in 2009, scholars have begun to identify institutional and individual predictors of financial decision making in an effort to improve individual financial dynamics. Institutional factors (e.g., increase in subprime lending, greater complexity of financial markets, and a shift towards self-management of finances [Immergluck & Smith, 2005; McKenzie & Liersch, 2011; Meier & Sprenger, 2012; Poterba, Venti, & Wise, 2007]) can explain some of the variability in indebtedness and bankruptcies.

Identifying the psychological forces that influence people's financial outcomes is a critical task as these enable individuals to make better financial decisions in the face of challenging economic conditions. A better understanding of the psychological factors guiding financial outcomes may result in fewer people experiencing financial hardship and therefore benefit society at large by avoiding far-reaching crises affecting millions of people.

Perhaps one of the most important markers of financial performance is income. The literature points to individual time preferences for rewards as a predictor of financial outcomes. Time discounting denotes one's relative valuation of a good at an earlier date compared to its valuation at a later date, variation in which is associated with a host of important life outcomes. Preferring sooner, smaller (SS), rather than later, larger (LL) rewards has been linked to lower scholastic achievement, lower intelligence, compromised executive functions, worse health-related behaviors, greater crime, more impulsive behavior, alcoholism, more energy consumption, lower creditworthiness, and lower retirement savings (Chabris, Laibson, Morris, Schuldt, & Taubinsky, 2008; Chapman, 1996; Eigsti et al., 2006; Frederick, Loewenstein, & O'Donoghue, 2002; Kirby & Herrnstein, 1995; Kirby, Petry, & Bickel, 1999; Meier & Sprenger, 2012; Mischel, Shoda, & Rodriguez, 1989; Petry, 2001; Reimers, Maylor, Stewart, & Chater, 2009).

While these findings demonstrate a link between time discounting and financial outcomes, they also indicate that this construct likely reflects a broad psychological and behavioral pattern in which discounters take the path of least cognitive resistance. Recent findings show that discounting the present value of future goods is associated with more automatic and/or less reflective cognition, such as providing incorrect but appealing solutions to math problems, applying sub-optimal probability matching in a one-shot gamble task, having greater need for cognitive closure, and adhering to simplified essentialist beliefs about the causes of human behavior (Shenhav, Rand, & Greene, 2017). Further evidence suggests that discounting arises from a bias to greater reliance on automatic processing. This results in SS rewards relative to more reflective processing, itself resulting in LL rewards (Figner et al., 2010; McClure & Bickel, 2014; McClure, Laibson, Loewenstein & Cohen, 2004; Metcalfe & Mischel, 1999).

To summarize, many individuals currently struggle with their financial decisions due to a mix of institutional and individual factors. Research suggests that people's time preferences for SS vs. LL rewards (e.g. time discounting) may help us to better identify internal drives that shape financial outcomes. Given that time discounting is associated with scholastic achievement, and cognitive processing more generally, it is conceivable that valuing future rewards nudges one to invest in general and domain-specific education. Staying longer in school is associated with greater income by forsaking immediate SS rewards for LL rewards (Tamborini, Kim, & Sakamoto, 2015).

With regard to the role of education and financial education specifically, researchers and policy makers alike have prescribed increasing financial literacy training (Hilgert et al., 2003; Greenspan, 2005; Morton, 2005; Lusardi & Mitchell, 2007). The field has agreed upon a definition of financial literacy: an ability to manage one's financial affairs successfully through the understanding of financial concepts and instruments (Alba & Hutchinson, 1987; Fernandes, Lynch, & Netemeyer, 2014; Lusardi, 2008; Remund, 2010). It is therefore hypothesized that education and financial literacy will mediate the relationships between time discounting and income.

We used a (β, δ) model of immediacy bias and individual discounting (Frederick et al., 2002; Weber et al., 2007), in which one can derive three distinct measures – mean time discounting, immediacy bias (β), and deliberative discounting (δ). Mean time discounting derives an individual discount factor by averaging participants' monetary choices across three temporal periods (today vs. a month from today; today vs. six months from today, and six months from today vs. seven months from today). Immediacy bias (β) is thought to reflect an inability to resist temptation by including an option where immediate gratification is available

(today vs. a month from today), whereas deliberative discounting (δ) reflects deeper and controlled processing by postponing the payout choice far into the future (6 versus 7 months from today), (Laibson, 1997; Harrison et al., 2002). Given that past research has demonstrated that mean time discounting and deliberative time discounting predict financial outcomes but that immediacy bias does not (Meier & Sprenger, 2012), we hypothesized that general education and financial literacy will mediate the relationships between mean and deliberative time discounting with income. We did not expect a model including immediacy bias as an independent variable to satisfy all statistical conditions for a mediation, as there is no evidence that immediacy bias predicts financial outcomes. In summary, we set out to study the educational factors (general and financial education) that may mediate the relationship between individual monetary preferences across time and income.

Method

Participants and Procedure

Data was collected from 708 individuals. Six participants were excluded due to switching multiple times between the SS and LL rewards in the time discounting measure. We were thus left with 702 individuals, of whom 650 reported income, but four of them were excluded due to being extreme outliers, thus leaving 646 individuals for the income analyses, where income spanned low- \$11,225 per household member (25^{th} percentile) to moderate \$32,750 per household member (75^{th} percentile), and were aged 21 to 69 (M_{age}= 33.51). Due to technical issues one of the 646 missed a financial literacy score. All participants were recruited through Amazon's Mechanical Turk from across the United States. Participants provided consent prior to completing the survey measures in accordance with the guidelines set by the local Institutional Review Board, and were compensated \$2.00 for their participation.

Measuring time discounting

We used a (β, δ) model of immediacy bias and individual discounting (Frederick et al., 2002; Weber et al., 2007), which has been demonstrated to perform best among other time preferences measures (Burks, Carpenter, Götte, & Rustichini, 2012). Participants were presented with 19 items and prompted to choose between a sooner, smaller (SS) payout or a later, larger one (LL) for three time periods. In the first time period participants chose between a SS payout that day, and a LL one a month later (0-1). For the second period they chose between a SS payout that day, and a LL one six months later (0-6). Finally, in the third period participants chose between a SS payout six months later, and a LL one seven months later (6-7). On all items the LL payouts remained the same at $80, whereas the SS ones started at $75 in the first pair and decreased in increments of $5 for each subsequent item. An individual discount factor (IDF) was calculated for each period by dividing the value of the item at which individuals switched from preferring the SS to the LL payout of $80. For instance, if an individual opted for the $65 payout the day of testing versus $80 in a month, but chose $80 a month from now over $60 that day, we treated the $65 as the switching point, where 65/80 became that person's IDF for period (0-1). A greater IDF is indicative of lower degree of time discounting, or greater preference for LL payouts compared to SS payouts.

The (β, δ) model offers three sub-measures – mean time discounting, taking into account participants' IDF across all three time periods (0-1 month, 0-6 month and 6-7 month), immediacy bias (β), calculated by dividing their (0-1 month) IDF to their (6-7 month) IDF, and deliberative time discounting (δ), derived from their IDF for the (6-7 month) time period (Laibson, 1997; Harrison et al., 2002).

Other Variables

Participants' finance-specific knowledge was measured by the financial literacy scale (Lusardi, 2008), which assesses understanding of arithmetic, interest rates, inflation, risk diversification, bonds, stocks, mutual funds, and asset pricing.

Participants were also asked to report their highest level of formal education, and their annual household income. Formal education was standardized prior to inclusion in the analyses. Participant's household income was divided by the number of household members, and due to a significant positive skew, the variable was log-transformed prior to including it in the analyses.

The mediation analyses utilized a bootstrapping procedure, which is a nonparametric resampling method intended for mediation analyses characterized by smaller sample sizes. Even though the results do not change in significance depending on whether or not bootstrapping was used, this method offers a more robust test of the model, since it is more powerful than the conservatively biased Sobel test for mediation (Carre, Iselin, Welker, Hariri, & Dodge, 2014; Sobel, 1982). We used the PROCESS tool, designed for SPSS (Hayes, 2012), which generates a 95% confidence interval for the indirect effects using 10,000 iterations.

Results

Analytic Approach

We first report bivariate correlations between the independent variable and the mediators, and the correlations between the mediators and the outcome variable, as well as the linear models of the mediators regressed on the predictor and outcome variables. Then we focus on predicting income where we provide three mediation models, in order to separately examine the predictive ability of the three distinct indexes of time discounting (mean time discounting, immediacy bias, and deliberative discounting) as predictor variables, and enter financial literacy and general education as mediating variables.

Bivariate Correlations and Linear Models

The data revealed significant positive correlations between time discounting and financial literacy, ($r_{(695)} = .35$, $p < .000$), as well as between financial literacy and income, ($r_{(646)} = .22$, $p < .000$). The data also yielded significant positive correlations between time discounting and education, ($r_{(695)} = .22$, $p < .000$), as well as between education and income, ($r_{(646)} = .25$, $p < .000$). Please, refer to Table 1 for a complete list of bivariate correlations among all variables included in the analyses.

Regressing financial literacy on both time discounting, ($b = 2.55$, $t = 8.50$, $p < .000$), and income, ($b = .51$, $t = 4.43$, $p < .000$), yielded significant positive coefficients, as well as a significant regression overall, ($R^2 = .144$, Adjusted $R^2 = .141$, $F_{(2, 645)} = 53.92$, $p < .000$). Regressing education on both time discounting, ($b = 1.17$, $t = 4.79$, $p < .000$), and income, ($b = .53$, $t = 5.68$, $p < .000$), yielded significant positive coefficients, as well as a significant regression overall, ($R^2 = .094$, Adjusted $R^2 = .091$, $F_{(2, 645)} = 53.92$, $p < .000$).

Table 1

Bivariate Correlations between Time Discounting, Income, and FICO

Variable	1	2	3	4	5	6	7
1. FICO							
2. Income	.29**						
3. Mean Time Discounting	.33**	.17**					
4. Immediacy Bias	.16**	.08*	-.01				
5. Deliberative Discounting	.12*	.11**	.76**	-.59**			
6. Financial Literacy	.25**	.22**	.35**	.06	.25**		
7. Education	.26**	.25**	.22**	.00	.17**	.21**	

Table 1, continued

Note. *indicates $p < .05$; ** indicates $p < .01$.

Mean Time Discounting

Model 1 tested the hypothesis that education and financial literacy mediate the relationship between mean time discounting and income (Figure 2). Results revealed that time discounting was a significant predictor of both education, $B = 1.40$, SE(B) =.24, $p < .0000$, and financial literacy $B = 2.77$, SE(B) = .29, $p < .0000$. The model also shows that financial literacy predicts income, $B = .05$, SE(B) = .01, $p < .0002$, 95% CI = [.02, .07], and so does general education, $B = .08$, SE(B) = .01, $p = .0000$, 95% CI = [.05, .11]. Whereas the total effect of time discounting on income is significant, $B = .44$, SE(B) = .10, $p < .0000$, its direct effect (controlling for education and financial literacy) fails to reach conventional levels of statistical significance, $B = .19$, SE(B) = .10, $p = .0645$.

Furthermore, the indirect effect of financial literacy was significant, $B = .14$, Boot SE(B) = .04, 95% CI = [.06, .23], as was the indirect effect of general education, $B = .11$, Boot SE(B) = .03, 95% CI = [.05, .19], thus demonstrating that both financial literacy and general education fully mediate the relationship between time discounting and income (Figure 2).

Switching the model around to test whether time discounting mediates the relationship between financial literacy and income did not yield a full mediation, $B = .01$, Boot SE(B)= .00, 95% CI = [.0043, .0226], where financial literacy remained a significant predictor of income, $B = .05$, SE(B) =.01, $p < .0000$, despite including time discounting as a mediator, $B = .28$, SE(B) =.10, $p < .0076$. A model where time discounting mediates the relationship between general education and income also failed to produce a full mediation, $B = .01$, Boot SE(B)= .004, 95% CI = [.0045, .0239], where general education remained a significant predictor of income, $B = .09$,

SE(*B*) =.01, $p < .0000$, despite including time discounting as a mediator, *B* = .32, SE(*B*) =.10, $p < .0014$. Therefore, the current data strongly suggest that while time discounting predicts income, it does so via general education and financial literacy. The full mediation in the current model suggests that valuing future goods may cause one to invest in general education and acquiring finance-specific knowledge, which in turn are associated with greater earnings potential.

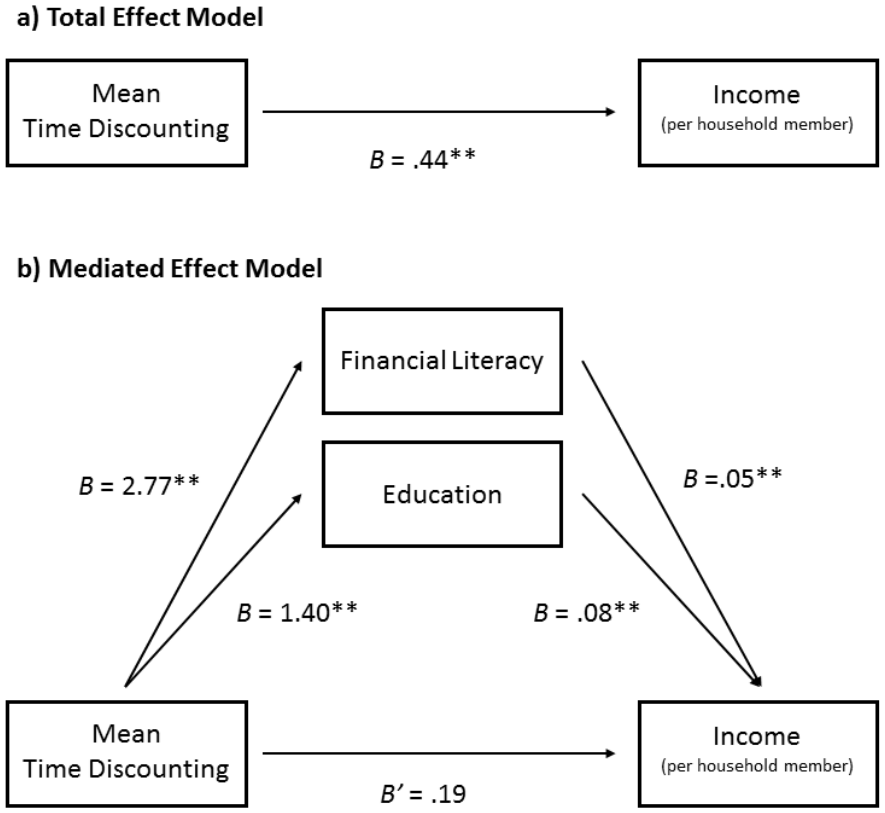

*Figure 2***.** Mediation model showing the total effect of time discounting on income (a), and the indirect effect of time discounting on income, as mediated by financial literacy and general education (b). Unstandardized regression coefficients are shown. (*$p < .05$. **$p < .008$ – Holm-Bonferroni-corrected.)

Immediacy Bias

Model 2 tested the hypothesis that education and financial literacy mediate the impact of immediacy bias on income. Results revealed that immediacy bias was not a significant predictor of either education, B = .07, SE(B) =.17, p = .65, or financial literacy B = .37, SE(B) = .22, p = .09, therefore failing one of the three necessary conditions for mediation to occur. In a linear regression model predicting income with all three predictors financial literacy and education remain significant predictors of income (ps < .0000), whereas immediacy bias does not (p = .08).

Deliberative Discounting

Model 3 tested the hypothesis that education and financial literacy mediate the impact of deliberative discounting on income (Figure 3). Results revealed that deliberative discounting was a significant predictor of both education, B = .93, SE(B) =.22, p < .0000, and financial literacy B = 1.74, SE(B) = .28, p < .0000. The model also shows that financial literacy predicts income, B = .05, SE(B) = .01, p < .0000, 95% CI = [.02, .07], and so does general education, B = .08, SE(B) = .01, p < .0000, 95% CI = [.05, .11]. Whereas the total effect of deliberative discounting on income is significant, B = .25, SE(B) = .09, p < .0059, its direct effect (controlling for education and financial literacy) fails to reach conventional levels of statistical significance, B = .08, SE(B) = .09, p = .3767.

The indirect effect of financial literacy was significant, B = .09, Boot SE(B) = .03, 95% CI = [.04, .17], and so was the indirect effect of general education, B = .08, Boot SE(B) = .03, 95% CI = [.03, .14], thus demonstrating that both financial literacy and general education fully mediate the relationship between deliberative discounting and income(Figure 3).

Switching the model around to test whether deliberative discounting also mediates the relationship between financial literacy and income failed to reach significance, B = .004, Boot SE(B)= .00, 95% CI = [-.0011, .0125], where financial literacy remained a significant predictor

of income, B = .06, SE(B) =.01, p < .0000, despite including deliberative discounting, B = .14, SE(B) =.09, p = .1322. A model where deliberative discounting mediates the relationship between general education and income also failed to produce a full mediation, B = .00, Boot SE(B)= .003, 95% CI = [-.0001, .0139], where general education remained a significant predictor of income, B = .09, SE(B) =.01, p < .0000, despite including deliberative discounting, B = .17, SE(B) =.09, p < .0617.

The data demonstrate that education and financial literacy fully mediate the relationship between deliberative discounting and income. Therefore we can draw a conclusion, similar to the one for the effect of mean time-discounting on income, that a predisposition to favor LL vs. SS rewards is associated with investment in both general and financial education, which in turn are associated with greater earnings potential.

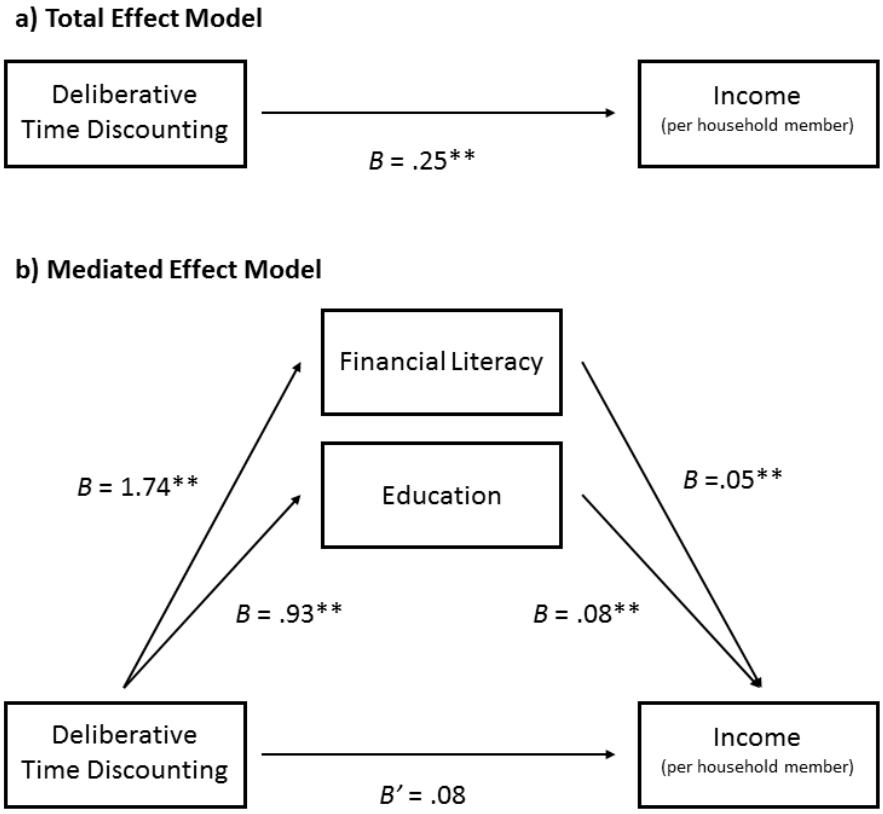

Figure 3 Mediation model showing the total effect of deliberative discounting on income (a), and the indirect effect of deliberative discounting on income, as mediated by financial literacy and general education (b). Unstandardized regression coefficients are shown. (*$p < .05$. **$p < .0125$ – Holm-Bonferroni-corrected.)

Discussion

This investigation examined the mediating processes underlying the relationship between discounting future rewards and income. Focusing on mean time discounting (0-1, 0-6, 6-7), education and financial literacy fully mediated the relationship between the construct and income. By focusing on the (6-7) time period we were able to derive a measure of deliberative time discounting, assessing controlled/reflective processing (Laibson, 1997; Meier & Sprenger, 2012). Financial literacy and general education fully mediated the relationship between deliberative discounting and income, indicating that individuals' propensity to discount future goods may influence their financial outcomes by triggering behavioral strategies that maximize them, such as staying longer in school, or gathering finance-specific knowledge.

The findings offer implications of theoretical importance. Time discounting has been linked to many important life outcomes, such as scholastic achievement, intelligence, executive functions, health-related behaviors, crime, impulsive behavior, alcoholism, energy consumption, creditworthiness, and retirement savings (Chabris, Laibson, Morris, Schuldt, & Taubinsky, 2008; Chapman, 1996; Eigsti et al., 2006; Frederick, Loewenstein, & O'Donoghue, 2002; Kirby & Herrnstein, 1995; Kirby, Petry, & Bickel, 1999; Meier & Sprenger, 2012; Mischel, Shoda, & Rodriguez, 1989; Petry, 2001; Reimers, Maylor, Stewart, & Chater, 2009). Research (Shenhav, Rand, & Greene, 2017) suggests that these relationships reveal a broad cognitive behavioral pattern, where the continuum of preferences for SS rewards vs. LL rewards maps onto a dual-process framework of judgment and decision-making (Evans, 2008; Evans & Stanovich, 2013;

Kahneman, 2003; Shiffrin & Schneider, 1977; Sloman, 1996, 2014). Furthermore, evidence suggests that discounting arises from a bias to more heavily rely on automatic processing resulting in SS rewards relative to more reflective processing resulting in LL rewards (Figner et al., 2010; McClure & Bickel, 2014; McClure, Laibson, Loewenstein & Cohen, 2004; Metcalfe & Mischel, 1999). Therefore, individual time preferences for value in the future vs. value in the present may represent a crucial building block for a number of life outcomes across distinct domains. Given that variability in time discounting predicts behavior in such distinct domains of life, ranging from scholastic achievement to crime and retirement savings among many others, it is likely that these relationships will be driven by mediating or moderating factors.

The current report shows that education and financial literacy are robust mediators of the relationship between deliberative discounting and income. Complex behaviors, such as fully developing one's earning potential, are likely to be multiply-determined, where time preferences trigger cognitive and behavioral tendencies that can be domain specific to the behavior of interest. For instance, given that time discounting is linked to one's likelihood of engaging in more automatic vs. reflective cognition (Shenhav, Rand, & Greene, 2017), it is conceivable that valuing future goods may nudge one to remain longer in formal education or gain more from formal education, which increases earnings potential (Tamborini, Kim, & Sakamoto, 2015).

CHAPTER 2

GENERAL EDUCATION AND FINANCIAL LITERACY MEDIATE THE RELATIONSHIP BETWEEN TIME DISCOUNTING AND INCOME

Creditworthiness, defined as a borrower's ability and willingness to repay a loan, represents another important aspect of personal finance in addition to income. But what are the internal drives that make people repay what they borrow? The current chapter extends the findings from Chapter 1 by focusing on education and financial literacy as possible mediators of the relationship between time discounting and creditworthiness, as measured by FICO scores. The literature points to individual time preferences for rewards as a predictor of financial outcomes. As such, defaulting on loans can be treated as an intertemporal choice, where those who discount the value of future goods should be more likely to default, as it offers financial benefits in the present – increased money availability – but also costs in the long run, where one experiences the negative effects of compromised credit history (Chatterjee, Corbae, Nakajima, & Rios-Rull, 2007; Fehr, 2002; Meier & Sprenger, 2012).

Time discounting has been linked to a number of behaviors across distinct domains of life, where discounters tend to rely on simplified and/or cognitively impulsive strategies. Importantly, previous research has shown a relationship between time discounting and FICO scores where valuing LL rewards over SS rewards was related to higher FICO scores (Meier & Sprenger, 2012).

Given that past research has demonstrated that mean time discounting and deliberative time discounting predict creditworthiness, but that immediacy bias does not (Meier & Sprenger, 2012), we hypothesized that general education and financial literacy will mediate the relationships between mean and deliberative time discounting with creditworthiness. We did not

expect a model including immediacy bias as an independent variable to satisfy all statistical conditions for a mediation, as there is no evidence that immediacy bias predicts financial outcomes. In summary, we set out to study the educational factors (general and financial education) that may mediate the relationship between individual monetary preferences across time and creditworthiness.

Method

Participants and Procedure

Data was collected from 708 individuals. Six participants were excluded due to switching multiple times between the SS and LL rewards in the time discounting measure. We were thus left with 702 individuals. Of the 702 individuals FICO scores were available for 302 of them, but 3 were excluded due to reporting FICO scores much greater than the maximum possible FICO (i.e. >850), thus leaving 299 from ages 23 to 69 (M_{age}= 33.94) for analyses. All participants were recruited through Amazon's Mechanical Turk from across the United States. Participants provided consent prior to completing the survey measures in accordance with the guidelines set by the local Institutional Review Board, and were compensated $2.00 for their participation.

Materials

Materials in Chapter 2 were identical to those in Chapter 1. Participants' FICO scores were used to represent their creditworthiness. FICO scores were first introduced in 1989, and are calculated by the FICO Corporation (formerly Fair Isaac Corporation). FICO scores are used by banks and other credit grantors when evaluating prospective clients' risk of default. Whereas the exact formula of the FICO score is not disclosed, FICO breaks down into the following five components: 35% payment history, 30% amounts owed, 15% length of credit history, 10% types of credit used, 10% new credit inquiries (www.myfico.com). The data from which FICO is

calculated is based on consumer credit files of the three national credit bureaus: Experian, Equifax, and TransUnion.

As in Chapter 1, the mediation analyses utilized a bootstrapping procedure, which is a nonparametric resampling method intended for mediation analyses characterized by smaller sample sizes. Even though the results do not change in significance depending on whether or not bootstrapping was used, this method offers a more robust test of the model, since it is more powerful than the conservatively biased Sobel test for mediation (Carre, Iselin, Welker, Hariri, & Dodge, 2014; Sobel, 1982). We used the PROCESS tool, designed for SPSS (Hayes, 2012), which generates a 95% confidence interval for the indirect effects using 10,000 iterations.

Results

Analytic Approach

We first report bivariate correlations between the independent variable and the mediators, and the correlations between the mediators and FICO, as well as the linear models of the mediators regressed on the predictor and outcome variables. We then focus on predicting creditworthiness, and report three mediation models, using the three distinct indexes of time discounting as predictor variables, with financial literacy and general education as mediating variables.

Bivariate Correlations and Linear Models

The data revealed significant positive correlations between time discounting and financial literacy, ($r_{(695)} = .35$, $p < .000$). The data also yielded significant positive correlations between time discounting and education, ($r_{(695)} = .22$, $p < .000$). Participants' FICO scores were significantly and positively correlated with both financial literacy, ($r_{(299)} = .25$, $p < .000$) and education, ($r_{(299)} = .26$, $p < .000$). Please, refer to Table 1 for a complete list of bivariate correlations among all variables included in the analyses.

Regressing financial literacy on both time discounting, (b = 0.93, t = 2.17, p < .031), and FICO, (b = .003, t = 3.58, p < .000), yielded significant positive coefficients, as well as a significant regression overall, (R^2 = .079, Adjusted R^2 = .073, $F_{(2, 298)}$ = 12.73, p < .000). Regressing education on both time discounting, (b = 1.07, t = 2.72, p < .007), and FICO (b = .002, t = 3.58, p < .000), yielded significant positive coefficients, as well as a significant regression overall, (R^2 = .092, Adjusted R^2 = .086, $F_{(2, 298)}$ = 15.04, p < .000).

Mediation Model for Mean Time Discounting

This model tested the hypothesis that education and financial literacy mediate the relationship between mean time discounting and creditworthiness, as measured by FICO scores (Figure 4). Results revealed that time discounting was a significant predictor of both education, B = 1.53, SE(B) =.37, p < .0001, and financial literacy B = 1.43, SE(B) = .41, p < .0006. The model also shows that financial literacy predicts FICO, B = 14.86, SE(B) = 4.52, p < .0011, 95% CI = [5.96, 23.76], and so does general education, B = 16.25, SE(B) = 4.92, p = .0011, 95% CI = [6.56, 25.94]. The total effect of time discounting on FICO is significant, B = 200.12, SE(B) = 32.95, p < .0000, and so is its direct effect when controlling for financial literacy and education, B = 153.94, SE(B) = 33.16, p = .0000.

The indirect effect of time discounting on FICO via financial literacy was significant, B = 21.29, Boot SE(B) = 10.04, 95% CI = [5.89, 50.05], and so was the indirect effect of time discounting on FICO via general education, B = 24.89, Boot SE(B) = 9.24, 95% CI = [11.21, 49.45], thus demonstrating that both financial literacy and general education partially mediate the relationship between time discounting and FICO. Please see Figure 4 for a structural representation of the mediation model.

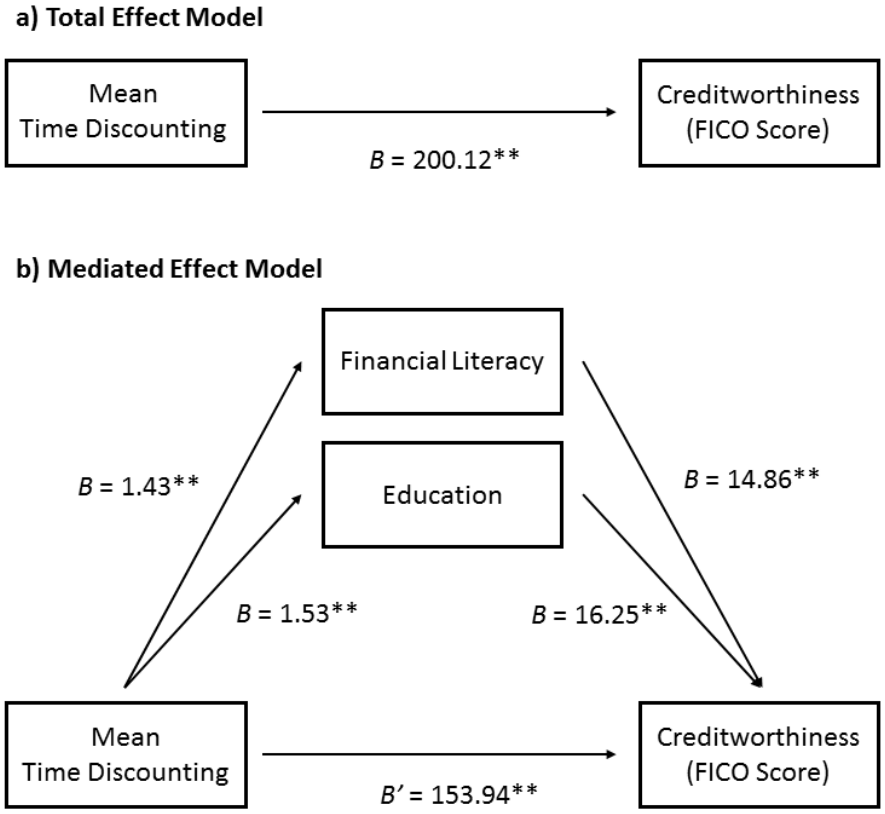

*Figure 4***.** Mediation model showing the total effect of deliberative discounting on income (a), and the indirect effect of time discounting on income, as partially mediated by financial literacy and general education (b). Unstandardized regression coefficients are shown. (*$p < .05$. **$p < .016$ – Holm-Bonferroni-corrected.)

Mediation Model for Immediacy Bias

This model tested the hypothesis that education and financial literacy mediate the impact of immediacy bias on creditworthiness, as measured by FICO scores (Figure 5). Results revealed that immediacy bias was a significant predictor of financial literacy, $B = -.87$, SE(B) =.28, $p < .0022$, but it was not a significant predictor of education, $B = -.34$, SE(B) = .26, $p = .2015$. The model also shows that financial literacy predicts FICO, $B = 21.64$, SE(B) = 4.54, $p < .0000$, 95% CI = 12.69, 30.60, and so does general education, $B = 22.02$, SE(B) = 4.85, $p = .0000$, 95% CI =

12.46, 31.58. The total effect of immediacy bias on FICO is significant, B = 65.86, SE(B) = 23.58, p < .0056, and so is its direct effect when controlling for financial literacy and education, B = 92.12, SE(B) = 22.26, p = .0000.

The indirect effect of immediacy bias on FICO via financial literacy was significant, B = -18.81, Boot SE(B) = 9.27, 95% CI = [-41.54, -3.57], but the indirect effect of immediacy bias on FICO via general education was not, B = -7.43, Boot SE(B) = 6.19, 95% CI = [-20.40, 4.09], thus demonstrating that only financial literacy partially mediates the relationship between time discounting and FICO. Please see Figure 4 for a structural representation of the mediation model.

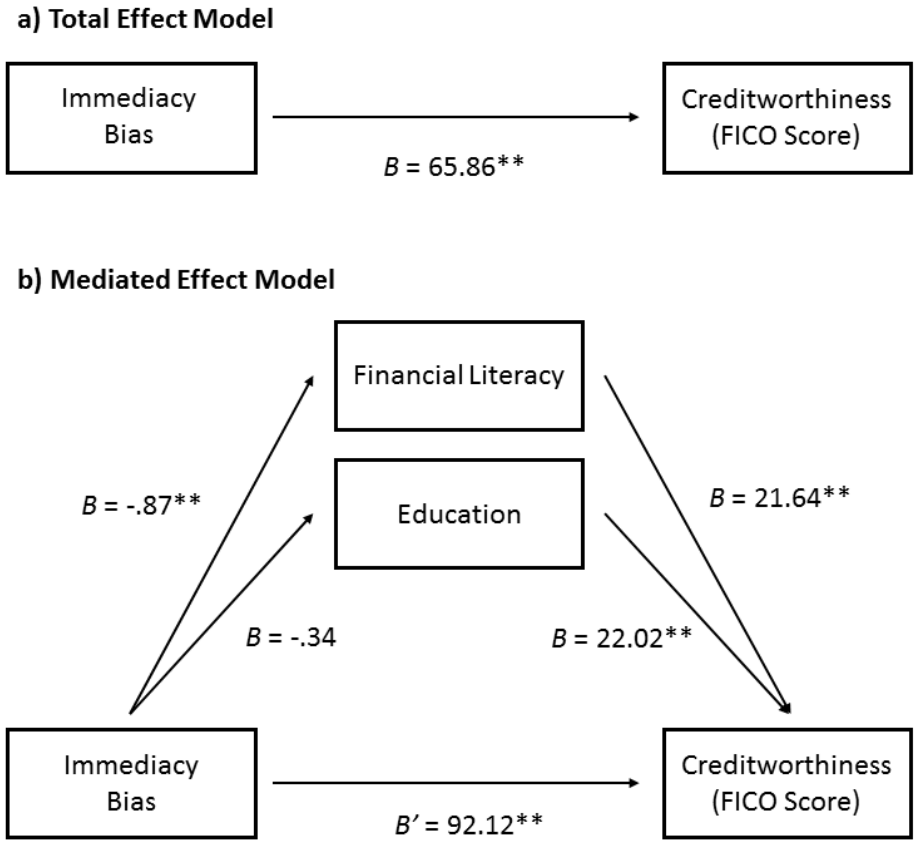

*Figure 5***.** Mediation model showing the total effect of immediacy bias on FICO (a), and the indirect effect of immediacy bias on FICO, as partially mediated by financial literacy

(b). Unstandardized regression coefficients are shown. (*$p < .05$. **$p < .025$ – Holm-Bonferroni-corrected.)

Mediation Model for Deliberative Discounting

This model tested the hypothesis that education and financial literacy mediate the relationship between deliberative discounting and creditworthiness, as measured by FICO scores (Figure 6). Results revealed that deliberative discounting was a significant predictor of both education, B = 1.30, SE(B) =.34, $p < .0002$, and financial literacy B = 1.72, SE(B) = .37, $p < .0000$. The model also shows that financial literacy predicts FICO, B = 18.17, SE(B) = 4.74, $p < .0002$, 95% CI = [8.82, 27.51], and so does general education, B = 20.74, SE(B) = 5.07, p = .0001, 95% CI = [10.75, 30.73]. The total effect of deliberative discounting on FICO is significant, B = 67.39, SE(B) = 31.95, $p < .0357$, whereas the direct effect when controlling for financial literacy and education is not significant, B = 8.97, SE(B) = 31.95, p = .7790.

The indirect effect of deliberative discounting on FICO via financial literacy was significant, B = 31.32, Boot SE(B) = 12.45, 95% CI = [11.39, 62.83], and so was the indirect effect of deliberative discounting on FICO via general education, B = 27.09, Boot SE(B) = 9.18, 95% CI = [12.71, 52.05], thus demonstrating that both financial literacy and general education fully mediate the relationship between deliberative discounting and FICO. Please see Figure 6 for a structural representation of the mediation model.

Switching the model around to test whether deliberative discounting also mediates the relationship between financial literacy and FICO failed to reach significance, B = 1.29, Boot SE(B)= 1.55, 95% CI = [-1.31, 5.12], where financial literacy remained a significant predictor of FICO, B = 19.92, SE(B) = 4.85, $p < .0001$, despite including deliberative discounting, B = 33.04, SE(B) = 32.23, p = .3062. A model where deliberative discounting mediates the relationship

between general education and FICO also failed to produce a full mediation, $B = 1.31$, Boot SE(B)= 1.43, 95% CI = [-1.19, 4.78], where general education remained a significant predictor of income, $B = 22.50$, SE(B) = 5.17, $p < .0000$, despite including deliberative discounting, $B = 38.00$, SE(B) = 31.75, $p < .2323$. Therefore, the current data strongly suggests that while deliberative discounting predicts FICO, it only does so via general education and financial literacy.

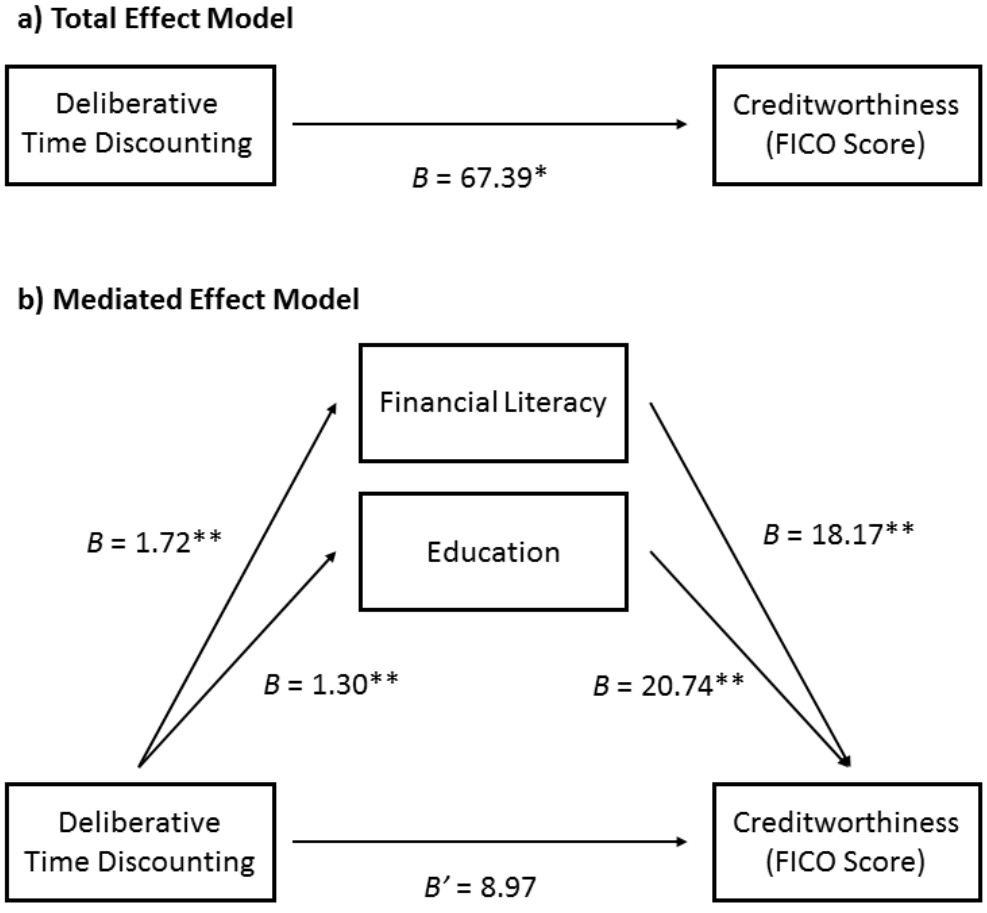

*Figure 6***.** Mediation model showing the total effect of deliberative discounting on FICO (a), and the indirect effect of deliberative discounting on FICO, as fully mediated by financial literacy and general education (b). Unstandardized regression coefficients are shown. (*$p < .05$ – Holm-Bonferroni-corrected. **$p < .001$)

Discussion

This investigation examined the mediating processes underlying the relationship between discounting future rewards and creditworthiness. Education and financial literacy partly mediated the relationship between mean time discounting and creditworthiness, replicating and extending earlier findings showing a relationship between time discounting and FICO scores (Meier & Sprenger, 2012).

By focusing on the (6-7) time period we were able to derive a measure of deliberative time discounting, assessing controlled/reflective processing (Laibson, 1997; Meier & Sprenger, 2012). Financial literacy and general education fully mediated the relationship between deliberative discounting and FICO scores, indicating that individuals' propensity to discount future goods may influence their financial outcomes by triggering behavioral strategies that maximize them, such as staying longer in school, or gathering finance-specific knowledge.

Comparing participants' choices between the (0-1) period, where immediate gratification was available, to the (6-7) period, where immediate gratification was not available, enabled us to derive a measure of immediacy bias, thought to reflect inability to resist temptation (Laibson, 1997; Meier & Sprenger, 2012). Whereas immediacy bias had modest total effect on FICO scores, the data failed to satisfy the necessary conditions for mediation.

The current report shows that education and financial literacy are robust mediators of the relationship between deliberative discounting and creditworthiness. Complex behaviors, such as remaining creditworthy in the eyes of financial institutions are likely to be multiply-determined, where time preferences trigger cognitive and behavioral tendencies that can be domain specific to the behavior of interest.

In the case of creditworthiness, it is possible that valuing future goods may drive a potential mortgage consumer to seek financial education in order to improve financial decisions

in a complex financial ecosystem (McKenzie & Liersch, 2011; Poterba, Venti, & Wise, 2007). By contrast, those who discount the present value of future goods, may be less likely to see the long run benefit in financial education and thus either not enroll in it, or not benefit as much from it. Research shows that preference for SS vs. LL rewards is associated with lower likelihood of participation in financial education programs (Meier & Sprenger, 2013). An improved financial knowledge in turn allows consumers to be more competent banking clients and thus avoid repayment delays, defaulting, and possibly bankruptcy, which benefits not only individuals, but also the financial system at large.

It is interesting to note that different aspects of time discounting (e.g. deliberative discounting vs. immediacy bias) predict income and creditworthiness via distinct paths, depending on the outcome variable. Both education and financial literacy exerted significant indirect effects on the relationships between deliberative time discounting with income and creditworthiness; whereas, immediacy bias was only related to participants' FICO scores, with financial literacy as a partial mediator. Given that deliberative discounting assesses time preference postponed in the future (6 vs. 7 months) it removes the effects of the inability to resist temptation in the face of instant gratification (today vs. 1 month). It is possible that deliberative discounting reflects a time preference for value that remains stable across situations and contexts. This may be a personality-wide tendency that carries downstream implications for complex or multiply-determined behaviors, such as pursuing education which improve one's earnings potential, which in turn allows for diligent debt repayment and greater FICO score. In contrast, it is conceivable that the lack of mediation in the case of immediacy bias reflects a behavioral pattern where individuals succumb to daily spending temptations, and correspondingly fail to budget for mortgage and loan payments, which in turn affect their FICO scores. Therefore, it

appears that in the case of deliberative discounting people's propensity to engage in reflection and deliberation is associated with variability in both income and creditworthiness, whereas in the case of immediacy bias people's propensity to overcome an impulse for immediate gratification is associated with variability in creditworthiness alone. However, future experimental research can test when and under what conditions time discounting manifests itself as overcoming impulsivity vs. propensity to engage in deliberation and reflection.

A limitation of the current study is that we used a measure of crystalized knowledge to measure financial literacy. The data show that being aware of financial concepts and how financial instruments and markets function predicts income and creditworthiness. However knowing this does not necessarily translate into prudent banking behaviors. For instance, many understand what a money market account is, but few would know why and how to get one. Future research ought to investigate not only how aware of financial constructs individuals are, but also the actual behavior of how individuals utilize financial instruments and in particular banking institutions for their individual finance management.

The current research also offers findings of practical importance for financial education. Our data suggest that improving individual financial performance is first driven by people's deliberative time preferences for rewards. The data also show that education and financial literacy are critically important, as the significance of the time discounting effect is either nullified (deliberative discounting), or lowered (mean time discounting), when these constructs are included. Therefore, financial literacy that translates into prudent financial behaviors may not be a phenomenon that can be improved by the teaching of finance alone. Financial education will likely be more effective if it is developed through a broader approach accounting for people's

time preferences and education. In doing so, interventions geared to improve individual financial performance can be tailored to determine when people are ready to receive financial education.

CHAPTER 3

CONCEPTUALIZING CONSUMER BANKING COMPETENCE: IMPLICATIONS FOR PERSONAL FINANCE, PHYSICAL HEALTH, AND PSYCHOLOGICAL WELL-BEING

As the varied outcomes of individual financial decisions are compounded across millions of consumers, they can exert a dramatic influence on multiple aspects of life. For instance, mortgage choice can greatly affect personal finance as lived-in housing represents on average 50% of household wealth; on the debt side, however, mortgage and car loans account for approximately 40% of what people owe (Frydman & Camerer, 2016). Rapidly expanding credit availability starting in the early 2000s offered homeownership to individuals who had been previously seen by financial institutions as not creditworthy. Unfortunately, the growth in homeownership and therefore subprime mortgages was not accompanied by a corresponding growth in income for these populations (Mian & Sufi, 2009). As housing prices plateaued starting in 2006 millions of individuals became delinquent on their debt payments, or declared default altogether (Foote et al., 2008; Gerardi, Goette, & Meier, 2010), thereby triggering the worst macroeconomic crisis since the Great Depression.

The Great Recession, which officially lasted from December 2007 through June 2009, greatly affected adult employment and income, housing, family composition, and personal finance. Research shows that the parental job loss, residential moves, income instability, and financial strain associated with such economic downturns ultimately carry negative implications for social relationships, family structure, health, psychological functioning, and child development (Burgard, Ailshire, & Kalousova, 2013; Cherlin, Cumberworth, & Morgan, 2013; Kalil, 2013).

The onset of the Great Recession has also generated research efforts aimed at identifying internal factors that carry implications for financial decision making. Even though individuals are faced with financial decisions on a daily basis, perhaps some of the most consequential ones, such as mortgage choice, loans for college education, and retirement savings (Frydman & Camerer, 2016) are carried out through financial services providers, such as consumer banks. Also known as retail banking, consumer banking represents the provision of financial services by a bank to individual consumers. Most commonly these services include money storage (e.g. checking accounts), savings, transactional accounts, mortgages, personal loans, and debit and credit cards. A recent report from the Federal Deposit Insurance Corporation (FDIC, 2012) indicates that approximately 92% of individuals in the US have a banking relationship. However, the same report also showed that among individuals from lower-income households (less than $15,000 annually in household income), 28.2% are completely unbanked, meaning that they have no checking account or some other relationship with a traditional financial institution.

Unbanked individuals are faced with substantial fees from alternative financial services (AFS) providers (e.g. payday loan); for a single individual this can add in excess of $500 annually in fees compared to regular banks. These problems have captured the attention of various government agencies including the Financial Industry Regulatory Authority (FINRA, 2009), which, in conjunction with the Treasury Department, carried out the first National Financial Capability Study in the United States. The data revealed that half of the surveyed individuals faced difficulties with monthly bills and expenses, and a majority did not have emergency savings at their disposal. Many also failed to save for predictable life events such as children's college education or one's own retirement, and more than a quarter of the sampled individuals reported having to engage in high-cost borrowing from AFS. Interestingly, even

though many of the respondents reported feeling adept at dealing with their own finances, many of them nonetheless engaged in banking behaviors that generated a sizeable volume of fees and other expenses. Only a few individuals shopped around and compared bank offers, before deciding on a financial product (FINRA, 2009). Further evidence demonstrates that individuals display poor understanding of financial instruments and processes (Warwick & Mansfield, 2000; Roberts & Jones, 2001; Henry, Weber, & Yarbrough, 2001; Lusardi & Mitchell, 2014).

Many researchers and policy makers alike have long prescribed that the solution to these problems is in increasing financial literacy and financial education, which ought to successfully address the challenges individuals face in their financial decisions (Hilgert et al., 2003; Greenspan, 2005; Morton, 2005; Lusardi & Mitchell, 2007). Whereas financial literacy intuitively suggests what it entails, providing a precise and exhaustive definition of the construct can be challenging. Researchers have agreed upon a definition of financial literacy that denotes a general ability to manage one's financial affairs successfully through familiarity with and understanding of financial concepts and instruments (Alba & Hutchinson, 1987; Fernandes, Lynch, & Netemeyer, 2014; Remund, 2010).

Unfortunately, research striving to show that improved financial literacy leads to heightened financial expertise is not consistent, with some reports advocating for the usefulness of financial literacy, and others negating it (Adams & Rau, 2011; Collins & O'Rourke, 2010; Hastings et al., 2013; Hira, 2010; Thaler & Sunstein 2008; Willis, 2009). A recent meta-analysis (Fernandes, Lynch, & Netemeyer, 2014) sheds light on this issue by revealing that correlational studies of financial literacy show significantly larger effects compared to studies that experimentally manipulated financial literacy. A counterintuitive finding is that financial education interventions are characterized by statistically significant – but relatively small –

effects. These interventions typically explain approximately 0.1 percent of the variance in the targeted financial behaviors (Fernandes, Lynch, & Netemeyer, 2014). In discussing possible explanations for this small effect, the authors suggest the following reasons may have limited the effectiveness of the experimental studies: intervention decay (i.e., the intervention did not last) or weak intervention effects in the actual acquiring of the financial knowledge. Among the correlational studies the authors argue that the greater predictive ability of financial literacy could be attributed to variables, putatively correlated with financial literacy or the financial behaviors investigated. According to Fernades et al., these variables included confidence in financial information, propensity to plan, willingness to take financial risks, and numeracy (Fernandes, Lynch, & Netemeyer, 2014). When these variables are accounted for, the effects of financial literacy decrease in magnitude (Fernandes, Lynch, & Netemeyer, 2014). Their findings indicate that acquiring financial knowledge may be an intrinsically motivated process that develops over a long period of time – characteristics that make financial literacy difficult to manipulate experimentally.

Conceptualizing Consumer Banking Competence

Financial education that generates prudent financial behaviors may not be something that can be improved by the teaching of finance alone, especially if this teaching is comprised of a single-trial intervention. Current measures of financial literacy typically assess crystalized knowledge of financial concepts, such as participants' understanding of interest and how compounding interest works (Alba & Hutchinson, 1987; Fernandes, Lynch, & Netemeyer, 2014; Lusardi, 2008; Lusardi & Mitchell, 2014; Remund, 2010). Focusing on the training of financial expertise alone may not be conducive to the generation of sound financial practices. The challenges of consistently linking financial literacy to creditworthiness (Adams & Rau, 2011; Collins &

O'Rourke, 2010; Fernandes, Lynch, & Netemeyer, 2014; Hastings et al., 2013; Hira, 2010; Thaler & Sunstein 2008; Willis, 2009) may also be due to the fact that we are not necessarily optimally assessing financial savviness. Being aware of financial concepts, which is what financial literacy represents, does not necessarily mean that one knows how to use these financial instruments, or how one can use them well. Mere financial expertise does not necessarily translate into prudent banking behavior. For instance, many people understand what a stock mutual fund is, and how it works, but they may not know the concrete steps they need to take in order to invest in one.

The current research therefore aims to investigate not only how aware of financial constructs individuals are, but also how financial instruments and markets function – namely, this represents the behaviors individuals engage in so that they can utilize assets, credits, financial markets, and in particular banking institutions and AFS providers. Given that such financial products are overwhelmingly offered through consumer banks, and that 92% of individuals have a banking relationship, it is critical to be able to better understand the ability of consumers to exercise self-regulation in regard to their banking practices, as their personal finances are influenced not only by raw earnings, but also by the way they interact with the banking industry.

In pursuit of this objective to understand and enhance how individuals interact with banks and other financial services providers, the purpose of the current research is to examine underlying individual differences in *consumer banking competence* (CBC). CBC is defined as exercising self-regulation when using assets, credits, financial markets, and in particular banking institutions for the purposes of managing personal finance. The CBC scale is seen as a

continuum in which lower scores would indicate undesirable banking practices, and high scores would indicate desirable banking practices.

Overview of Studies

In the first part of the current manuscript we detail the procedure used to derive the items of the CBC scale which primarily adopted a data-driven approach with consumer financial data from a large US bank; however, more items were added after a review of the extant literature, and also by the authors.

In the second part of the current manuscript we describe the psychometric testing in order to demonstrate the validity and reliability of the newly composed scale. In Study 1 we detail the construct's reliability and conduct an exploratory factor analysis examining the underlying structure of the CBC scale, which yielded three distinct factors. Study 2 demonstrates the test-retest reliability of the CBC measure. Study 3A examines the measure's construct and criterion validity.

In the third part of the current manuscript we wanted to further corroborate the scale's validity by examining three distinct applications. In Study 3B we demonstrate that the consumer banking competence scale fully mediates the relationship between financial literacy with income and creditworthiness. Study 3C focuses on the financially savvy personality by examining similarities and contrasts in the relationships among two distinct indices of "financial savviness" (banking competence vs. financial literacy) with related personality traits. Finally, Study 3D focuses on banking competence and financial literacy as distinct predictors of physical health and psychological functioning, explaining variability in these constructs beyond that explained by their already known predictors, such as SES, self-control, time discounting, negative affect, and demographic variables.

Item Generation and Measurement Development

We began with a dataset containing information on all of the bank's credit product accounts that were originated in the year 2012. There were a total of four credit product types including personal credit cards, business credit cards, mortgages, and car loans. Debt repayments on the credit products by the credit customers were tracked for the following 18 months, where the outcome variable was a binary indicator of whether a credit product payment was delayed at least once for more than 60 days. The dataset also contained 294 predictor variables that were used to assess predictability of delinquent payments across the four credit product types. The 294 predictor variables assessed a wide range of behaviors that banking customers typically engage in, which could be grouped under three broader categories: relationship with the bank, financial dynamics, and financial behaviors.

Variables that assessed one's relationship with the bank measured how many different financial products one uses, as well as the length of time each customer used each financial product, such as having a checking account, and the length of time it was used. Variables that assessed financial dynamics contained data pertaining to accounts' balances, such as the balance of one's checking and/or savings account, ATM deposits, inflow/outflow of money, and credit vs debit card usage. Finally, variables assessing financial behaviors indicated how diligently customers met their financial obligations to the bank, such as the amount and instances of fees and penalties they accumulated, including non-sufficient funds fees, history of overdraft events, and number of days spent in collections.

Logistic regressions were used to determine each variable's predictability of delinquent payment across the four credit product types (personal credit cards, business credit cards, mortgages, and car loans). Each of the 294 predictor variables was then assessed with respect to

three distinct nonparametric tests (KS [Kolmogorov Smirnov], AUC [Area Under the Receiver-Operator Curve], and Kendall's Tau [rank correlation]) for each predictor variable-credit product pair. The rank statistics exhibited strong linear correlation across the four different credit product types. In other words, if a predictor variable was a significant predictor according to its KS statistic, it was also highly likely that the same variable will be considered a significant predictor based on its AUC and Tau statistics. All predictor variables were then ranked in order from most to least predictable within each credit product type (personal credit cards, business credit cards, mortgages, and car loans). The median percentile rank for each predictor variable across the four credit product types (personal credit cards, business credit cards, mortgages, and car loans) was then used as the final ranking, which yielded 22 predictor variables as most predictive of delinquent payments across all four types of loan products.

Within the framework of the current project, these 22 variables that were most predictive of delinquent debt-repayment were deemed to represent the spectrum of desirable banking practices, and formed the core of the CBC measure. We used these variables along with the extant literature and our input to derive the items of the CBC scale.

One of the main conclusions of the big data analyses was that bank customers who have had a greater diversity of bank products, as well as a longer tenure of having had these products tended to be less likely to delay debt-repayment. Therefore, a number of items on the CBC scale measure the extent to which individuals take advantage of the various consumer bank products available to them. The scale measures whether individuals have checking, savings, investments, and retirement accounts. It also asked about people's motivation in choosing their bank (aka, did they choose based on proximity and convenience, or most favorable financial terms, relative to

other offers they may have had). Several items assessed individual preferences for cash vs. card payments, and the frequency with which people engage in debit vs. credit card transaction.

Another conclusion from the big data analyses pointed to the way individuals use and misuse credit when it is available to them. Therefore, other items within the CBC scale measure whether individuals have a history of accumulating bank fees, such as non-sufficient funds fees, or late payment fees. A few items assess whether individuals have experienced financial strain, such as overdraft events, having been sent to a collection agency, having been denied credit line increases on their credit card, if they have been denied a loan, whether they only make minimum credit card payments, or if they have revolving card balance from one billing cycle to the next.

It is important to note that a number of the CBC scale items were designed to assess individual self-control as it pertains to the use of bank products for personal finance management. General self-control denotes one's ability to monitor own behavior, set clear performance standards, and have a capacity for change (Baumeister 2002; Carver & Scheier, 1998; Vohs & Faber, 2007).

Self-control in the context of financial decision making can be viewed as an intended delay of immediate gratification with the goal of greater affluence in the future. Interestingly, research shows that people who are unable to resist temptation by spending sizeable proportions of their income on luxury goods are more likely to default on their loans, have larger amounts of consumer credit, and incur more finance charges across time (Gathergood, 2012). Research in the field further shows that while employed most people tend to undersave for retirement (Benartzi & Thaler, 2013). Therefore, it is reasonable to expect that individuals capable of greater self-control will be more likely to engage in more prudent banking behaviors, and thus exhibit a greater degree of financial competence.

Self-control is often assessed with trait-level measures of self-control reflecting the degree to which one is able to resist temptation, maintain good self-discipline, as well as breaking bad habits (Tangney, Baumeister, & Boone, 2004). Even though their measure (Tangney et al., 2004) assesses behaviors across a wide variety of domains, only a single item, out of 36, pertains to individual financial decisions – "I spend too much money."

However, while self-control can be construed as a coherent strategy to successfully exert control over one's own behaviors, research has indicated that this general tendency is likely multi-dimensional, differs across domains of life, and it is best assessed using multiple-methods (Duckworth & Kern, 2011; Haws, Bearden, & Nenkov, 2011). In general, recent research underscores the importance of domain-specificity for the study of individual traits (Hanoch et al., 2006; Lynch et al., 2010). Other researchers have also argued that specificity in the assessment of traits and attitudes improves the predictability of domain-relevant behaviors (Fishbein & Ajzen, 1975; Mowen, 2000; Mowen & Spears, 1999).

Whereas research to date has conceptualized self-control as either domain-general across a number of behaviors (Baumeister 2002; Tangney et al., 2004), or as domain-specific such as self-control specifically linked to consumption and spending (Haws et al., 2011; Hoch & Loewenstein, 1991; Loewenstein 1996; Wertenbroch 1998) no efforts have examined the notion of self-control to one's capacity to develop and adhere to specific personal finance practices.

Given that an overwhelming number of individuals (92% in the US) manage their money and financial resources through banks, it is important to examine how self-regulation of resources affects one's use of banking products. Knowing this is important as it affects how one is viewed by the financial industry, and specifically whether one is seen as creditworthy or not,

which in turn can shape the outcome of crucial financial decisions such as mortgage choice, college education, and retirement savings (Frydman & Camerer, 2016).

Therefore, the CBC scale contained items that assess self-regulatory capacity as it pertains to one's use of bank products, such as "I rarely exceed spending more than one third of my credit card limit per month", "I request credit line increases because I need them", "I routinely max out my credit card and only make the required minimum monthly payment", "I am often surprised at how much I have charged on my credit card(s)". The final version of the CBC scale consisted of 46 items, where eight of them required a binary response "True/False" (e.g. "I have had a checking account for most of my adult life."), and the rest prompted participants to provide a Likert type response ranging from 1 - "not at all like me" to 7 - "very much like me" (e.g. "When I use a card, I prefer to use credit rather than debit card"). For a complete list of the CBC scale items, please see Table 2. The CBC scale was then submitted to psychometric testing.

Table 2

Items[*] *of the Consumer Banking Competence Scale*

1. I have had a checking account for most of my adult life.
2. I have had a savings account for most of my adult life.
3. I have an investment account, such as a money market.
4. (R)[†] In the past, I have filed for bankruptcy at least once.
5. (R) In the past I have been charged a non-sufficient funds fee by my bank or other financial institution at least once.
6. (R) In the past I have been charged a late payment fee by my bank or other financial institution at least once.
7. (R) In the past I have had at least one overdraft event.

Table 2, continued

8. (R) In the past I have been sent to a collection agency.
9. I use multiple banks and/or other financial institutions to serve my financial needs.
10. I chose my bank based on the interest rate it offers.
11. (R) I chose my bank, because of convenience (i.e. proximity to work or home, multiple branches, etc.).
12. I have different account types at different banks in order to take maximum advantage of interest rates offered on the market.
13. (R) I do all my banking with one financial institution, because it is the easiest thing to do.
14. In addition to banks I also use other financial services providers, such as a financial planner, or investment broker.
15. I use online stock brokerage websites for the trading of stocks, bonds, mutual funds, such as “E*Trade”.
16. I am likely to switch banks if I have an offer for better financial terms, rather than staying with the same bank because it is the easier thing to do.
17. For my income earnings I prefer to use direct deposit to my bank account.
18. (R) In general I make more cash deposits rather than using direct deposit.
19. (R) In general I prefer to use cash rather than card for day to day purchases.
20. When I use a card I prefer to use credit rather than debit card.
21. I rarely exceed spending more than one third of my credit card limit per month.
22. (R) I request credit line increases because I need them.
23. I request credit line increases as often as possible, but NOT because I need the money.

Table 2, continued

24. I always pay my monthly bill in full and do not carry credit card balance from one billing period to the next.
25. (R) I routinely max out my credit card and only make the required minimum monthly payment.
26. Whenever I find myself with cash to spare I deposit it to one of my bank accounts, such as my checking account.
27. I have enrolled in a scheduled transfer (e.g. weekly, biweekly, monthly, yearly, etc.) from my checking account to my savings account?
28. I am enrolled in auto pay for my utility bills, such as electricity, internet, etc.
29. I have at least one loan product from a financial institution, such as mortgage, car loan, or student loan.
30. I have more than one loan product from a financial institution.
31. (R) On occasion, I have been late with a monthly loan payment.
32. (R) For my financial transactions I rely primarily on alternative financial services providers such as “payday loan” or “car title loan” places.
33. (R) When I have to transfer money or make payments to institutions, I use money orders more often than I use transfers between bank accounts.
34. (R) When I need an ATM I go to the first available one, rather than looking for my bank’s ATM.
35. I regularly use my bank’s app to stay on top of my finances.
36. I use budget apps, such as MINT, in order to control how much I spend.
37. (R) I often spend more than I originally intend.

Table 2, continued

38. I read news about trends in the financial industry and consumer banking.
39. Whatever funds I don't use in my checking account, I make sure to move to my savings or investment accounts in order to gain as much as possible in interest.
40. I tend to put every purchase, no matter how small, on my credit card.
41. I consider myself to be completely financially independent from others, such as parents, spouse or significant others.
42. I have a retirement plan, such as 401k, IRA, etc.
43. I have investments such as stocks, bonds, or mutual funds outside my retirement account.
44. (R) In the past I have been denied credit for a loan.
45. (R) In the past I have been denied a credit line increase for my credit card(s).
46. (R) I am often surprised at how much I have charged on my credit card(s).

Notes:

[*]Items 1 through 8 require a binary response "True/False", and items 9 through 46 require a Likert type response ranging from 1 - "not at all like me" to 7 - "very much like me"

[†](R) indicates reverse scoring

Study 1 Measurement Reliability

For Study 1, responses to the 46 items of the scale were collected from adults via an online panel. A total of 449 (206 females) complete responses were received. The mean age was 34.31 (*SD* = 10.05) years, and median household income (available for *N*=421 respondents) was 42,000 US dollars. In this study, and all subsequent studies, responses to the CBC scale items were collected using a 7-point response scale, ranging from 1 - "not at all like me" to 7 - "very much like me" (For items 1 through 8, where a binary True/False response was required, items

marked as "True" were assigned a value of "7", and items marked as "False" were assigned a value of "1").

As shown in Table 3, internal consistency estimates of reliability were high, Cronbach's α = .833 (Cronbach's α based on standardized items was .828). Thus, the scale appears to have adequate internal reliability. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy varies between "0" and "1", where "0" indicates that the sum of partial correlations is large, relative to the sum of correlations, indicating diffusion in the pattern of correlations, which in turn suggests that a factor analysis would be inappropriate. A value closer to 1[1] indicates that patterns of correlations are relatively compact, and therefore a factor analysis would produce distinct and reliable factors. The KMO statistic in this sample was .84, and Bartlett's test of sphericity was highly significant $p < .000$, indicating that the CBC scale is suitable for factor analysis.

[1] Kaiser (1974) recommends treating values greater than .5 as acceptable, where values between .5 and .7 are considered mediocre, values between .7 and .8 are good, values between .8 and .9 are great, and values above .9 are superb (see Hutcheson & Sofroniou, 1999, pp.224-225).

Table 3

CBC Descriptive Statistics and Construct Reliability

Statistic	Study 1(*N*=449)	Study 2 (*N*=366)
Minimum	2.24	1.70
Maximum	6.33	6.33
Mean	4.15	4.17
Median	4.10	4.13
Standard Deviation	.78	.80
KMO	.840	.830
Bartlett's Test	.000	.000
Cronbach's α	.833	.848

Factor Analysis

Exploratory factor analyses were also conducted to investigate the dimensionality of the CBC scale. To this end, the 46 items were subjected to a principal components analysis with a varimax rotation[2]. In our analyses we opted for an orthogonal Varimax rotation, as opposed to and oblique rotation, because our aim was to identify potentially unique components. Kaiser's (1974) recommendation (i.e. eigenvalues greater than "1") suggests as many as 13 possible factors within the CBC scale; however, a Scree test demonstrated that there are at most 3 distinct factors, indicated by the point of inflexion, after which a stable plateauing of eigenvalues is observed.

[2] Varimax is an orthogonal rotation, and assumes that the scale items are not related. However, factor analyses were also conducted, using Direct Oblimin rotation, which allows the scale items to be related. Results were identical.

Factor loadings were suppressed, if less than .4, as a marker of minimum acceptable standard for a substantive factor loading. For scale items grouped and ranked by factor loadings, please see Table 4. Items with cross-loadings greater than .1 were not considered. Factor loadings and cross-loadings were a priori restricted, so that we only consider items that load very highly onto a single factor, allowing for more conservative and more interpretable factor structure.

The data suggest that Factor 1 (18 items, 14.46 % of the variance) primarily assesses the degree to which individuals take advantage of a diverse set of bank products, such as having checking, savings, investment, and retirement accounts. This factor also seems to assess how individuals manage their money, such as choosing banks based on financial terms, rather than convenience, a preference for using card (credit in particular) as opposed to cash payments, and whether they use additional financial resources, such as apps, advisors, and financial news trends. It is interesting to note that CBC Factor 1 corroborates the big data findings from the bank dataset that was used to generate the CBC items. Having a diversity of bank products may reflect one's level of financial stability, customer sophistication, and possibly the quality of one's banking relationship.

Factor 2 (13 items, 13.36 % of the variance) seems to assess self-regulatory capacity in regard to the use and misuse of bank credit. The items that loaded highly on this factor measured credit card use, accumulation of revolving balance, maxing out one's credit line, having problems with spending control, being late with loan payments, experiencing overdraft events, accumulating non-sufficient funds and late payment fees, having been denied credit line increases or other loans, and having been sent to collections. Variability in this factor of the CBC may serve as an indicator of whether individuals are experiencing financial strain, or it may reflect the degree of financial discipline individuals are capable of maintaining.

Finally, Factor 3 (4 items, 5.75 % of the variance) appears to reflect the willingness with which participants accept the use of online banking, such as not using AFS providers, using less cash, having scheduled direct deposit of one's earnings, not using money orders for transfers. This factor seems to reflect the ease with which individuals can access and take advantage of banking products, as opposed to more costly alternatives, offered through AFS providers, the use of which is known to generate high volume of fees (FINRA, 2009).

Table 4

Factor Loadings for CBC Scale Items

Item ID	Scoring*	Item	Factor 1	Factor 2	Factor 3
43	N	I have investments such as stocks, bonds, or mutual funds outside my retirement account	0.737		
12	N	I have different account types at different banks in order to take maximum advantage of interest rates offered on the market	0.728		
15	N	I use online stock brokerage websites for the trading of stocks, bonds, mutual funds, such as "E*Trade"	0.697		
3	N	I have an investment account, such as a money market	0.678		
9	N	I use multiple banks and/or other financial institutions to serve my financial needs	0.640		
14	N	In addition to banks I also use other financial services providers, such as a financial planner, or investment broker	0.630		
38	N	I read news about trends in the financial industry and consumer banking	0.604		
10	N	I chose my bank based on the interest rate it offers	0.594		

Table 4, continued

42	N	I have a retirement plan, such as 401k, IRA, etc.	0.592	
39	N	Whatever funds I don't use in my checking account, I make sure to move to my savings or investment accounts in order to gain as much as possible in interest	0.544	
20	N	When I use a card I prefer to use credit rather than debit card	0.503	
40	N	I tend to put every purchase, no matter how small, on my credit card	0.490	
23	N	I request credit line increases as often as possible, but NOT because I need the money	0.486	
27	N	I have enrolled in a scheduled transfer (e.g. weekly, biweekly, monthly, yearly, etc.) from my checking account to my savings account	0.462	
13	R	I do all my banking with one financial institution, because it is the easiest thing to do	0.461	
2	N	I have had a savings account for most of my adult life	0.422	
36	N	I use budget apps, such as MINT, in order to control how much I spend	0.417	
16	N	I am likely to switch banks if I have an offer for better financial terms, rather than staying with the same bank because it is the easier thing to do	0.40	
25	R	I routinely max out my credit card and only make the required minimum monthly payment		0.733

Table 4, continued

44	R	In the past I have been denied credit for a loan	0.704	
37	R	I often spend more than I originally intend	0.695	
45	R	In the past I have been denied a credit line increase for my credit card(s)	0.679	
31	R	On occasion, I have been late with a monthly loan payment	0.677	
24	N	I always pay my monthly bill in full and do not carry credit card balance from one billing period to the next	0.665	
21	N	I rarely exceed spending more than one third of my credit card limit per month	0.651	
8	R	In the past I have been sent to a collection agency	0.580	
6	R	In the past I have been charged a late payment fee by my bank or other financial institution at least once	0.573	
7	R	In the past I have had at least one overdraft event	0.568	
5	R	In the past I have been charged a non-sufficient funds fee by my bank or other financial institution at least once	0.566	
46	R	I am often surprised at how much I have charged on my credit card(s)	0.566	
22	R	I request credit line increases because I need them	0.527	
18	R	In general I make more cash deposits rather than using direct deposit		0.629
17	N	For my income earnings I prefer to use direct deposit to my bank account		0.600

Table 4, continued

33	R	When I have to transfer money or make payments to institutions, I use money orders more often than I use transfers between bank accounts	0.465
32	R	For my financial transactions I rely primarily on alternative financial services providers such as “payday loan” or “car title loan” places	0.423
1	N	I have had a checking account for most of my adult life	
4	R	In the past, I have filed for bankruptcy at least once	
11	R	I chose my bank, because of convenience (i.e. proximity to work or home, multiple branches, etc.)	
19	R	In general I prefer to use cash rather than card for day to day purchases	
26	N	Whenever I find myself with cash to spare I deposit it to one of my bank accounts, such as my checking account	
28	N	I am enrolled in auto pay for my utility bills, such as electricity, internet, etc	
29	N	I have at least one loan product from a financial institution, such as mortgage, car loan, or student loan.	
30	N	I have more than one loan product from a financial institution	
34	R	When I need an ATM I go to the first available one, rather than looking for my bank’s ATM	
35	N	I regularly use my bank’s app to stay on top of my finances	

Table 4, continued

41	N	I consider myself to be completely financially independent from others, such as parents, spouse or significant others

Note:
* *R indicates reverse scoring, and N indicates normal scoring*

Study 2 Test-Retest Reliability

In order to establish test-retest reliability of the new Consumer Banking Competence scale, the same online panel of participants from Study 1 was invited to participate in a second wave of data collection, conducted approximately three months following the first wave of data collection. Of the 449 original responses in the first wave, we were able to secure a second set of responses for 81.5% of the participants, N = 366 (172 females). The mean age was slightly higher, relative to Study 1, 35.17 (SD = 10.29) years, and median household income (available for N=346 respondents) remained at 42,000 US dollars, same as in Study 1.

As shown in Table 3, internal consistency estimates of reliability remained high, similar to Study 1, Cronbach's α = .848 (Cronbach's α based on standardized items was .842). Test-retest reliability was $r_{(366)} = .644$, $p < .000$. Thus, the scale appears to have good internal reliability, as well as satisfactory test-retest reliability. The KMO statistic in this sample was .83, and Bartlett's test of sphericity was highly significant $p < .000$, indicating that the data from the second wave of data collection are also suitable for factor analysis. A factor analysis with the same specification as in Study 1 (i.e. principal components analysis with a varimax rotation, items were considered when factor loadings were greater than .4, and cross-loadings less than .1) yielded three distinct factors that were identical to the ones inferred from Study 1, where Factor 1 explained 15.31 % of the variance, Factor 2 explained 13.71 %, and Factor 3 explained 6.38 %

- values that are highly consistent with those derived in Study 1. Even though the underlying dimensionality of CBC scale is highly stable across time, future studies ought to conduct confirmatory factor analyses with different samples.

Study 3A Construct and Criterion Validity

The main purpose of Study 3 was to test whether the CBC scale indeed measures what it purports to measure – namely how individuals use financial knowledge and self-regulation strategies in regard to their use of assets, credits, financial markets, and in particular banking institutions for their money management needs, where high scores are interpreted to indicate more prudent money management practices, and lower scores indicate less prudent money management practices. Therefore variability in the CBC scale is expected to reflect the overall quality of one's financial dynamics.

In order to demonstrate the measure's construct validity we estimated convergent validity with financial literacy (Alba & Hutchinson, 1987; Fernandes, Lynch, & Netemeyer, 2014; Lusardi, 2008; Lusardi & Mitchell, 2014; Remund, 2010), as a measure most closely related to the CBC scale. Given that a substantial number of the CBC items were designed to assess self-regulatory capacity, specifically in regard to money management and banking behaviors, we provide discriminant validity analysis between the CBC and general self-control (Baumeister 2002; Carver & Scheier, 1998; Vohs & Faber, 2007).

Under criterion validity the current study examines concurrent and predictive validity of the CBC scale. In order to demonstrate the measure's concurrent validity we hypothesized that individuals who know their FICO score will also score significantly higher on the CBC measure, relative to those who do not know their FICO score. Predictive ability was examined by correlating the CBC scale with four distinct income measures: individual income, household

income, income from investments, and income from capital gains, where we expected significant positive correlations between the CBC scale and the different income measures. In assessing the scale's predictive validity it is important to consider not only overall household income, as individuals have multiple channels of deriving raw earnings, but it is also crucial to examine relationships between the scale and income specifically derived from the proper use of a diverse set of banking products, such as income from investments, and income from capital gains.

Study 3A Method

Participants and Procedure

We used the data from the online panel of 449 (206 females) participants from Study 2. The mean age was 34.31 (*SD* = 10.05) years, and median household income (available for *N*=421 respondents) was 42,000 US dollars.

Materials

Participants completed the 46 item Consumer Banking Competence scale along with the following measures.

The Financial Literacy scale (Lusardi, 2008) was used to assess finance-specific knowledge such as understanding of arithmetic, interest rates, inflation, risk diversification, bonds, stocks, mutual funds, and asset pricing

The Self-control scale (Tangney, Baumesiter, & Boone, 2004) was used to assess trait level general self-control. The scale asks subjects to rate how applicable to themselves are various aspects of achieving, such as keeping neat surroundings or failing at self-control, such as losing one's temper easily.

Participants were also asked to report their FICO score, overall household income, income from investments, insurance, or property (including dividends, interest, and rent from rental property), and income from capital gains.

Results and Discussion

Convergent validity for the CBC scale was obtained by correlating the measure with participants' financial literacy scores. A moderate significant relationship was observed, $r_{(448)} = .32$, $p < .000$, such that being financially literate was associated with also being a competent consumer of banking products. The magnitude of the relationship indicates that, while related, the two measures are not so highly related as to measure the same construct. This outcome confirms our expectations that the two constructs reflect distinct aspects of money management, where financial literacy assesses crystalized knowledge of financial instruments, whereas the CBC scale assesses the behavioral practices that individuals typically engage in as part of their interactions with financial institutions.

Given that the CBC scale contained a number of items assessing self-regulatory capacity in regard to one's management of bank products, it was necessary to provide evidence that the scale under development is substantially different from general measures of self-control (Baumeister 2002; Carver & Scheier, 1998; Vohs & Faber, 2007). A chi-square difference test (Gerbing & Anderson, 1988) supported discriminant validity between the CBC scale and general self-control, $\Delta\chi^2 = 77.58$, $p < .002$. A positive moderate correlation was also observed, $r_{(444)} = .26$, $p < .000$, indicating that greater self-control was associated with more competent banking behavior. However, the magnitude of the correlation indicates that while related, the two measures assess distinct self-regulatory capacities.

In order to examine concurrent validity, under the more general criterion validity, we compared variability in CBC scores among participants who knew their FICO scores to those who did not. As expected, participants who knew their FICO score had significantly greater CBC scores (M = 4.42, SD = .88), relative to those who did not (M = 3.98, SD = .66), $t_{(447)} = 6.0002$, $p < .000$. A significant positive correlations was observed between participants' FICO scores and their CBC scores, $r_{(171)} = .446$, $p < .000$, providing further evidence for the validity of the measure under development.

Predictive validity, as another aspect of criterion validity, was assessed by examining the relationships between the CBC scale and different types of income, such as overall household income, income from investments, and income from capital gains. While we expected positive relationships among all variables, it is important to note we specifically included separate measures of investment income and capital gains income, as these earnings reflect a proficiency not just in knowing financial instruments (i.e. financial literacy), but also reflect a proficiency in the actual use of these financial products (i.e. consumer banking competence). As expected, the relationship between the CBC scale and individual income was significant, $r_{(421)} = .28$, $p < .000$, as well as between CBC Factor 1 and individual income (assessing portfolio diversification, and money management practices), $r_{(421)} = .33$, $p < .000$. Similarly, the relationship between the CBC scale and household income was significant, $r_{(421)} = .15$, $p < .002$, as well as between CBC Factor 1 and household income, $r_{(421)} = .23$, $p < .000$. Income from investments was positively correlated with both the CBC scale, $r_{(351)} = .12$, $p < .025$, as well as with CBC Factor 1, $r_{(444)} = .15$, $p < .006$. Finally, income from capital gains was also significantly and positively correlated with both the CBC scale, $r_{(348)} = .15$, $p < .004$, as well as with CBC Factor 1, $r_{(348)} = .18$, $p < .001$. The data suggest that engaging in desirable banking practices does not only provide

benefits for overall household income, but it is also associated with greater income specifically derived from investment products, which are available to consumers through consumer banks.

Study 3B CBC Mediates the Relationship between Financial Literacy with Income and Creditworthiness

Having established a valid and reliable measure of banking competence, we now focus on the impact of this important individual difference, as it pertains to individual financial dynamics. In order to further test the validity of the CBC measure, we examined its properties as a mediator variable between broader individual differences factors, and financial outcomes. The literature suggests that individual differences in time preferences for rewards represents a domain-general individual differences factor that predicts a number of life outcomes, beneficial to the individual.

Time discounting denotes one's preference for sooner, smaller (SS) versus later, larger (LL) rewards. Research has demonstrated that a preference for SS over LL rewards has been associated with lower scholastic achievement and intelligence, compromised executive functions, worse health-related behaviors, greater likelihood of committing a crime, more impulsive behavior, alcoholism, more energy consumption, as well as particularly relevant for the subject of the current investigation lower creditworthiness, and lower retirement savings (Chabris, Laibson, Morris, Schuldt, & Taubinsky, 2008; Chapman, 1996; Eigsti et al., 2006; Frederick, Loewenstein, & O'Donoghue, 2002; Kirby & Herrnstein, 1995; Kirby, Petry, & Bickel, 1999; Meier & Sprenger, 2012; Mischel, Shoda, & Rodriguez, 1989; Petry, 2001; Reimers, Maylor, Stewart, & Chater, 2009).

Earlier work from our lab (Gyurovski & Berman, Submitted) argued that the multitude of these relationships suggests that time discounting likely reflects a broad psychological and

behavioral pattern – a claim supported by recent research where discounters have been demonstrated to take the path of least cognitive resistance (Shenhav, Rand, & Greene, 2017). Given that non-discounters tend to be more deliberative and reflective in their cognitive style, we further posited it is also likely that when faced with a complex decision or problem, such as choosing a 401K retirement plan, an investment, or a mortgage, they may be more likely to acquire finance-specific knowledge in order to improve their financial standing, by making informed decisions on investments and loans. Therefore, we examined the mediating effect of general education and financial education on the relationships between time discounting with income and creditworthiness. Data from a US sample of adults revealed that education and financial literacy fully mediated the relationship between time discounting and income. Furthermore, the data demonstrated that education and financial literacy fully mediated the relationships between deliberative time discounting, thought to reflect controlled/reflective processing, with income and creditworthiness, as measured by FICO scores.

The current study aims to extend our earlier work. Given that we observed only a partial mediation effect of education and financial literacy in the relationship between mean time discounting and FICO, we wanted to test whether the newly developed CBC scale fully mediates the relationships between financial literacy with income and creditworthiness, since the scale under development is theorized as the behavioral application of financial knowledge. Our expectation is that both measures account for variability in financial performance, where we focus on income and creditworthiness, but we expect that the CBC plays a more proximal role to one's money management strategies. We expect this to be the case, as it is conceivable that existing measures of "financial savviness" – financial literacy (Lusardi, 2008) – may not necessarily represent an optimal measure of one's level of financial education and expertise.

Current measures focus exclusively on measuring one's knowledge of financial terminology, such as being able to recognize the definition of compound interest. Whereas, such crystalized knowledge is indeed important, and does have implications for one's financial well-being, especially when predicting income (Gyurovski & Berman, Submitted), it is conceivable that it may affect individual financial standing by triggering the development and adherence to self-regulation strategies in regard to money management.

For the vast majority of individual consumers (92 % in the US) the main way of applying their financial knowledge are the times when they have to interact with banking institutions in order to make some of the most consequential monetary choices in their lives, such as mortgage choice, college education, and retirement savings (Frydman & Camerer, 2016). However, the outcome of these choices is determined to a large extent by the given bank's policies and regulations. Therefore, bank employees determine a prospective client's creditworthiness not based on that consumer's understanding of financial terminology, but rather on that person's past financial, and in particular banking behavior. Therefore, being able to account for the variability in banking competence may represent an important mediator of the relationship between financial literacy and creditworthiness, but also between financial literacy and income. Thus, we hypothesized that consumer banking competence will mediate the relationships between financial literacy with creditworthiness, and income.

Study 3B Method

Participants and Procedure

We used the same sample as in Study 3A.

Measures

We assessed participants' time preferences for reward with a (β, δ) model of immediacy bias and individual discounting (Frederick et al., 2002; Weber et al., 2007), which has been demonstrated to perform best among other time preferences measures (Burks, Carpenter, Götte, & Rustichini, 2012). Participants were presented with 19 items and prompted to choose between a sooner, smaller (SS) payout or a later, larger one (LL) for three time periods: today versus a month from today, today versus three months from today, and finally six month from today versus seven months from today. On all items the LL payouts remained the same at $80, whereas the SS ones started at $75 in the first pair and decreased in increments of $5 for each subsequent item. An individual discount factor (IDF) was calculated for each period by dividing the value of the item at which individuals switched from preferring the SS to the LL payout of $80. (The time discounting measure in this chapter is identical to the one used in Chapters 1 and 2; please, refer to these chapters for a more detailed description along with examples.)

As in Chapters 1 and 2, the mediation analyses utilized a bootstrapping procedure, which is a nonparametric resampling method intended for mediation analyses characterized by smaller sample sizes. Even though the results do not change in significance depending on whether or not bootstrapping was used, this method offers a more robust test of the model, since it is more powerful than the conservatively biased Sobel test for mediation (Carre, Iselin, Welker, Hariri, & Dodge, 2014; Sobel, 1982). We used the PROCESS tool, designed for SPSS (Hayes, 2012), which generates a 95% confidence interval for the indirect effects using 10,000 iterations.

Results

Analytic Approach

We first report bivariate correlations between the independent variable and the mediator, and the correlations between the mediator and the outcome variables, as well as the linear models of the

mediator regressed on the predictor and outcome variables. Then we provide the mediation models, where financial literacy is treated as the predictor variable, consumer banking competence is entered as the mediator variable, and creditworthiness and income represent the outcome variables of interest.

Bivariate Correlations and Linear Models

The data revealed a significant positive correlation between financial literacy and the CBC scale, $r_{(448)} = .32$, $p < .000$. The data also yielded significant positive correlations between CBC and FICO, $r_{(171)} = .45$, $p < .000$, as well as between CBC and income, $r_{(421)} = .28$, $p < .000$.

Linear Models

Regressing CBC on both financial literacy, ($B = 10.81$, $t = 4.31$, $p < .000$), and FICO, ($B = .14$, $t = 5.99$, $p < .000$), yielded significant positive coefficients, as well as a significant regression overall, ($R^2 = .28$, Adjusted $R^2 = .27$, $F_{(2, 168)} = 32.47$, $p < .000$). Regressing CBC on both financial literacy, ($B = 1.17$, $t = 4.79$, $p < .000$), and income, ($B = .53$, $t = 5.68$, $p < .000$), yielded significant positive coefficients, as well as a significant regression overall, ($R^2 = .094$, Adjusted $R^2 = .091$, $F_{(2, 645)} = 53.92$, $p < .000$).

Mediation Model Predicting Creditworthiness

This model tested the hypothesis that the CBC scale mediates the relationship between financial literacy and creditworthiness, as measured by FICO scores (Figure 7). Results revealed that financial literacy was a significant predictor of the CBC, $B = 13.31$, SE(B) =2.71, p < .0000. The model also shows that CBC predicts FICO, $B = 1.26$, SE(B) = .21, p < .0000, 95% CI = [.85, 1.68]. Whereas the total effect of financial literacy on FICO is significant, $B = 17.94$, SE(B) = 8.17, p < .02, its direct effect (controlling for CBC) fails to reach conventional levels of statistical significance, $B = 1.12$, SE(B) = 7.95, p = .8880.

The indirect effect of financial literacy on FICO via CBC was significant, *B* = 16.82, Boot *SE*(B) = 4.51, 95% CI = [9.10, 26.71], thus demonstrating that consumer banking competence fully mediates the relationship between financial literacy and FICO. Please see Figure 7 for a structural representation of the mediation model.

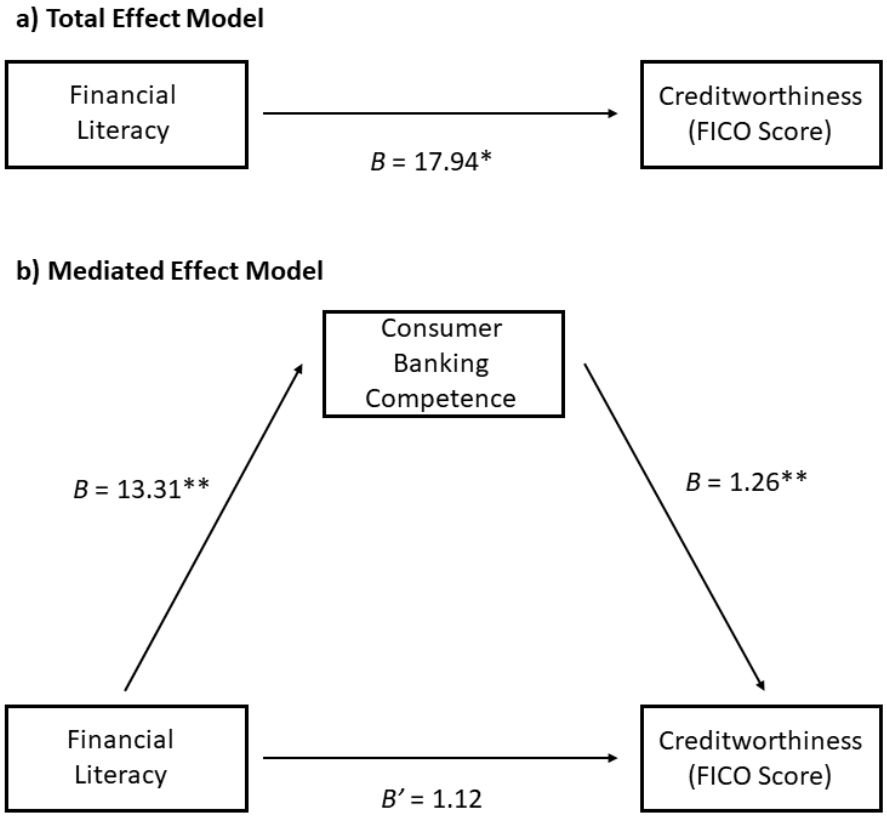

*Figure 7***.** Mediation model showing the total effect of financial literacy on FICO (a), and the indirect effect of financial literacy on FICO, as mediated by consumer banking competence (b). Unstandardized regression coefficients are shown. (*$p < .05$. **$p < .001$)

Mediation Model Predicting Income

This model tested the hypothesis that the CBC scale mediates the relationship between financial literacy and income (Figure 8). Results revealed that financial literacy was a significant predictor of the CBC, *B* = 8.75, SE(*B*) =1.28, p < .0000. The model also shows that CBC predicts income,

B = .0031, SE(*B*) = .0007, p < .0000, 95% CI = [.0017, .0045]. Whereas the total effect of financial literacy on income is significant, *B* = .0563, SE(*B*) = .0187, p < .0027, its direct effect (controlling for CBC) fails to reach conventional levels of statistical significance, *B* = .029, SE(*B*) = .0193, p = .1328.

The indirect effect of financial literacy on FICO via CBC was significant, *B* = .0537, Boot *SE*(B) = .0139, 95% CI = [.0166, .0432], thus demonstrating that consumer banking competence fully mediates the relationship between financial literacy and income. Please see Figure 8 for a structural representation of the mediation model.

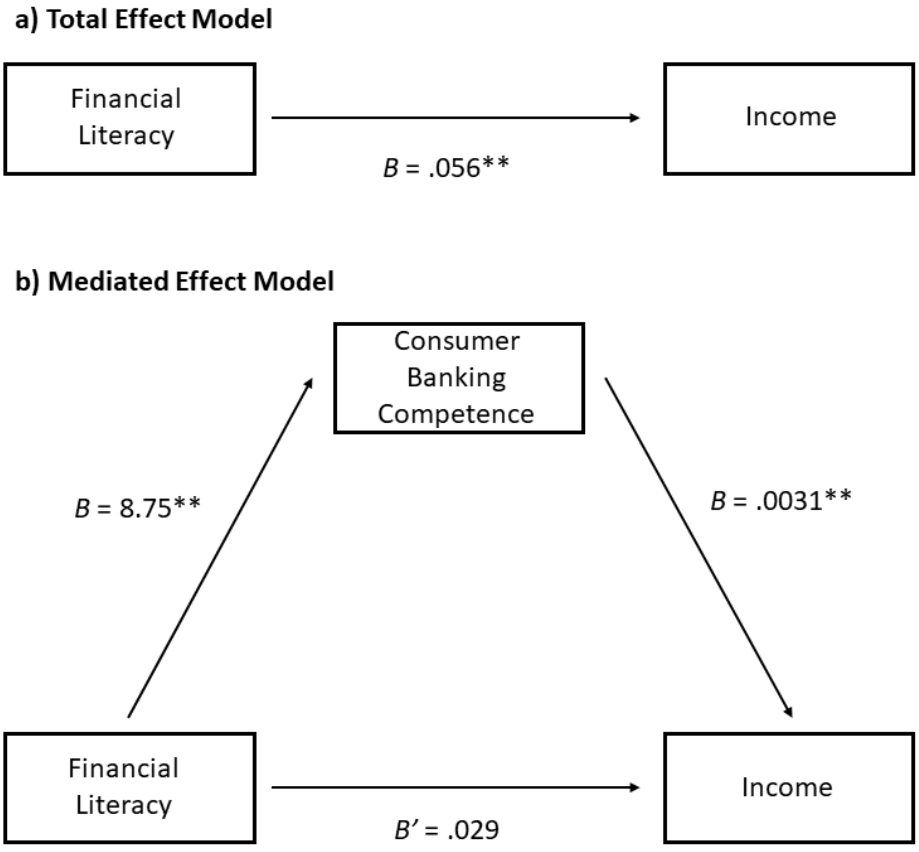

*Figure 8***.** Mediation model showing the total effect of financial literacy on income (a), and the indirect effect of financial literacy on income, as mediated by consumer banking competence (b). Unstandardized regression coefficients are shown. (*$p < .05$. **$p < .001$)

Study 3B Discussion

Study 4 examined the mediating role of consumer banking competence underlying the relationship between financial literacy and individual financial outcomes – income and creditworthiness. The newly developed scale fully mediated both the relationship between financial literacy and creditworthiness, and between financial literacy and income, indicating that one's finance-specific knowledge may influence that person's financial outcomes by triggering self-regulatory practices pertaining to banking behavior, which in turn improve individual money management and therefore one's income and creditworthiness prospects.

The current study demonstrates that consumer banking competence represents a robust mediator of the relationship between measures of crystalized finance-specific knowledge with income and creditworthiness, thus further corroborating the validity of the scale under development. Critiques of the current model may suggest that individuals develop their finance-specific knowledge (i.e. financial literacy), because they have accumulated experience managing their finances through banks (i.e. consumer banking competence). However, switching the two models around to test whether financial literacy mediates the relationship between consumer banking competence with income and creditworthiness did not yield significant results for the mediating role of financial literacy [in the case of predicting income - B = .0003, Boot SE(B) = .0002, 95% CI = (.0000, .0007); in the case of predicting FICO - B = .0105, Boot SE(B) = .0007, 95% CI = (-.0013, .0013)], whereas the coefficients for consumer banking competence remained highly significant (in the case of predicting income - B = .0031, SE(B) = .0007, $p < .0017$; in the case of predicting FICO - B = 1.26, SE(B) = .2108, $p < .000$), even after including financial literacy in the models, the coefficients of which failed to reach conventional levels of

significance (in the case of predicting income - B = .0290, SE(B) = .0193, p = .1328; in the case of predicting FICO - B = 1.12, SE(B) = 7.95, p = .888).

Therefore, the additional analyses further corroborate the proposed pathway, where financial literacy generates knowledge about finance, which in turn is applied through developing and adhering to self-regulatory behaviors in money management. These behavioral practices, in turn, improve one's financial prospects. The data suggest that consumer banking competence plays a more proximal role to personal finance, compared to financial literacy.

However, a limitation of the current study is that we simply measured financial literacy, rather than attempting to manipulate it. Recent research (Fernandes, Lynch, & Netemeyer, 2014) shows that correlational studies of financial literacy show significantly larger effects compared to studies that experimentally manipulated financial literacy. The authors suggest this may be due to intervention decay (i.e., the financial literacy intervention did not last), or weak intervention effects in the acquiring of financial knowledge. Among the correlational studies the authors argue that the greater predictive ability of financial literacy could be attributed to variables, putatively correlated with financial literacy or the financial behaviors investigated.

This is important for three reasons. First, the current study offers evidence that consumer banking competence may represent one of these omitted variables in correlational research. Second even after accounting for potential omitted variables, such as confidence in financial information, propensity to plan, willingness to take financial risks, and numeracy, the effects of measured financial literacy decrease in magnitude, but nonetheless remain significant (Fernandes, Lynch, & Netemeyer, 2014), suggesting that acquiring financial knowledge may be an intrinsically motivated process that develops over a long period of time – characteristics that make financial literacy difficult to manipulate experimentally. Third, what researchers construe

as financial literacy, may not represent accurately or exhaustively the complexity of what financial savviness represents. Being aware of the meaning of financial terminology, may be less conducive to prudent financial decisions, than being aware of finance in addition to being able to actually apply that knowledge through one's most influential money choices – mortgage, college loans, and retirement savings (Frydman & Camerer, 2016), all of which are a product of one's interaction with a banking institution. The current study shows that financial literacy and consumer banking competence represent distinct aspects of one's financial expertise, where the data indicate consumer banking competence may play a more proximal role, relative to financial literacy, to improved personal finance.

The current study is informative for the debate on the effectiveness of financial literacy manipulations. Research reports show that improved financial literacy does not consistently lead to actual improvements in financial expertise (Adams & Rau, 2011; Collins & O'Rourke, 2010; Hastings et al., 2013; Hira, 2010; Thaler & Sunstein 2008; Willis, 2009). Given that consumer banking competence fully mediates the relationship between financial literacy with income and creditworthiness, as indicators of financial expertise, the current data offer implications of practical importance for efforts in financial education. It is conceivable that we may have more success in financial education if we focus on training self-regulatory strategies that generate desirable banking practices with direct implications for personal finance, rather than merely teach crystalized knowledge clarifying the meaning of financial terminology.

Study 3C Personality and Personal Finance Management

The Five Factor Model of Personality offers a robust representation of the underlying structure of personality traits. The five traits – Extraversion, Agreeableness, Conscientiousness, Emotional Stability, and Openness to Experience – have been widely established as major features of

personality across cultures (Costa & McCrae, 2008). The current study aims to identify the character traits of the "financially savvy" personality. In order to further examine the properties of the newly-developed CBC scale, we wanted to investigate the construct's relationship with the Big Five personality traits. We were specifically interested in the relationship between the CBC scale and conscientiousness, as a key personality trait, already related to trait-level self-control (Olson, 2005; Tangney, et al., 2004). Self-regulatory capacity is crucial for personal finance management, such as making deb-repayments on time, budgeting for necessary expenses, saving for planned events (i.e. college education) as well as for emergencies, consistently keeping track of inflow and outflow of cash, and perhaps most importantly monitor all of these behaviors in accordance with self-set standards.

In order to arrive at a more complete picture of how personality relates to being "financially savvy", we included a measure of financial literacy (Lusardi, 2008), in addition to the CBC measure, as the two scales appear to reflect distinct aspects of processes related to personal finance management.

We hypothesized that both consumer banking competence and financial literacy will be positively related with conscientiousness. Given that CBC Factor 2 seems to assess self-regulatory capacity in regard to past use of bank credit, we expected that this variable will be also positively related to conscientiousness.

Method, participants, and procedure were identical to those in Studies 3A and 3B. A short version of the Big Five Inventory (Gosling, Rentfrow, & Swann, 2003) was administered, where each of the five personality characteristics (Extraversion, Agreeableness, Conscientiousness, Emotional Stability, and Openess to Experience) is represented by two items on a scale of 1 "disagree strongly" to 7 "agree strongly".

Study 3C Results and Discussion

As expected, significant and positive relationships were observed between conscientiousness with consumer banking competence, $r_{(435)} = .182$, $p < .000$, and with CBC Factor 2, assessing past use of bank credit, $r_{(435)} = .249$, $p < .000$. Individuals who tend to be efficient and organized, rather than easy-going and disorderly tend to be more competent banking clients, and appear to be more diligent at debt-repayment. Interestingly, extraversion was also significantly and positively correlated with consumer banking competence, $r_{(437)} = .178$, $p < .000$, as well as with CBC Factor 1, assessing the degree to which one maintains a diversified portfolio of banking products, $r_{(437)} = .177$, $p < .000$. Being one of the major aspects of personality, the extraversion-introversion continuum indicates individual differences in the experience of positive emotion, social engagement, and life satisfaction (Ashton, Lee, & Paunonen, 2002; John & Srivastava, 1999). However, it has been suggested that these differences stem from underlying variability in how sensitive to rewards cues one is, as well as motivation to obtain rewards (DeNeve & Cooper, 1998; Depue et al., 1994; Diener, Oishi, & Lucas, 2003; Gray, 1970; Lucas & Diener, 2001). Given that extraversion is associated with obtaining gratification from sources outside the self, it is conceivable that this underlying reward sensitivity may motivate individuals to develop and maintain desirable banking practices, as those are associated with improved personal finance, and therefore better access to resources. However, the significant relationship between CBC and extraversion may also reflect social comparison processes. Among countries with high income inequality, such as the US, low-income individuals may be induced to make up the difference between themselves and their wealthier counterparts by borrowing (Christen & Morgan, 2005). Finally, emotional stability was also significantly and positively related to

consumer banking competence, $r_{(436)} = .191$, $p < .000$, as well as with CBC Factor 1, $r_{(436)} = .111$, $p < .021$, and CBC Factor 2, $r_{(436)} = .16$, $p < .001$.

Contrary to expectations, financial literacy was not related to conscientiousness, $r_{(435)} = .028$, $p = .556$; however, the construct was related to emotional stability, $r_{(436)} = .133$, $p < .006$. For a complete list of bivariate correlations, please see Table 5.

Even though it was not hypothesized, the relationship between emotional stability with consumer banking competence, and financial literacy is an interesting finding. Emotional stability represents the opposite of neuroticism/emotional instability, which is associated with a tendency to experience negative emotions, such as anger, anxiety, or depression (Jeronimus, Riese, Sanderman, & Ormel, 2014). Individuals scoring high on neuroticism tend to exhibit low tolerance for stress or aversive stimuli, and react emotionally to stress (Norris, Larsen, & Cacioppo, 2007). Emotional instability has also been linked to pessimistic and anxious attitudes toward work (Fiske, Gilbert, & Lindzey, 2009). It is possible that emotional stability then reflects one's ability to process information clearly, plan effectively, make decisions, and handle stressful events – all of which are crucial for personal finance. Perhaps, individuals who score lower on emotional stability are more likely to be overwhelmed by stress, known to affect financial decision making (Porcelli & Delgado, 2009). Keeping track of personal finance may be seen as a stressful activity in and of itself, which in turn may then be avoided, despite the negative implications for one's financial dynamics.

Table 5

Bivariate Correlations between CBC, Financial Literacy, and the Five Factor Model of Personality

Variable	1	2	3	4	5	6	7	8	9	10
1. CBC										
2. CBC Factor 1 *Portfolio Diversification*	.76**									
3. CBC Factor 2 *Past Use of Credit*	.64**	.05								
4. CBC Factor 3 *Bank Utilization*	.14**	-.14**	.12*							
5. Financial Literacy	.32**	.26**	.10*	.32**						
6. Extraversion	.18**	.18**	.07	-.09	-.05					
7. Agreeableness	.00	-.07	.04	.08	.02	.18**				
8. Conscientiousness	.18**	.01	.25**	.04	.03	.22**	.29**			
9. Emotional Stability	.19**	.11*	.16**	.01	.13**	.29**	.35**	.44**		
10. Openness to Experience	.02	-.02	.04	.03	-.02	.25**	.21**	.12*	.17**	

Note. *indicates $p < .05$; ** indicates $p < .01$.

Study 3D Personal Finance Management, Health, and Well-Being

Lower socio-economic status has been linked to a heightened risk of contracting disease and dying prematurely (Adler, Marmot, McEwen, & Stewart, 1999); whereas, having higher status has been linked to improved access to scarce resources, greater social support, better physical and mental health, longer life expectancy, and better reproductive success (Adler et al., 1994; Ellis, 1994). Whereas, some of these relationships may be driven by health effects on SES, the literature points to stronger SES implications for health (Fox, Goldblatt, & Jones, 1985; Haan, Kaplan, & Syme, 1989). In identifying some of the potential pathways through which SES affects health and longevity, research suggests that the increased health risks among lower SES individuals may be due to the fact that they appear less able to adapt to and handle stress, compared to higher SES individuals, as measured by pro-inflammatory cytokine interleukin-6 (IL-6) expression following stress (Brydon, Edwards, Mohamed-Ali, & Steptoe, 2004). Having lower SES has also been linked to accelerated biological aging, as measured by white-blood-cell telomere length (Cherkas et al., 2006). However, it is important to note that the precise mechanisms through which SES influences important health outcomes have not been precisely or exhaustively established.

In contrast to the substantial research on SES and income (as a composite of SES) on health, there is almost no research investigating the effects of personal money management on health. A recent study with a focus on psychological well-being demonstrated that a greater bank-balance is associated with positive perceptions of one's financial well-being, which, in turn, predicted greater life satisfaction (Ruberton, Gladstone, & Lyubomirsky, 2016), indicating that the way one manages personal material resources may carry implications for that person's psychological, and possibly physiological well-being. Financial expertise, as a way of improving

personal finance management, is associated with improved income and creditworthiness. Therefore, it is possible that the extent to which one is "financially savvy" may exert influence on health, beyond the known effects of raw earnings. This is important to investigate, because the scope of personal finance extends beyond income, and it is also affected by how well one manages earnings, debt, savings, and emergencies. It is possible that people may buffer themselves from the deleterious effects of low income, by enabling them to make more prudent financial decisions that account for their earnings' constraints. This, in turn, may reduce the experience of stress and anxiety, ultimately leading to better health outcomes.

Therefore the current study is focused on examining the associations between personal finance management with indices of physiological and psychological health. In doing so, we sought to control for broader individual differences, such as self-control and time discounting. Self-control represents a self-initiated regulation of conflicting impulses in favor of long term valued goals (Baumeister, Heatherton, & Tice, 1994). In a recent paper, Duckworth and colleagues (2016) identify two core features of self-control – first, it entails two mutually exclusive options, and second it is initiated by the individual in order to accomplish the more valued of two goals. Better self-control at an early age predicts a wide range of life outcomes from scholastic achievement (Mischel, Shoda, & Peake, 1988; Mischel, Shoda, & Rodriguez, 1989; Shoda, Mischel, & Peake, 1990) to substance use, general and mental health (Ayduk, Zayas, Downey, Cole, Shoda, & Mischel, 2008; Schlam, Wilson, Shoda, Mischel, & Ayduk, 2013), as well as executive functioning (Casey et al., 2011). Poor self-control on the other hand has been linked to a host of behavioral problems, such as overeating, alcohol and drug abuse, crime and violence, overspending, sexually impulsive behavior, unwanted pregnancy, and

smoking (e.g., Baumeister, Heatherton, & Tice, 1994; Tangney, Baumeister, & Boone, 2004; Vohs & Faber, 2007).

Time Discounting (or time preference, temporal discounting) on the other hand denotes one's relative valuation of a good at an earlier date, compared to its valuation at a later date. Discounting the value of future rewards is associated with lower scholastic achievement, worse health-related behavior, and lower creditworthiness (Chabris, Laibson, Morris, Schuldt, & Taubinsky, 2008; Chapman, 1996; Eigsti et al., 2006; Frederick, Loewenstein, & O'Donoghue, 2002; Kirby & Herrnstein, 1995; Kirby, Petry, & Bickel, 1999; Mischel, Shoda, & Rodriguez, 1989).

In our analyses we set out to examine the unique contribution of consumer banking competence and financial literacy, as two distinct, yet viable indices of financial savviness, on physiological (physical health, BMI, sleep latency, healthcare) and psychological (anxiety, perceived stress, loneliness, subjective well-being, control over life) health indices, while controlling for the know effects of SES, self-control, and time discounting on health. We expected that both financial literacy and consumer banking competence will be associated with salubrious effects on health indices, above known predictors.

Measures

Physical health was assessed through the general health sub-scale of the SF-36 (Ware & Sherbourne, 1992). The scale consists of five items measuring one's global health assessment, as well as how it compares to that of others, where high scores reflect better health.

Body mass index (BMI) was calculated by dividing participants' weight to their height squared, based on widely accepted practices.

Sleep latency was assessed with a single item asking participants how many hours of actual sleep they tend to get per night on average.

The healthcare measure asked participants four questions, measuring the regularity with which they visit the doctor, follow prescriptions, visit the dentist, and floss their teeth.

Negative affect was measured using the Negative Affect subscale of the PANAS (Watson, Clark, & Tellegen, 1988).

Control over life was assessed with a single item from the MacArthur Midlife Survey (Lachman & Weaver, 1998) which asked participants to indicate how much control they have over their life on a scale of 0 “no control at all” to 10 “very much control”.

Using widely accepted practices (Diener, Oishi, & Lucas, 2003), subjective well-being was measured with a single item asking participants how happy they are all things taken together on a scale of 1 “not at all” to 10 “extremely”.

We used the Spielberger State-Trait Anxiety Inventory (STAI: Y-6 item) (Marteau & Bekker, 1992), which measures participants’ anxiety through six items, where participants are asked to rate on a 4-point scale how accurate statements are of oneself (e.g., “I am worried.”).

Participants experience of stress was assessed with the Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983), which assess the frequency of both stressful situations and feelings.

Loneliness was assessed with a three-item measure (Hughes, Waite, Hawkley, & Cacioppo, 2004) asking participants about the extent to which they feel isolated from others, where possible response ranged from 1 “hardly ever” to 3 “often”.

Analytic Approach

We first report bivariate correlations among all variables in the current study, including the health indices, the CBC scale, the Financial Literacy Scale, SES, self-control, time discounting, along with all physiological and psychological health indices.

Hierarchical regressions examined the effect of CBC and financial literacy, independent of SES, self-control, time discounting, and possible reporting bias as a result of experiencing greater negative affect. Step 1 of the regressions included self-control, time discounting, and SES, as comprised by averaging standardized scores for participants' income, education, and occupation. Step 2 included negative affect, and demographic variables – age, sex, and race. Finally, Step 3 included consumer banking competence and financial literacy. Each physiological (physical health, BMI, sleep latency, healthcare) and psychological (anxiety, perceived stress, loneliness, subjective well-being, control over life) index of health was used as the predicted variable, for a total of nine hierarchical regression models. Initial beta weights from when each variable was first entered in each model are reported in Table 7 along with overall adjusted R^2 for the regression and the change in R^2 after the last step when CBC and financial literacy were entered.

Study 3D Results and Discussion

Bivariate Correlations

Consumer banking competence was related to all variables, except control over life. All signs were in the expected direction, such that being a more competent bank consumer was associated with better physical health, $r_{(421)} = .30$, $p < .000$, lower BMI, $r_{(421)} = -.23$, $p < .000$, greater amount of sleep, $r_{(421)} = .16$, $p < .001$, better healthcare practices, $r_{(421)} = .26$, $p < .000$, lower

anxiety, $r_{(421)} = -.15$, $p < .002$, less stress, $r_{(421)} = -.27$, $p < .000$, feeling more socially-connected, $r_{(421)} = -.19$, $p < .000$, and feeling happier, $r_{(421)} = .20$, $p < .000$.

In contrast, financial literacy was only related to perceived stress, such that being more financially literate was associated with experiencing less stress, $r_{(421)} = -.14$, $p < .000$. For a complete set of bivariate correlations, including time discounting, SES, and self-control, please see Table 6.

Table 6

Bivariate Correlations for CBC and Financial Literacy Predicting Physical Health and Psychological Indices (N=421)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Predictors														
1. CBC														
2. Financial Literacy	.33**													
Controls														
3. Time Discounting	.34**	.35**												
4. Socio-economic Status	.34**	.25**	.21**											
5. Self-control	.27**	.02	.11*	.04										
Physiological Indices														
6. Physical Health	.30**	-.01	.05	.16*	.42**									
7. BMI	-.23**	-.03	-.07	-.12*	-.21**	-.40**								
8. Sleep Latency	.16**	.05	.04	.03	.07	.13*	.01							
9. Healthcare	.26**	-.01	.03	.08	.22**	.09	-.03	.17**						
Psychological Indices														
10. Anxiety	-.15**	-.06	-.06	.01	-.42**	-.45**	.05	-.19**	-.25**					
11. Perceived Stress	-.27**	-.14**	-.16**	-.10	-.55**	-.42**	.07	-.21**	-.26**	.72**				
12. Loneliness	-.19**	-.07	-.08	-.13**	-.41**	-.39**	.06	-.11*	-.30**	.51**	.58**			
13. Subjective well-being	.20**	-.01	-.07	.09	.43**	.50**	-.06	.22**	.29**	-.64**	.69**	-.60**		
14. Control over life	.05	.00	-.03	.02	.19**	.15*	-.00	.01	.01	-.18**	-.24**	-.23**	.26**	

Note. *indicates $p < .05$; ** indicates $p < .01$.

Associations with CBC and Financial Literacy Controlling for SES, Time Discounting, Self-control, Negative Affect, and Demographics

Hierarchical multiple regressions were performed on all variables, in order to test whether banking competence and financial literacy demonstrate independent associations with physiological and physical health while controlling for known correlates of these constructs,

such as SES, time discounting, self-control, negative affect, race, age, and sex. Trait level self-control was a significant predictor of all variables, but sleep latency. Whereas SES was a significant predictor of physical health, BMI, loneliness, and subjective well-being, time discounting was a significant predictor of perceived stress only. Nonetheless these three variables were entered first in an effort to remove any association of banking competence and financial literacy that may overlap with SES, time discounting, and self-control. Negative affect was significantly associated with a number of variables, except for BMI, sleep latency, and healthcare. Negative affect, age, race, and sex as markers of our sample's demographic characteristics were entered second in the regression in order to control for any overlapping variability between these variables with banking competence and financial literacy.

Standardized beta coefficients, changes in R^2 after entering banking competence and financial literacy, as well as the total variance accounted for by each model are shown in Table 7. Despite the significant associations between self-control and negative affect on one hand, and some of the physiological and psychological indices of health on the other, consumer banking competence explained variability in physical health, BMI, sleep latency, healthcare, and perceived stress, beyond known correlates of these constructs. Being a more competent consumer of banking products was associated with unique contributions to better physical health, lower BMI, more sleep per night, better healthcare practices, and less perceived stress, above and beyond what we may expect from predicting these variables with SES, self-control, and time discounting.

Financial literacy on the other hand accounted for unique variability in healthcare and subjective well-being, beyond that explained by known correlates of these constructs. Being financially literate was associated with better healthcare utilization, and greater happiness. It was

interesting to note that consumer banking competence was most predictive of physiological variables, compared to those measuring psychological health. It is possible that engaging in desirable banking practices improves the overall state of one's personal finance, which in turn may free up resources to invest in better nutrition and healthcare, which in turn may have salubrious effects for one's health.

Table 7

Summaries of Hierarchical Regression Models for CBC and Financial Literacy Predicting Physical Health and Psychological Indices (N=421)

	Step 1			Step 2			Step 3			ΔR^2	Overall
Variable	SES	TD	SC	A	R	S	NAS	CBC	FL	Level 3	Adj. R^2
Physiological											
Physical health	.12*	-.01	.39**	-.15*	.05	-.01	-.33**	.16*	-.1	.02*	.28
BMI	-.10*	-.04	-.2**	.18**	.02	.03	-.6	-.16**	.03	.02*	.11
Sleep latency	.02	.00	.07	-.11*	-.18**	-.03	-.11	.13**	.01	.01	.05
Healthcare	.08	-.03	.01**	.09	.01	.00	-.07	.31**	.15*	.07*	.10
Psychological											
Anxiety	.03	-.02	-.43**	-.02	.05	.06	.68**	-.01	.02	.00	.56
Perceived stress	-.07	-.08*	-.55**	-.07	.06	.04	.5**	-.10*	-.01	.01	.55
Loneliness	-.12*	-.02	-.40**	-.11*	.10*	.03	.33**	-.06	.05	.00	.28
Subj. well-being	.09*	.02	.41**	-.02	-.08*	.09*	-.45**	.07	.11*	.01	.36
Control over life	.02	-.06	.2*	.09	-.01	.04	-.16*	.03	-.02	.00	.05

Note.

Standardized coefficients are reported

SES = Socio-economic status; TD = Mean time discounting; SC = Trait level self-control; R = binary indicator of race (1 white, 2 non-white); A = Age; S = binary indicator of sex (1 male, 2 female); NAS = Negative affect; CBC = Consumer banking competence; FL = Financial literacy; BMI = Body mass index;

*indicates $p < .05$; ** indicates $p < .01$.

Chapter 3 Discussion

The current set of studies aimed to accomplish three primary goals. First, we developed a measure of consumer banking competence, which reflects individual differences in personal finance management. Second, in a series of three studies indices of internal consistency, test-

retest reliability, as well as construct and criterion validity indicate that the newly developed measure performs well as a trait measure. The CBC scale was significantly, yet moderately related to financial literacy and general self-control, indicating that while related, the measures do not assess the same construct. A discriminant analysis further distinguished self-regulatory capacity as it pertains to personal finance management from general self-control. Significant and positive correlations were established among the CBC measure, FICO, and three distinct measures of income. The scale not only predicted individual and household income, but it was also positively related to income from investments and capital gains, which is important to note, as the latter two types of income denote greater sophistication of personal finance management, which is what the scale purports to measure.

Finally, we further corroborated the scale's validity by examining three distinct applications of the CBC measure. First, we demonstrated that consumer banking competence fully mediated the relationships between financial literacy with income and creditworthiness, suggesting that acquiring crystalized financial knowledge may influence individual financial outcomes by triggering self-regulatory practices in the management of personal finance. We then demonstrate relationships between integral aspects of personality and the CBC scale. Greater banking competence was associated with being more conscientious, extraverted, and emotionally stable.

Third, we demonstrated that consumer banking competence explained variability in physical health, BMI, sleep latency, healthcare, and perceived stress, beyond known correlates of these constructs. Being a more competent consumer of banking products was associated with unique contributions to better physical health, lower BMI, more sleep per night, better healthcare practices, and less perceived stress, above and beyond what we may expect from predicting these

variables with SES, self-control, and time discounting. Financial literacy on the other hand accounted for unique variability in healthcare and subjective well-being, beyond that explained by known correlates of these constructs. Being financially literate was associated with better healthcare utilization, and greater happiness. It is important to note that two distinct indices of financial savviness carry implications for health beyond raw earnings, SES, or other individual difference factors, such as self-control and time discounting. Whereas income and SES are robust predictors of health outcomes, it is important to note that developing and adhering to desirable banking practices offers unique contributions to health. It is possible that developing competence in how one manages personal finance, through the use of bank products, may buffer the deleterious effects of lower income, or lower SES.

In fact, exploring the possibility of interventions that may help individuals low in consumer banking competence could be important, and represent a fruitful avenue for research on financial education. Previous efforts in this sphere have been characterized by mixed success, where some reports advocating for the usefulness of financial literacy, and others negating it (Adams & Rau, 2011; Collins & O'Rourke, 2010; Hastings et al., 2013; Hira, 2010; Thaler & Sunstein 2008; Willis, 2009). It is conceivable that focusing on the training of finance may not be the most optimal way of improving people's daily financial decisions. The consumer banking competence scale offers a unique opportunity to focus on the training of concrete practices of personal finance management, associated with improved income and creditworthiness.

SUMMARY AND CONCLUSIONS

SES has been known to significantly influence people, across many aspects of life, such as social functioning, structural brain development, as well as neurocognitive functioning across multiple domains, including language, self-regulation, memory, and socio-emotional processing (Kim et al., 2013; Noble, Wolmetz, Ochs, Farah, & McCandliss, 2006; Raizada, Richards, Meltzoff, & Kuhl, 2008; Sheridan, Sarsour, Jutte, D'Esposito, & Boyce, 2012; Stevens, Lauinger, & Neville, 2009; Tomalski et al., 2013). Some have theorized that SES exerts this influence on individuals primarily by shaping their environment (Kraus & Stephens, 2012). An integral aspect of SES is income, as it determines access to material resources (Burkhauser, Feng, Jenkins, & Larrimore, 2009; Fiske & Markus, 2012; Kraus, Piff, & Keltner, 2009; Norton & Ariely, 2011; Picketty & Saez, 2003). Economic downturns, associated with job loss and corresponding income instability have been linked to negative outcomes in the realms of social relationships, family structure, health, psychological functioning, and child development (Burgard, Ailshire, & Kalousova, 2013; Cherlin, Cumberworth, & Morgan, 2013; Kalil, 2013).

Much of this research underscores the importance of income for the quality of human life. However, it is important to note that earnings alone do not exhaustively reflect the varied nature of personal finance. An important aspect of personal finance is how individuals manage the financial resources at their disposal. Given the contemporary omnipresence of banks and financial institutions, one would be hard pressed to imagine a world where personal loans, mortgages, credit cards, and savings and investments for retirement and education do not exist. In fact, 92% of US adults have at least one, but in most cases more than one, of these financial products, overwhelmingly offered through banks and financial institutions.

Given that banks are often the only channel through which individuals make some of their most consequential financial choices, such as mortgage, college loan, or retirement savings (Frydman & Camerer, 2016), it is important to better understand the complex relationship between individuals and financial institutions. It is also important to identify how the nature of this relationship affects individual financial standing, and more broadly quality of life, as finances exert direct influence on it. Previous research has identified that a relevant factor for personal finance management is the lack of financial knowledge – or as is the case with many people, the lack of motivation to acquire finance-specific knowledge (Antonides, De Groot, & Van Raaij, 2011). People who lack much needed financial knowledge are likely to buy financial products that do not match their needs, or budgets, and often accrue a large amount of fees (Garling, Kirchler, Lewis, & Van Raaij, 2009).

To that end, in the first part of the current manuscript we aim to identify broader individual factors that are associated with an eagerness to pursue education and, specifically the acquisition of finance-specific knowledge. Financial decisions about bank products can be viewed as an intertemporal choice. For instance, mortgages offer money availability in the present, but are associated with lower money availability in the future, as one progresses through debt-repayment. Therefore, in Chapter 2 and Chapter 3 we investigated how temporal discounting of future rewards may affect financial standing through educational mediators. Chapter 2 demonstrates that general education and financial literacy fully mediate the relationship between time discounting and income. Chapter 3 shows that education and financial literacy partly mediate the relationship between mean time discounting and creditworthiness, as measured by FICO scores. Interestingly, we also found that education and financial literacy fully mediated the relationship between deliberative time discounting and FICO.

Time discounting predicts a wide range of individual outcomes from scholastic achievement to crime. Some researchers have suggested that the multitude of these associations indicates that the degree to which individuals discount future rewards triggers a broad cognitive behavioral pattern whereby the continuum of preferences for SS rewards vs. LL rewards maps onto a dual-process framework of judgment and decision-making (Evans, 2008; Evans & Stanovich, 2013; Kahneman, 2003; Shiffrin & Schneider, 1977; Sloman, 1996, 2014). Accordingly, automatic processing is associated with a preference for SS rewards relative to more reflective processing, on the other hand, associated with a preference for LL rewards (Figner et al., 2010; McClure & Bickel, 2014; McClure, Laibson, Loewenstein & Cohen, 2004; Metcalfe & Mischel, 1999). Our findings indicate that time discounting may represent an important building block for financial decision making such that preferences for LL over SS rewards likely trigger a varied set of mental processes and behaviors. These may include strategies that ultimately improve one's financial standing: for example, striving to complete higher formal degree of education, or gathering finance-specific knowledge, when a situation calls for it, such as mortgage choice.

Interestingly, we discovered that education and financial literacy fully mediated the relationship between deliberative time discounting with income and creditworthiness. In the context of financial decision making deliberation over possible actions implies information search, knowledge acquisition, comparison and evaluation of alternatives, risk estimation of default, and ability to repay. Deliberating prior to financial decisions positions individuals to make more prudent financial choices (Kamleitner & Kirchler, 2007). Few, however, are interested in deliberately searching and comparing financial products for purposes of personal

finance management. For instance, a study found that only one third of people holding a credit card had compared alternatives before applying (Hilgert, Hogarth, & Beverly, 2003).

Our findings from Chapter 3 indicated that education and financial literacy did not fully mediate the relationships between mean time discounting and immediacy bias with creditworthiness. These partial mediations suggested there may be omitted variables in the way we assess finance-specific knowledge. Financial literacy assesses basic arithmetic and numeracy skills, but it primarily measures one's crystalized knowledge of financial terminology, such as knowing how compounding interest works. This is important for two reasons. First, knowing financial terminology does not necessarily mean prudent financial decisions in regard to personal finance management. Financial institutions offer a wide array of complex products. Even if one is familiarized with the products themselves, one may be unfamiliar with the concrete steps needed to take advantage of these products. Second, when individuals apply for credit from banks, or other financial intuitions, the contract terms one is offered, is not based on an assessment of that person's knowledge of finance; rather, banks rely on past behavioral consumer data to decide whether to offer credit products at all, and if they do what will be terms of that offer.

Operationalizing, and reliably measuring individual banking behaviors and practices therefore represents a measure of personal finance management, distinct from financial literacy. The new scale focuses on individual self-regulatory practices in regard to the use of financial institutions and the products they offer. To that end, in the second part of the manuscript (Chapter 3) we develop and validate a measure of *consumer banking competence* (CBC). The CBC scale represents an individual difference measure of personal finance management assessing how individuals use assets, credits, loans, savings, and investments, wherein lower

scores indicate undesirable banking practices, associated with delinquent debt-repayment, and possibly default, and higher scores indicate desirable banking practices that could potentially lead to improved overall financial standing.

Studies 1, 2, and 3A demonstrate the construct's internal consistency, test-retest reliability, and validity. Exploratory factor analyses revealed three distinct factors underlying the structure of the CBC scale: Factor 1, pertaining to the diversity of one's banking portfolio, Factor 2, indicating self-regulatory capacity in regard to one's use of loan products and debt-repayments, and Factor 3, assessing whether individuals utilize banks vs. AFS providers. Future research, however, is needed to conduct confirmatory factor analyses of the scale, in order to test whether the current factor structure holds across different samples.

In an effort to further investigate the validity of the newly-developed scale, Studies 3B, 3C, and 3D present three distinct applications of the CBC. Study 3B showed that consumer banking competence fully mediated the relationship between financial literacy with income and creditworthiness. These results suggest that personal money management behaviors and strategies may play a more proximal role to indicators of financial standing – income and creditworthiness – than does financial literacy. Study 3C demonstrated that extraversion, conscientiousness, and emotional stability may represent personality variables with implications for how one manages personal finance. By contrast, financial literacy was only associated with emotional stability. Study 3D demonstrated that variability in CBC scores explained unique variability in physical health, BMI, sleep latency, healthcare, and perceived stress beyond known correlates of these constructs, such as SES, time discounting, self-control, demographics, and the experience of negative affect. Financial literacy on the other hand accounted for unique

variability in healthcare and subjective well-being beyond that explained by known correlates of these constructs.

The data across the current set of studies indicate that managing personal finance represents a wide-ranging set of skills. Whereas financial literacy measures one's financial expertise, the CBC scale appears to assess the behavioral aspects of one's personal money management. Both scales are associated with improved financial standing. However, the data also suggest that better personal money management may have implications for physical health, stress, and well-being. Future experimental work will be needed to addresses whether and how does improved money management improve health and well-being. Given that the CBC explains variance primarily in physical health, above known correlates, it is conceivable that more prudent money management practices free up additional resources that can improve one's quality of life, such as nutrition and healthcare, which ultimately result in better physical health.

However, the CBC and financial literacy also explained unique variance in perceived stress, and subjective well-being respectively. Therefore, it may also be the case that improved personal finance management and greater financial expertise may be reducing the amount of anxiety and stress commonly associated with financial affairs. In fact, research shows that being indebted is associated not only with direct monetary costs, but also with personal, emotional, and psychological costs (DeVaney & Lytton, 1995). More future research is needed to clarify these potential mechanisms. Households with unpaid credit as well as indebted students report poorer psychological well-being compared to households without debt and students without loans (Brown, Taylor, & Wheatley Price, 2005; Roberts, Golding, & Towell, 1998; Stradling, 2001). Furthermore, financial strain is also associated with greater incidence of mental disorders, health problems, and marital conflict (Drentea & Lavrakas, 2000; Jeffrey, 2007; Weich & Lewis, 1998).

The current set of studies offers implications of practical importance for research on financial education. Previous efforts in the area have produced mixed results (Adams & Rau, 2011; Collins & O'Rourke, 2010; Fernandes, Lynch, & Netemeyer, 2014; Hastings et al., 2013; Hira, 2010; Thaler & Sunstein 2008; Willis, 2009). The data presented in this manuscript suggest that financial education may be most effective if it adopts a more customized approach that considers what type of financial expertise a person needs as well as the broader individual factors that may influence the degree to which one benefits from financial education. The data show that financial literacy and consumer banking competence represent two distinct yet viable indices of financial expertise. Whereas some people may benefit from developing their knowledge of finance, others may benefit most from learning about concrete behavioral practices that they can employ in order to manage personal funds. Financial education that focuses on banking practices and strategies may be especially useful for individuals from lower-income households (less than $15,000 annually in household income) as 28.2% do not have a relationship with a financial institution (FDIC, 2012). The relationships between time discounting with financial literacy and consumer banking competence suggest that those that discount the present value of future goods may be less likely to benefit from financial education. In fact, recent research shows that preference for SS vs. LL rewards is associated with lower likelihood of participation in financial education programs (Meier & Sprenger, 2013).

It would be difficult if not impossible to downplay the significance of introducing money in order to replace barter, to provide a medium with shared value among people, and to develop efficient markets (Lewis & Mizen, 2000). However, since the advent of money, the financial ecosystem in which we function today has grown drastically more complex and individuals are expected to play an increasingly more active role in the management of their finances

(Immergluck & Smith, 2005; McKenzie & Liersch, 2011; Poterba, Venti, & Wise, 2007). Meanwhile, the financial markets do not always function optimally as individuals are susceptible to cognitive biases, social influence, and struggle with self-control. The current manuscript documents a set of studies showing a heightened need to better understand the cognitive and behavioral patterns that shape personal finance management. Here we focus on identifying the benefit of time discounting, self-control, general education, financial literacy, and banking competence for individual financial standing with the ultimate goal of reducing the negative effects of lower SES on health and well-being. As individuals across most of the world live longer while facing decreasing incomes and increasing income inequality, understanding how personal finance management affects them becomes exceedingly critical.

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