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Does self-control predict financial behavior and financial well-being?

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ABSTRACT

To improve our understanding of how people make financial decisions, it is important to investigate what psychological characteristics influence individuals' positive financial behavior and financial well-being. In this study, we explore the effect of individual differences in self-control and other non-cognitive factors on financial behavior and financial well-being. A survey containing measures of financial behavior, subjective financial well-being, self-control, optimism, deliberative thinking and demographic variables was sent to a representative sample ($n = 2063$) of the Swedish population. Our findings extend the application of the behavioral lifecycle hypothesis beyond savings behavior, to include general financial behavior. People with good self-control are more likely to save money from every pay-check, have better general financial behavior, feel less anxious about financial matters, and feel more secure in their current and future financial situation.

1. Introduction

People make bad financial decisions. We save too little for retirement (Lusardi, 1999), we overspend (Sotiropoulos and d'Astous, 2013), we do not pay our bills on time, and we sometimes buy things we regret (Abendroth and Diehl, 2006). However, we do not make bad financial decisions all the time and some of us are more or less inclined to make bad financial decisions. Moreover, some of us are more or less susceptible to feeling anxiety as a consequence of our financial behavior. This behavioral heterogeneity is a challenge to one-model-fits-all theories of economic behavior and as a consequence recent research has been concerned with understanding the role of individual differences in financial behavior and financial well-being. However, previous research has mostly focused on the influence of cognitive factors such as financial literacy (Fernandes et al., 2014; Lusardi and Mitchell, 2007) and numeric skills (Lusardi, 2012) on financial behavior. Less research has focused on the influence of non-cognitive factors related to self-control and other similar constructs such as deliberativeness.[1] In this study, we explore the influence of such factors on both financial behavior and financial well-being in a large scale diverse sample of the Swedish population, while controlling for financial literacy and demographic factors.

1.1. Individual differences and financial behavior

Self-control is typically manifested as our ability to break bad habits, resist temptations and overcome first impulses (Baumeister, 2002; Fujita et al., 2006). One way to define self-control is that it constitutes the ability of our future selves to control our current self. When self-control failure occurs, people act in a non-optimal way and they might, for example, procrastinate work even though

[1] Borghans et al. (2008) pointed out that the usage of the words 'cognitive and non-cognitive factors' can be confusing since few abilities are devoid of cognition. Cognitive abilities are often measured using IQ or numeracy tests (Parise and Peijnenburg, 2017). In this paper cognitive factors are factors measured by some kind of knowledge or performance test, while non-cognitive factors are self-reported measures of personal preferences, personality, behavior, thoughts or feelings.

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they know that they would be better off spreading the work-load over time (Ariely and Wertenbroch, 2002; Fudenberg and Levine, 2006). Such explanations of self-control failure are in line with the behavioral life-cycle (BLC) hypothesis formalized by Shefrin and Thaler (1988). According to the BLC hypothesis people act as if there within every person is an ongoing conflict between a "planner" who thinks about the long-run and a "doer" who is more concerned about the current situation. The BLC hypothesis further states that people's financial behavior over the course of life is determined by their ability to control impulses and the costs connected to exercising such self-control. Depending on our mental accounts and how we categorize money, it is more or less costly for us to save for the future. For example, monthly income is easier to spend and, therefore, costlier to save than money set aside for retirement. The BLC hypothesis is an extension of the traditional life-cycle model which assumes that people perceive money as completely fungible and that the farsighted individual rationally plans his or her life-time consumption (Modigliani and Brumberg, 1954). Although the BLC hypothesis has been influential in understanding savings behavior, research is currently lacking regarding to what extent it is applicable for other types of financial behavior that extend beyond savings behavior.

The ability to control impulses is undoubtly a key factor for long-term success in many areas of life. In the seminal work on self-control by Mischel et al. (1972) pre-school children were presented with the simple marshmallow test, in which they could either eat a small snack right away or wait 15 min and get a larger snack. Around 67% of the children in the original study failed to resist temptation and ate the small snack, indicating a lower level of self-control. Mischel followed the children in the original sample for more than five decades tracking how the ability to exercise self-control at an early age was correlated with various life outcomes as the children grew into adults. The results were striking. Children who were successful in resisting temptation and delayed gratification were more successful in almost every outcome measured. They had higher SAT scores, educational attainment, sense of self-worthiness and ability to cope with stress. Additionally, they were less likely to be addicted to drugs and had lower body mass index (Mischel et al., 1989). Similarly, Moffitt et al. (2011) measured nine different aspects of self-control, including impulsive aggression and hyperactivity, among children in New Zealand. At the age of 32 people who had shown good self-control as children had better physical health, higher socioeconomic status, were more likely to be homeowners and have retirement plans and were less likely to have committed a crime. Duckworth and Seligman (2005) performed a longitudinal study where eight-grade students either had to self-report their self-control or perform an IQ-test. Self-control was a better predictor than IQ when predicting final grades, high school selection, school attendance and hours spent doing homework.

Studies that have explored the link between self-control and financial behavior have focused on specific financial decisions, such as retirement planning or credit use. Achtziger et al. (2015) found that people with low self-reported self-control are more likely to engage in compulsive shopping while Gathergood (2012) found that people with self-control problems in the financial domain are more likely to suffer from credit withdrawals and unforeseen expenses on durables leading to over-indebtedness. It has also been shown that people's savings behavior is affected by their self-control. According to Biljanovska and Palligkinis (2015), households with self-control problems due to lack of planning, monitoring or commitment, have lower wealth accumulation. Choi et al. (2011) found that people with low self-control are less likely to save enough money for retirement. Rha et al. (2006) used data from a survey of a representative American sample in order to test how self-control mechanisms, such as saving goals, foreseeable expenses and saving rules, affect households' savings behavior. They found that households with saving rules are more likely to save than households without such rules and also that specific saving goals generally increase the probability of saving. On the contrary, Ballinger et al. (2011) found in experiments that neither self-control nor four different kinds of measured impulsive behavior affect savings behavior when taking cognitive abilities, such as working memory, into account. Thus, the relationship between self-control and financial behavior is still inconclusive.

Few studies have explored the link between self-control and broader, more general, measures of financial behavior. One of few studies that have investigated a more general set of financial behaviors is Miotto and Parente (2015). They used qualitative as well as quantitative methods to investigate how personal characteristics, including self-control and propensity to plan for the future, affect low-middle class households' financial management. According to their study, individuals with higher self-control and tendencies to plan for the future also manage their finances better. However, their sample contained only 165 lower-middle class female consumers of a retail company in São Paulo. Thus, there is a need for large scale surveys covering more general samples.

1.2. Individual differences and financial well-being

A related topic that has been underexplored in the previous literature is how the ability to control impulses links to feelings of anxiety regarding one's own financial situation. Financial well-being is often treated as an objective measure where certain financial decisions are defining features of what constitutes financial well-being. However, an equally important aspect of financial well-being is how people subjectively feel about their financial situation. To what extent do people feel anxiety concerning the many decisions and uncertainties involved in financial decision making? Moreover do people with self-control problems feel more anxiety concerning their own financial behavior irrespective of their own financial situation? To our knowledge, no previous research has been done to examine the effect of self-control on financial well-being.

In addition to self-control, two other psychological constructs that might influence financial behavior and financial well-being are optimism and the tendency to think deliberatively. People who are optimistic are more likely to save, work harder and retire later. However, extremely optimistic people demonstrate deficient financial behavior (Puri and Robinson, 2007). Optimism has also been shown to be associated with general well-being and may be an important aspect of financial well-being. Depressed individuals are more prone to pessimistic thoughts about the future and suffer to a greater extent from pessimism bias than non-depressed individuals (Strunk et al., 2006). Not only optimism, but also intuitive thinking, which can be seen as the opposite of deliberative thinking, has been associated with behavioral biases in decision making. Klaczynski et al. (1997) showed that faith in intuition was significantly related to heuristic judgments as described by Kahneman et al. (1982). Furthermore, Thoma et al. (2015) found that professional financial traders tend to engage in deliberative thinking to a greater extent than non-financial traders, and also that they use fewer heuristics in decision-making. Thus it is interesting to also explore to what extent these psychological constructs, which are related to self-control, are linked to financial behavior and financial well-being.

1.3. Aim of the present research

The main aim of this study is to investigate if self-control predicts financial behavior and financial well-being. Following the BLC hypothesis we predict that self-control will be positively

associated with general financial behavior. We also hypothesize that self-control will be positively associated with financial well-being. This study will contribute to the literature on self-control, and financial behavior in three important ways. First, this study is unique since it examines several cognitive and non-cognitive individual differences related to financial decision making. This study simultaneously considers financial literacy and self-control in models predicting financial outcomes. Second, we explore the influence of self-control and other non-cognitive factors on a wide range of financial behaviors, rather than just one single financial behavior. Finally, we also explore how self-control and other non-cognitive factors relate to anxiety and perceived security associated with a person's financial situation.

2. Method

2.1. Sample and procedure

A web-based survey administrated by CMA Research was sent in May 2016 to a diverse sample of the adult Swedish population (aged 20–75). In total 2063 respondents (1048 females and 1015 males, mean age of 49 years) received a small monetary compensation for completing the survey. The sample was fairly representative of the general population in Sweden, with regards to income and education. Sample characteristics are shown in Table 1.

2.2. Questionnaire

Most studies have measured financial behavior on a one-item scale, usually related to savings behavior (e.g. Gathergood, 2012; Lusardi, 2012; Rha et al., 2006). We used the first twelve items of the Financial Management Behavior Scale (FMBS), where the respondents were asked to rate how often they have engaged in a number of stated behaviors during the last six months (Dew and Xiao, 2011). Table 2 shows all the items included in the FMBS including the descriptive statistics. The scale ranged from 1 (not at all) to 5 (always). The total average scores of respondents for the FMBS ranged from 1.5 to 5 ($M = 3.44$; $SD = 0.65$). The scale was translated into Swedish and the option "not applicable" was added to three of the questions (items 4–6). The low mean value of item 6 "Maxed out the limit on one or more credit cards" is due to the fact that 785 participants responded not applicable, which was coded as 1. Item 2 "Paid all your bills on time" had the highest mean, 4.56, indicating that most respondents pay their bills on time.

To measure financial well-being, we used two separate scales, one measuring anxiety related to financial decisions and one measuring perceived security in one's current and future financial situation. Four items from Fünfgeld and Wang (2009) were adopted to measure anxiety related to money matters. For example, respondents were asked to indicate to what extent they felt "anxious about financial and money affairs". The three items included to measure financial security have, as far as we know, not been used together previously. All items can be found in Table 2. For both scales, the respondents were asked to indicate to what extent they agree with the statements presented, with scale options ranging from 1 (not at all) to 5 (completely agree).

Additionally, the survey contained a number of scales measuring individual differences, such as self-control, optimism and deliberate thinking. These scales were used as predictors in the regressions and neither had any specific connection to the financial domain.

Self-control was measured through a shorter version of the Brief Self-Control Scale (Tangney et al., 2004), which is a general measure of self-control, and the four items from the Short-Term Future Orientation Scale (Antonides et al., 2011). The original version of the Brief Self-Control Scale consisted of 13 items, however, we chose to only include five of them in our survey. Although our version of the scale is shorter, the Cronbach's alpha is still 0.73, which indicates that the scale has an acceptable internal consistency. Table 3 shows the five items measuring self-control that were included in our survey as well as the mean value and the range of the responses. Compared to the sample in Tangney et al. (2004), we have a greater spread in our data with several respondents scoring either 1 or 5. The average respondent in our sample scored marginally higher on the self-control scale than in Tangney et al. (2004), 3.17 and 3.07, respectively. The Short-term Future Orientation Scale measures the respondents' preferences for focusing on the short-term and neglecting the future and contains statements like "I live more for the day of today than for the day of tomorrow". The internal consistency of the Short-Term Future Orientation Scale is 0.65. An exploratory factor analysis showed that these two scales measure the same underlying construct, and were, therefore, merged into one scale in this study.

Optimism was measured using five out of eight items from the Life Orientation Scale (Scheier and Carver, 1985). The statements used were as followed: "In uncertain times, I usually expect the best". Although this scale was shortened the internal consistency was kept high with a Cronbach alpha of 0.77. To measure the respondents' deliberativeness, two items from the Unified Scale to Assess Individual Differences in Intuition and Deliberation were used (Pachur and Spaar, 2015): "Developing a clear plan is very important to me" and "I like to analyze problems". The items have a correlation of 0.62.

Additionally, respondents were asked to answer four questions measuring their financial literacy (see, e.g., Van Rooij et al., 2012). In the regressions, financial literacy is expressed as the number of correct answers on the financial literacy test. Hence, a higher score indicates that the respondent has a better knowledge of simple financial concepts, such as compound interest rate and inflation.

2.3. Estimation strategy/analysis

To evaluate the effects of different psychological constructs on financial behavior and financial well-being, a series of OLS regressions were run. Our main specification is:

$$Y_i = \beta_0 + \beta_1' X_i + \beta_2 SC_i + \beta_3 Opt_i + \beta_4 Del_i + u$$

where Y is the outcome variable of interest, which means that it can be either savings behavior, general financial behavior, financial anxiety or perceived financial security. SC is the self-control measure, Opt is the optimism measure, Del is the measure of deliberative decision making, and i is the index for the individuals of our sample. Vector X includes all control variables (income, age, sex, educational attainment and level of financial literacy). Previous research has shown that these variables influence financial behaviors (Achtziger et al., 2015; Biljanovska and Palligkinis, 2015; Fernandes et al., 2014).

Table 4 shows the correlations between the three independent variables of interest, self-control, optimism and deliberative thinking. The three constructs are positively correlated. However, the correlations are not high enough to cause multicollinearity problems in the regressions.

3. Results

3.1. Do people behave in accordance with the behavioral life-cycle hypothesis?

To test if the reported financial behavior is supportive of the BLC hypothesis, we first test if self-control has a positive effect on how

Table 1
Descriptive statistics for all respondents.

	Study sample ($n = 2063$)
Age	
All respondents, mean	49.2
20–39 years old, *n* (%)	644 (31.2)
40–59 years old, *n* (%)	769 (37.3)
60–75 years old, *n* (%)	649 (31.5)
Sex	
Female, *n* (%)	1048 (50.8)
Income per household/month[a]	
0–14,999 SEK, *n* (%)	300 (14.6)
15,000–44,999 SEK, *n* (%)	1127 (54.7)
>45,000 SEK, *n* (%)	634 (30.8)
Education	
Middle school	266 (12.9)
Secondary preuniversity education	902 (43.7)
University or vocational education less than 3 years	310 (15.0)
University education, at least 3 years	585 (28.4)

[a] Income was reported as the household's monthly income before tax.

Table 2
Dependent variables.

Financial management behavioral scale[a], $\alpha = 0.65$		Mean	St. Dev.	Range
1	Comparison shopped when purchasing a product or service	3.86	1.00	1–5
2	Paid all your bills on time	4.56	0.84	1–5
3	Kept a written or electronic record of your monthly expenses	3.54	1.34	1–5
4	Stayed within your budget or spending plan	2.98	1.50	1–5, N/A
5	Paid off credit card balance in full each month	3.20	1.87	1–5, N/A
6	Maxed out the limit on one or more credit cards	1.60	1.03	1–5, N/A
7	Made only minimum payments on a loan	2.50	1.34	1–5
8	Began or maintained an emergency savings fund	3.23	1.41	1–5
9	Saved money from every paycheck	3.54	1.40	1–5
10	Saved for a long term goal such as a car, education, home, etc.	3.10	1.41	1–5
11	Contributed money to a retirement account	2.90	1.56	1–5
12	Bought bonds, stocks, or mutual funds	2.53	1.45	1–5
FMBS average		3.44	0.65	1.5–5
Financial anxiety, $\alpha = 0.68$				
1	I get unsure by the lingo of financial experts	3.14	1.12	1–5
2	I am anxious about financial and money affairs	2.88	1.08	1–5
3	I tend to postpone financial decisions	2.51	1.18	1–5
4	After making a decision, I am anxious whether I was right or wrong	2.70	1.12	1–5
FA average		2.81	0.80	1–5
Financial security, $\alpha = 0.91$				
1	I feel secure in my current financial situation	3.27	1.28	1–5
2	I feel confident about my financial future	3.05	1.30	1–5
3	I feel confident about having enough money to support myself in retirement, no matter how long I live	2.75	1.36	1–5
FS average		3.03	1.20	1–5

[a] Item 6 and 7 were reversed before calculating the aggregated mean value.

people save ("Have you during the last six months saved money from every paycheck?"). We model the relationship between self-control and savings behavior using OLS regressions with robust standard errors, including the control variables income,[2] age, sex, education and financial literacy. As predicted by the BLC hypothesis, and shown in Table 5, level of self-control affects to what extent respondents report that they have consecutively saved money during the last six months. Moreover, income level and age have a significant negative effect on savings behavior.

Looking at our additional exploratory variables, level of optimism and to what extent people are prone to deliberative thinking (model 2 and 3), we see that both optimism and deliberative thinking have positive effects on savings behavior independent of self-control and the other control variables. According to life-cycle models, older people save less since pensioners in general use their savings rather than save more for the future. Our results are in line with this hypothesis, even though the effect of age is rather small. Financial literacy, income and being a female have a positive effect on savings behavior.

3.2. Self-control and financial behavior

To test if it is possible to generalize the BLC hypothesis to include not only savings behavior, but a broader concept of good financial behavior, we include the respondents' mean value of all items in the Financial Management Behavioral Scale in our analyses. First, we split the sample at the median level of self-control and compare the two groups' self-reported financial behavior. Individuals scoring 3.2 or lower on the self-control scale are classified as having low self-control (48.5%), the rest as having high self-control (51.5%). People with low self-control have an average score of 3.27 on the FMBS while people with high self-control have an average score of 3.61, indicating that people with

[2] Income is divided into three categories; the respondents with a household income of less than 15,000 SEK/month were categorized as low income households and respondents with a household income of at least 45,000 SEK/month were categorized as high income households.

Table 3
Independent variables.

Self-control, $\alpha = 0.76$		Mean	St.dev.	Range
Tangney et al. (2004)[a]				
1	I have a hard time breaking bad habits	3.11	1.12	1–5
2	I get distracted easily	2.98	1.10	1–5
3	I'm good at resisting temptation	3.04	1.08	1–5
4	I do things that feel good in the moment but regret later on	2.60	1.00	1–5
5	I often act without thinking through all the alternatives	2.48	1.06	1–5
Antonides et al. (2011)[b]				
1	I only focus on the short term	2.23	1.11	1–5
2	The future will take care of itself	2.97	1.15	1–5
3	I live more for the day of today than for the day of tomorrow	2.43	1.14	1–5
4	My convenience plays an important role in the decisions I make	3.25	1.02	1–5
Self-control average		3.23	0.63	1.125–5
Optimism[c], $\alpha = 0.77$				
1	In uncertain times, I usually expect the best	3.10	1.01	1–5
2	If something can go wrong for me, it will	2.73	1.08	1–5
3	I'm always optimistic about my future	3.20	1.06	1–5
4	I hardly ever expect things to go my way	2.80	1.12	1–5
5	I rarely count on good things happening to me	2.84	1.13	1–5
Optimism average		3.19	0.78	1–5
Deliberative thinking, $\alpha = 0.62$				
1	Developing a clear plan is very important to me	3.36	0.96	1–5
2	I like to analyze problems	3.48	1.10	1–5
Deliberative thinking average		3.42	0.88	1–5

[a] Item 1, 2, 4 and 5 were reversed before calculating the aggregated mean value.
[b] Item 1, 2, 3 and 4 were reversed before calculating the aggregated mean value.
[c] Item 2, 4 and 5 were reversed before calculating the aggregated mean value.

Table 4
Correlations between the independent variables.

	Self-control	Optimism	Deliberative thinking
Self-control	1.000		
Optimism	0.262	1.000	
Deliberative thinking	0.109	0.109	1.000

Table 5
OLS regressions on the association between self-control and savings behavior.

Variables	(1) Saved	(2) Saved	(3) Saved	(4) Saved
Self-control	0.521***			0.451***
	(0.050)			(0.051)
Optimism		0.289***		0.202***
		(0.042)		(0.042)
Deliberative thinking			0.191***	0.143***
			(0.037)	(0.036)
Low income	−0.377***	−0.328***	−0.378***	−0.314***
	(0.094)	(0.095)	(0.094)	(0.093)
High income	0.547***	0.493***	0.539***	0.514***
	(0.063)	(0.065)	(0.065)	(0.063)
Age	−0.007***	−0.005**	−0.001	−0.008***
	(0.002)	(0.002)	(0.002)	(0.002)
Female	0.184***	0.190***	0.192***	0.201***
	(0.062)	(0.062)	(0.062)	(0.061)
Education	0.054*	0.069**	0.062**	0.031
	(0.030)	(0.031)	(0.031)	(0.030)
Financial literacy	0.160***	0.150***	0.143***	0.130***
	(0.028)	(0.028)	(0.029)	(0.028)
Observations	2060	2060	2060	2060
R-squared	0.142	0.114	0.104	0.161

Robust standard errors in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

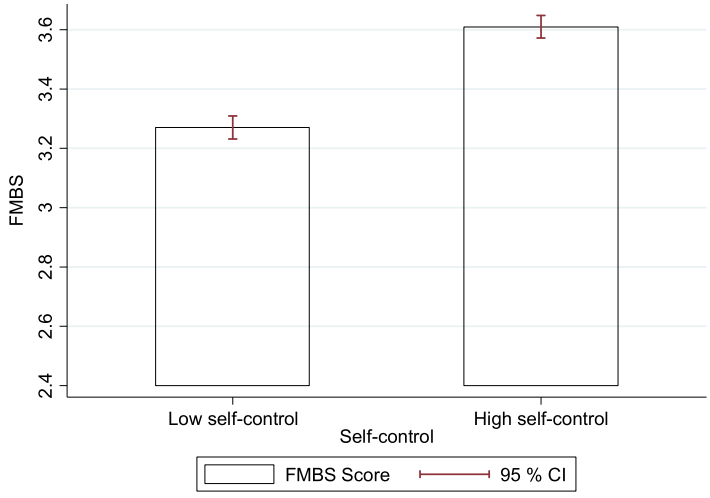

Fig. 1. Good financial behavior by self-control level.

Table 6
OLS regressions on the association between self-control and good financial behavior.

Variables	(1) FMBS	(2) FMBS	(3) FMBS	(4) FMBS
Self-control	0.282***			0.235***
	(0.023)			(0.023)
Optimism		0.154***		0.103***
		(0.018)		(0.017)
Deliberative thinking			0.169***	0.144***
			(0.015)	(0.015)
Low income	−0.214***	−0.188***	−0.207***	−0.175***
	(0.039)	(0.040)	(0.038)	(0.037)
High income	0.234***	0.205***	0.230***	0.217***
	(0.028)	(0.029)	(0.028)	(0.027)
Age	0.003***	0.004***	0.006***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Female	0.030	0.033	0.039	0.044*
	(0.027)	(0.027)	(0.027)	(0.026)
Education	0.040***	0.048***	0.036***	0.020
	(0.013)	(0.013)	(0.013)	(0.013)
Financial literacy	0.114***	0.109***	0.096***	0.090***
	(0.012)	(0.012)	(0.012)	(0.012)
Observations	2060	2060	2060	2060
R-squared	0.238	0.200	0.218	0.289

Robust standard errors in parentheses. * $p < 0.1$. ** $p < 0.05$. *** $p < 0.01$.

high self-control have better financial behavior. A t-test shows that the difference in mean scores between the two groups is statistically significant [$t(2061) = -12.338, P < 0.001$] (see Fig. 1).

We model the relationship between self-control and financial behavior using OLS regressions with robust standard errors. Once again the control variables income, age, sex, educational attainment and financial literacy are included. Table 6 shows the marginal effects of self-control, optimism and deliberative thinking when regressed one at a time, as well as all together, on financial behavior. The results are similar to those obtained from the regressions on savings behavior. As expected, self-control has a positive effect on general financial behavior, even though the effect is smaller (0.235, p-value < 0.01) when explaining general financial behavior than savings behavior. The same is true for optimism, while the effect of deliberative thinking is unchanged. Financial literacy and income have positive effects on good financial behavior, while there is no difference between the sexes when it comes to financial behavior. There is a small, but significantly positive effect of age on financial behavior (see Table 6).

3.3. Self-control and financial well-being

Additionally, we are interested in whether self-control affects financial well-being. First of all, we want to investigate if there is a difference in financial well-being based only on respondents' reported self-control. Once again we split the sample into two groups, respondents with self-control scores of 3.2 or lower (48.5%), and respondents with a score of 3.4 or higher (51.5%). Fig. 2 shows that respondents with low self-control are more anxious about financial matters than people with high self-control, mean score of 3.05 and 2.57, respectively. A t-test shows that the difference is statistically significant [$t(2061) = 14.187, P < 0.001$].

Fig. 3 illustrates the relationship between self-control and financial security. Respondents with low self-control are more likely to feel diffident about their current and future financial situation than people with high self-control. The average respondent with low self-control scored 2.78 on the financial security scale, while the average respondent with high self-control scored 3.27. A t-test shows that the difference between the two groups is statistically significant [$t(2061) = 9.482, P < 0.001$].

To investigate if these differences persist when controlling for other variables, we model the relationship between self-control

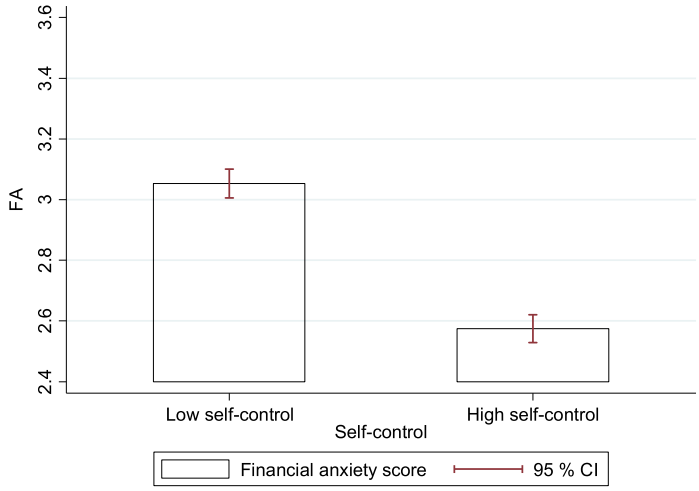

Fig. 2. Financial anxiety by self-control level.

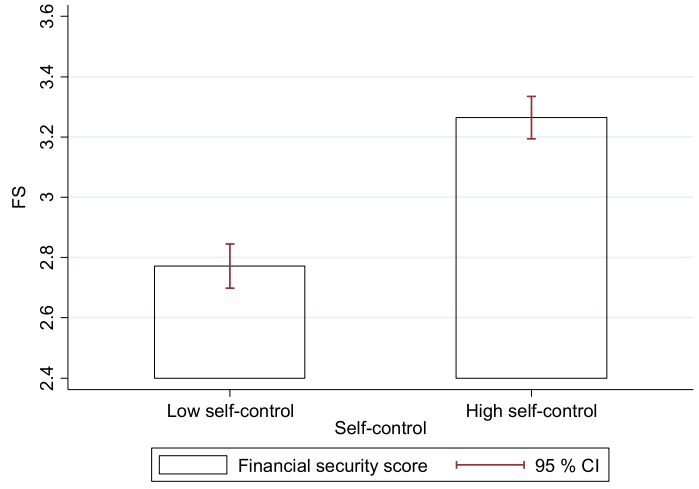

Fig. 3. Financial security by self-control level.

Table 7
OLS regressions on the association between self-control and financial well-being.

Variables	(1) FA	(2) FA	(3) FA	(4) FA	(5) FS	(6) FS	(7) FS	(8) FS
Self-control	−0.455***			−0.380***	0.381***			0.230***
	(0.028)			(0.028)	(0.042)			(0.041)
Optimism		−0.387***		−0.327***		0.584***		0.533***
		(0.023)		(0.022)		(0.030)		(0.030)
Deliberative thinking			−0.026	0.025			0.199***	0.145***
			(0.024)	(0.020)			(0.030)	(0.028)
Low income	0.087*	0.012	0.104*	0.013	−0.613***	−0.486***	−0.607***	−0.472***
	(0.052)	(0.051)	(0.057)	(0.048)	(0.073)	(0.068)	(0.073)	(0.066)
High income	−0.120***	−0.052	−0.113***	−0.067**	0.556***	0.458***	0.551***	0.470***
	(0.034)	(0.035)	(0.037)	(0.033)	(0.050)	(0.048)	(0.051)	(0.047)
Age	−0.002**	−0.003***	−0.007***	0.001	0.009***	0.007***	0.014***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
Female	0.169***	0.159***	0.172***	0.159***	−0.205***	−0.187***	−0.195***	−0.176***
	(0.034)	(0.034)	(0.037)	(0.032)	(0.049)	(0.046)	(0.050)	(0.045)
Education	−0.012	−0.018	−0.035**	−0.002	0.055**	0.047**	0.054**	0.019
	(0.016)	(0.016)	(0.018)	(0.015)	(0.024)	(0.022)	(0.024)	(0.022)
Financial literacy	−0.079***	−0.063***	−0.082***	−0.064***	0.136***	0.107***	0.116***	0.088***
	(0.016)	(0.016)	(0.017)	(0.015)	(0.022)	(0.021)	(0.023)	(0.021)
Observations	2060	2060	2060	2060	2060	2060	2060	2060
R-squared	0.205	0.213	0.088	0.292	0.259	0.349	0.242	0.374

Robust standard errors in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

and financial well-being (financial anxiety and financial security respectively). Income, age, sex, education, and financial literacy are included as control variables. The results are robust, people with good self-control were less anxious about financial matters and more secure in their current and future financial situation. (See Table 7).

Looking at our additional exploratory variables, level of optimism and to what extent people are prone to deliberative thinking, we see that optimism has a negative effect on financial anxiety but a positive effect on financial security independent of self-control and the other control variables. Deliberative thinking has a positive effect on financial security (model 8), while it does not significantly affect financial anxiety (model 4). Income has a positive effect on financial security, but does not affect financial anxiety when self-control, optimism and deliberative thinking are included. Financial literacy and being a female, do affect both aspects of financial well-being, but have greater impact on perceived security than they have on financial anxiety.

4. Discussion

Researchers are often confronted with a great deal of behavioral heterogeneity when evaluating economic theories. At the heart of behavioral and experimental economics is the goal to better understand human behavior through observation, in order to improve economic theories. One way to approach this heterogeneity is to acknowledge that decision makers differ from each other in fundamental ways and these differences contribute to the differences in observed financial behavior. The aim of this paper was to better understand the heterogeneous non-cognitive processes that underlie financial behavior and financial well-being, with a specific focus on self-control.

4.1. Main findings

Self-control influences people's financial behavior as well as their subjectively perceived financial well-being. Respondents with good self-control were more likely to regularly save money from their pay-checks, which means that they are better prepared to manage unforeseen expenses and more likely to have enough money for their retirement. This finding is in line with the BLC hypothesis and previous research (Ameriks et al., 2007; Biljanovska and Palligkinis, 2015; Rha et al., 2006). When we extended the analysis from savings behavior to general financial behavior, we observed that self-control also has a positive effect on general financial behavior. This result holds even when controlling for other variables, such as financial literacy and income, which previously have been shown to affect financial behavior.

Apart from being positively associated with good financial behavior, self-control affected both aspects of financial well-being (financial anxiety and perceived financial security) that we were interested in. It had a positive effect on financial security while affecting financial anxiety negatively. Thus, we can conclude that self-control has a positive effect not only on financial behavior but also on financial well-being. For a better understanding of this finding, future studies should investigate if self-control has an immediate effect on financial well-being or if the effect comes from good self-control leading to better financial behavior, which has a positive effect on financial well-being.

This study has shown that self-control predicts sound financial behavior and financial well-being. However, there are also other non-cognitive factors, such as optimism and deliberative thinking, that seem to influence respondents' financial behavior and financial well-being. Respondents who were more optimistic demonstrated better financial behavior, were less anxious about financial matters, and were more confident about their financial situation. Respondents scoring high on the optimism scale had a more positive view of their life and assumed to a greater extent than others that good things will happen to them. Respondents who assumed that good things will happen to them were probably less likely to worry about the future. Respondents scoring high on the deliberative thinking scale were more likely to make plans and analyze problems which have positive effects on financial behavior and perceived financial security. However, we found no evidence of deliberative thinking affecting financial anxiety.

Self-control, optimism and deliberative thinking are three unrelated factors that affect financial behavior and financial well-being. Several previous studies have looked at these constructs separately or only studied the effect of financial literacy on financial behavior which might lead to biased results. Future studies should look more closely into which cognitive and non-cognitive skills that influence people's behavior and their well-being. This is knowledge crucial if we want to be able to help people make better financial decisions and decisions that increase their well-being.

4.2. Limitations

Some limitations should be noted. First, the survey is based on self-reported data, which might suffer from social desirability issues. Another potential limitation that occurs when dealing with self-reported data is that the results might be influenced by people misunderstanding the questions or knowingly or unknowingly giving inaccurate information. Second, although we have included more personal characteristics than several other studies, there is still a possibility that our results suffer from omitted variable bias. Joshi and Fast (2013) showed for example that people with perceived power in their work place have higher life-time savings, even when controlling for income and socioeconomic status.

4.3. Conclusion

The BLC hypothesis states that self-control has a positive effect on savings behavior. The results of our study are in line with this hypothesis, but they also show that self-control has a positive effect on general financial behavior, which implies that self-control has an even greater effect on financial behavior than the BLC hypothesis suggests. Additionally, people with good self-control suffer from less anxiety connected to financial matters and are more secure and confident in their current and future financial situation. Apart from the impact of self-control on financial behavior and financial well-being, we have found that the two related constructs of optimism and deliberative thinking also affect financial behavior and financial well-being. This is a first step on the road to understand the underlying factors of the heterogeneous financial behaviors of decision makers.

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